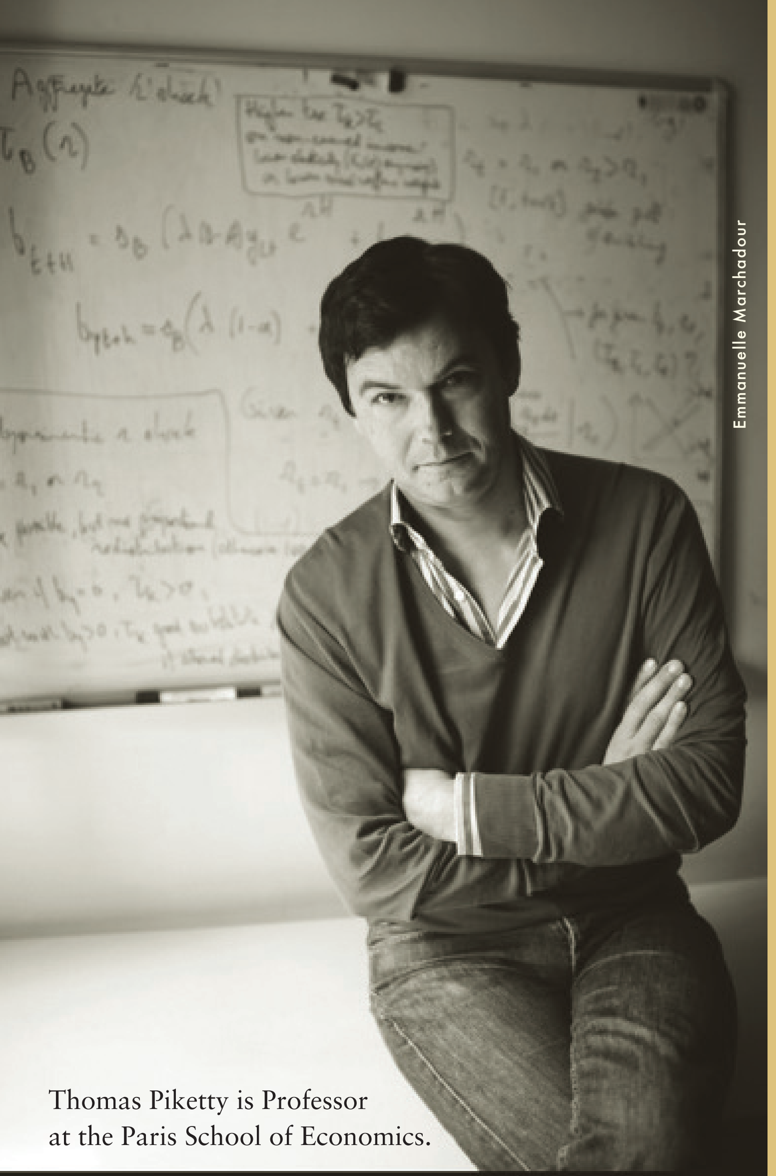

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THE BELKNAP PRESS OF
HARVARD UNIVERSITY PRESS
CAMBRIDGE, MASSACHUSETTS
LONDON, ENGLAND
www.hup.harvard.edu

Jacket design: Graciela Galup

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ISBN 978-0-674-43000-6
90000
9 780674 430006

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CAPITAL

in the Twenty-First Century

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CAPITAL

in the Twenty-First Century

THOMAS PIKETTY

TRANSLATED BY ARTHUR GOLDHAMMER

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What are the grand dynamics that drive the accumulation and distribution of capital? Questions about the long-term evolution of inequality, the concentration of wealth, and the prospects for economic growth lie at the heart of political economy. But satisfactory answers have been hard to find for lack of adequate data and clear guiding theories. In *Capital in the Twenty-First Century,* Thomas Piketty analyzes a unique collection of data from twenty countries, ranging as far back as the eighteenth century, to uncover key economic and social patterns. His findings will transform debate and set the agenda for the next generation of thought about wealth and inequality.

Piketty shows that modern economic growth and the diffusion of knowledge have allowed us to avoid inequalities on the apocalyptic scale predicted by Karl Marx. But we have not modified the deep structures of capital and inequality as much as we thought in the optimistic decades following World War II. The main driver of inequality—the tendency of returns on capital to exceed the rate of economic growth—today threatens to generate extreme inequalities that stir discontent and undermine democratic values. But economic trends are not acts of God. Political action has curbed dangerous inequalities in the past, Piketty says, and may do so again.

A work of extraordinary ambition, originality, and rigor, *Capital in the Twenty-First Century* reorients our understanding of economic history and confronts us with sobering lessons for today.

Introduction

"Social distinctions can be based only on common utility."
—Declaration of the Rights of Man and the Citizen, article 1, 1789

The distribution of wealth is one of today's most widely discussed and controversial issues. But what do we really know about its evolution over the long term? Do the dynamics of private capital accumulation inevitably lead to the concentration of wealth in ever fewer hands, as Karl Marx believed in the nineteenth century? Or do the balancing forces of growth, competition, and technological progress lead in later stages of development to reduced inequality and greater harmony among the classes, as Simon Kuznets thought in the twentieth century? What do we really know about how wealth and income have evolved since the eighteenth century, and what lessons can we derive from that knowledge for the century now under way?

These are the questions I attempt to answer in this book. Let me say at once that the answers contained herein are imperfect and incomplete. But they are based on much more extensive historical and comparative data than were available to previous researchers, data covering three centuries and more than twenty countries, as well as on a new theoretical framework that affords a deeper understanding of the underlying mechanisms. Modern economic growth and the diffusion of knowledge have made it possible to avoid the Marxist apocalypse but have not modified the deep structures of capital and inequality—or in any case not as much as one might have imagined in the optimistic decades following World War II. When the rate of return on capital exceeds the rate of growth of output and income, as it did in the nineteenth century and seems quite likely to do again in the twenty-first, capitalism automatically generates arbitrary and unsustainable inequalities that radically undermine the meritocratic values on which democratic societies are based. There are nevertheless ways democracy can regain control over capitalism and ensure that the general interest takes precedence over private interests, while preserving economic openness and avoiding protectionist and nationalist reactions. The policy recommendations I propose later in the book tend in this direction. They are based on lessons derived from historical experience, of which what follows is essentially a narrative.

A Debate without Data?

Intellectual and political debate about the distribution of wealth has long been based on an abundance of prejudice and a paucity of fact.

To be sure, it would be a mistake to underestimate the importance of the intuitive knowledge that everyone acquires about contemporary wealth and income levels, even in the absence of any theoretical framework or statistical analysis. Film and literature, nineteenth-century novels especially, are full of detailed information about the relative wealth and living standards of different social groups, and especially about the deep structure of inequality, the way it is justified, and its impact on individual lives. Indeed, the novels of Jane Austen and Honoré de Balzac paint striking portraits of the distribution of wealth in Britain and France between 1790 and 1830. Both novelists were intimately acquainted with the hierarchy of wealth in their respective societies. They grasped the hidden contours of wealth and its inevitable implications for the lives of men and women, including their marital strategies and personal hopes and disappointments. These and other novelists depicted the effects of inequality with a verisimilitude and evocative power that no statistical or theoretical analysis can match.

Indeed, the distribution of wealth is too important an issue to be left to economists, sociologists, historians, and philosophers. It is of interest to everyone, and that is a good thing. The concrete, physical reality of inequality is visible to the naked eye and naturally inspires sharp but contradictory political judgments. Peasant and noble, worker and factory owner, waiter and banker: each has his or her own unique vantage point and sees important aspects of how other people live and what relations of power and domination exist between social groups, and these observations shape each person's judgment of what is and is not just. Hence there will always be a fundamentally subjective and psychological dimension to inequality, which inevitably gives rise to political conflict that no purportedly scientific analysis can alleviate. Democracy will never be supplanted by a republic of experts—and that is a very good thing.

Nevertheless, the distribution question also deserves to be studied in a systematic and methodical fashion. Without precisely defined sources, methods, and concepts, it is possible to see everything and its opposite. Some people believe that inequality is always increasing and that the world is by definition always becoming more unjust. Others believe that inequality is naturally decreasing, or that harmony comes about automatically, and that in any case nothing should be done that might risk disturbing this happy equilibrium. Given this dialogue of the deaf, in which each camp justifies its own intellectual laziness by pointing to the laziness of the other, there is a role for research that is at least systematic and methodical if not fully scientific. Expert analysis will never put an end to the violent political conflict that inequality inevitably instigates. Social scientific research is and always will be tentative and imperfect. It does not claim to transform economics, sociology, and history into exact sciences. But by patiently searching for facts and patterns and calmly analyzing the economic, social, and political mechanisms that might explain them, it can inform democratic debate and focus attention on the right questions. It can help to redefine the terms of debate, unmask certain preconceived or fraudulent notions, and subject all positions to constant critical scrutiny. In my view, this is the role that intellectuals, including social scientists, should play, as citizens like any other but with the good fortune to have more time than others to devote themselves to study (and even to be paid for it—a signal privilege).

There is no escaping the fact, however, that social science research on the distribution of wealth was for a long time based on a relatively limited set of firmly established facts together with a wide variety of purely theoretical speculations. Before turning in greater detail to the sources I tried to assemble in preparation for writing this book, I want to give a quick historical overview of previous thinking about these issues.

Malthus, Young, and the French Revolution

When classical political economy was born in England and France in the late eighteenth and early nineteenth century, the issue of distribution was already one of the key questions. Everyone realized that radical transformations were under way, precipitated by sustained demographic growth—a previously unknown phenomenon—coupled with a rural exodus and the advent of the Industrial Revolution. How would these upheavals affect the distribution of wealth, the social structure, and the political equilibrium of European society?

For Thomas Malthus, who in 1798 published his *Essay on the Principle of Population,* there could be no doubt: the primary threat was overpopulation.[1] Although his sources were thin, he made the best he could of them. One particularly important influence was the travel diary published by Arthur Young, an English agronomist who traveled extensively in France, from Calais to the Pyrenees and from Brittany to Franche-Comté, in 1787–1788, on the eve of the Revolution. Young wrote of the poverty of the French countryside.

His vivid essay was by no means totally inaccurate. France at that time was by far the most populous country in Europe and therefore an ideal place to observe. The kingdom could already boast of a population of 20 million in 1700, compared to only 8 million for Great Britain (and 5 million for England alone). The French population increased steadily throughout the eighteenth century, from the end of Louis XIV's reign to the demise of Louis XVI, and by 1780 was close to 30 million. There is every reason to believe that this unprecedentedly rapid population growth contributed to a stagnation of agricultural wages and an increase in land rents in the decades prior to the explosion of 1789. Although this demographic shift was not the sole cause of the French Revolution, it clearly contributed to the growing unpopularity of the aristocracy and the existing political regime.

Nevertheless, Young's account, published in 1792, also bears the traces of nationalist prejudice and misleading comparison. The great agronomist found the inns in which he stayed thoroughly disagreeable and disliked the manners of the women who waited on him. Although many of his observations were banal and anecdotal, he believed he could derive universal consequences from them. He was mainly worried that the mass poverty he witnessed would lead to political upheaval. In particular, he was convinced that only the English political system, with separate houses of Parliament for aristocrats and commoners and veto power for the nobility, could allow for harmonious and peaceful development led by responsible people. He was convinced that France was headed for ruin when it decided in 1789–1790 to allow both aristocrats and commoners to sit in a single legislative body. It is no exaggeration to say that his whole account was overdetermined by his fear of revolution in France. Whenever one speaks about the distribution of wealth, politics is never very far behind, and it is difficult for anyone to escape contemporary class prejudices and interests.

When Reverend Malthus published his famous *Essay* in 1798, he reached conclusions even more radical than Young's. Like his compatriot, he was very afraid of the new political ideas emanating from France, and to reassure himself that there would be no comparable upheaval in Great Britain he argued that all welfare assistance to the poor must be halted at once and that reproduction by the poor should be severely scrutinized lest the world succumb to overpopulation leading to chaos and misery. It is impossible to understand Malthus's exaggeratedly somber predictions without recognizing the way fear gripped much of the European elite in the 1790s.

Ricardo: The Principle of Scarcity

In retrospect, it is obviously easy to make fun of these prophecies of doom. It is important to realize, however, that the economic and social transformations of the late eighteenth and early nineteenth centuries were objectively quite impressive, not to say traumatic, for those who witnessed them. Indeed, most contemporary observers—and not only Malthus and Young—shared relatively dark or even apocalyptic views of the long-run evolution of the distribution of wealth and class structure of society. This was true in particular of David Ricardo and Karl Marx, who were surely the two most influential economists of the nineteenth century and who both believed that a small social group—landowners for Ricardo, industrial capitalists for Marx—would inevitably claim a steadily increasing share of output and income.[2]

For Ricardo, who published his *Principles of Political Economy and Taxation* in 1817, the chief concern was the long-term evolution of land prices and land rents. Like Malthus, he had virtually no genuine statistics at his disposal. He nevertheless had intimate knowledge of the capitalism of his time. Born into a family of Jewish financiers with Portuguese roots, he also seems to have had fewer political prejudices than Malthus, Young, or Smith. He was influenced by the Malthusian model but pushed the argument farther. He was above all interested in the following logical paradox. Once both population and output begin to grow steadily, land tends to become increasingly scarce relative to other goods. The law of supply and demand then implies that the price of land will rise continuously, as will the rents paid to landlords. The landlords will therefore claim a growing share of national income, as the share available to the rest of the population decreases, thus upsetting the social equilibrium. For Ricardo, the only logically and politically acceptable answer was to impose a steadily increasing tax on land rents.

This somber prediction proved wrong: land rents did remain high for an extended period, but in the end the value of farm land inexorably declined relative to other forms of wealth as the share of agriculture in national income decreased. Writing in the 1810s, Ricardo had no way of anticipating the importance of technological progress or industrial growth in the years ahead. Like Malthus and Young, he could not imagine that humankind would ever be totally freed from the alimentary imperative.

His insight into the price of land is nevertheless interesting: the "scarcity principle" on which he relied meant that certain prices might rise to very high levels over many decades. This could well be enough to destabilize entire societies. The price system plays a key role in coordinating the activities of millions of individuals—indeed, today, billions of individuals in the new global economy. The problem is that the price system knows neither limits nor morality.

It would be a serious mistake to neglect the importance of the scarcity principle for understanding the global distribution of wealth in the twenty-first century. To convince oneself of this, it is enough to replace the price of farmland in Ricardo's model by the price of urban real estate in major world capitals, or, alternatively, by the price of oil. In both cases, if the trend over the period 1970–2010 is extrapolated to the period 2010–2050 or 2010–2100, the result is economic, social, and political disequilibria of considerable magnitude, not only between but within countries—disequilibria that inevitably call to mind the Ricardian apocalypse.

To be sure, there exists in principle a quite simple economic mechanism that should restore equilibrium to the process: the mechanism of supply and demand. If the supply of any good is insufficient, and its price is too high, then demand for that good should decrease, which should lead to a decline in its price. In other words, if real estate and oil prices rise, then people should move to the country or take to traveling about by bicycle (or both). Never mind that such adjustments might be unpleasant or complicated; they might also take decades, during which landlords and oil well owners might well accumulate claims on the rest of the population so extensive that they could easily come to own everything that can be owned, including rural real estate and bicycles, once and for all.[3] As always, the worst is never certain to arrive.

It is much too soon to warn readers that by 2050 they may be paying rent to the emir of Qatar. I will consider the matter in due course, and my answer will be more nuanced, albeit only moderately reassuring. But it is important for now to understand that the interplay of supply and demand in no way rules out the possibility of a large and lasting divergence in the distribution of wealth linked to extreme changes in certain relative prices. This is the principal implication of Ricardo's scarcity principle. But nothing obliges us to roll the dice.

Marx: The Principle of Infinite Accumulation

By the time Marx published the first volume of *Capital* in 1867, exactly one-half century after the publication of Ricardo's *Principles,* economic and social realities had changed profoundly: the question was no longer whether farmers could feed a growing population or land prices would rise sky high but rather how to understand the dynamics of industrial capitalism, now in full blossom.

The most striking fact of the day was the misery of the industrial proletariat. Despite the growth of the economy, or perhaps in part because of it, and because, as well, of the vast rural exodus owing to both population growth and increasing agricultural productivity, workers crowded into urban slums. The working day was long, and wages were very low. A new urban misery emerged, more visible, more shocking, and in some respects even more extreme than the rural misery of the Old Regime. *Germinal, Oliver Twist,* and *Les Misérables* did not spring from the imaginations of their authors, any more than did laws limiting child labor in factories to children older than eight (in France in 1841) or ten in the mines (in Britain in 1842). Dr. Villermé's *Tableau de l'état physique et moral des ouvriers employés dans les manufactures,* published in France in 1840 (leading to the passage of a timid new child labor law in 1841), described the same sordid reality as *The Condition of the Working Class in England,* which Friedrich Engels published in 1845.[4]

In fact, all the historical data at our disposal today indicate that it was not until the second half—or even the final third—of the nineteenth century that a significant rise in the purchasing power of wages occurred. From the first to the sixth decade of the nineteenth century, workers' wages stagnated at very low levels—close or even inferior to the levels of the eighteenth and previous centuries. This long phase of wage stagnation, which we observe in Britain as well as France, stands out all the more because economic growth was accelerating in this period. The capital share of national income—industrial profits, land rents, and building rents—insofar as can be estimated with the imperfect sources available today, increased considerably in both countries in the first half of the nineteenth century.[5] It would decrease slightly in the final decades of the nineteenth century, as wages partly caught up with growth. The data we have assembled nevertheless reveal no structural decrease in inequality prior to World War I. What we see in the period 1870–1914 is at best a stabilization of inequality at an extremely high level, and in certain respects an endless inegalitarian spiral, marked in particular by increasing concentration of wealth. It is quite difficult to say where this trajectory would have led without the major economic and political shocks initiated by the war. With the aid of historical analysis and a little perspective, we can now see those shocks as the only forces since the Industrial Revolution powerful enough to reduce inequality.

In any case, capital prospered in the 1840s and industrial profits grew, while labor incomes stagnated. This was obvious to everyone, even though in those days aggregate national statistics did not yet exist. It was in this context that the first communist and socialist movements developed. The central argument was simple: What was the good of industrial development, what was the good of all the technological innovations, toil, and population movements if, after half a century of industrial growth, the condition of the masses was still just as miserable as before, and all lawmakers could do was prohibit factory labor by children under the age of eight? The bankruptcy of the existing economic and political system seemed obvious. People therefore wondered about its long-term evolution: what could one say about it?

This was the task Marx set himself. In 1848, on the eve of the "spring of nations" (that is, the revolutions that broke out across Europe that spring), he published *The Communist Manifesto,* a short, hard-hitting text whose first chapter began with the famous words "A specter is haunting Europe—the specter of communism."[6] The text ended with the equally famous prediction of revolution: "The development of Modern Industry, therefore, cuts from under its feet the very foundation on which the bourgeoisie produces and appropriates products. What the bourgeoisie therefore produces, above all, are

its own gravediggers. Its fall and the victory of the proletariat are equally inevitable."

Over the next two decades, Marx labored over the voluminous treatise that would justify this conclusion and propose the first scientific analysis of capitalism and its collapse. This work would remain unfinished: the first volume of *Capital* was published in 1867, but Marx died in 1883 without having completed the two subsequent volumes. His friend Engels published them posthumously after piecing together a text from the sometimes obscure fragments of manuscript Marx had left behind.

Like Ricardo, Marx based his work on an analysis of the internal logical contradictions of the capitalist system. He therefore sought to distinguish himself from both bourgeois economists (who saw the market as a self-regulated system, that is, a system capable of achieving equilibrium on its own without major deviations, in accordance with Adam Smith's image of "the invisible hand" and Jean-Baptiste Say's "law" that production creates its own demand), and utopian socialists and Proudhonians, who in Marx's view were content to denounce the misery of the working class without proposing a truly scientific analysis of the economic processes responsible for it.[7] In short, Marx took the Ricardian model of the price of capital and the principle of scarcity as the basis of a more thorough analysis of the dynamics of capitalism in a world where capital was primarily industrial (machinery, plants, etc.) rather than landed property, so that in principle there was no limit to the amount of capital that could be accumulated. In fact, his principal conclusion was what one might call the "principle of infinite accumulation," that is, the inexorable tendency for capital to accumulate and become concentrated in ever fewer hands, with no natural limit to the process. This is the basis of Marx's prediction of an apocalyptic end to capitalism: either the rate of return on capital would steadily diminish (thereby killing the engine of accumulation and leading to violent conflict among capitalists), or capital's share of national income would increase indefinitely (which sooner or later would unite the workers in revolt). In either case, no stable socioeconomic or political equilibrium was possible.

Marx's dark prophecy came no closer to being realized than Ricardo's. In the last third of the nineteenth century, wages finally began to increase: the improvement in the purchasing power of workers spread everywhere, and this changed the situation radically, even if extreme inequalities persisted and in some respects continued to increase until World War I. The communist revolution did indeed take place, but in the most backward country in Europe, Russia, where the Industrial Revolution had scarcely begun, whereas the most advanced European countries explored other, social democratic avenues—fortunately for their citizens. Like his predecessors, Marx totally neglected the possibility of durable technological progress and steadily increasing productivity, which is a force that can to some extent serve as a counterweight to the process of accumulation and concentration of private capital. He no doubt lacked the statistical data needed to refine his predictions. He probably suffered as well from having decided on his conclusions in 1848, before embarking on the research needed to justify them. Marx evidently wrote in great political fervor, which at times led him to issue hasty pronouncements from which it was difficult to escape. That is why economic theory needs to be rooted in historical sources that are as complete as possible, and in this respect Marx did not exploit all the possibilities available to him.[8] What is more, he devoted little thought to the question of how a society in which private capital had been totally abolished would be organized politically and economically—a complex issue if ever there was one, as shown by the tragic totalitarian experiments undertaken in states where private capital was abolished.

Despite these limitations, Marx's analysis remains relevant in several respects. First, he began with an important question (concerning the unprecedented concentration of wealth during the Industrial Revolution) and tried to answer it with the means at his disposal: economists today would do well to take inspiration from his example. Even more important, the principle of infinite accumulation that Marx proposed contains a key insight, as valid for the study of the twenty-first century as it was for the nineteenth and in some respects more worrisome than Ricardo's principle of scarcity. If the rates of population and productivity growth are relatively low, then accumulated wealth naturally takes on considerable importance, especially if it grows to extreme proportions and becomes socially destabilizing. In other words, low growth cannot adequately counterbalance the Marxist principle of infinite accumulation: the resulting equilibrium is not as apocalyptic as the one predicted by Marx but is nevertheless quite disturbing. Accumulation ends at a finite level, but that level may be high enough to be destabilizing. In particular, the very high level of private wealth that has been attained since the 1980s and 1990s in the wealthy countries of Europe and in Japan, measured in years of national income, directly reflects the Marxian logic.

From Marx to Kuznets, or Apocalypse to Fairy Tale

Turning from the nineteenth-century analyses of Ricardo and Marx to the twentieth-century analyses of Simon Kuznets, we might say that economists' no doubt overly developed taste for apocalyptic predictions gave way to a similarly excessive fondness for fairy tales, or at any rate happy endings. According to Kuznets's theory, income inequality would automatically decrease in advanced phases of capitalist development, regardless of economic policy choices or other differences between countries, until eventually it stabilized at an acceptable level. Proposed in 1955, this was really a theory of the magical postwar years referred to in France as the "Trente Glorieuses," the thirty glorious years from 1945 to 1975.[9] For Kuznets, it was enough to be patient, and before long growth would benefit everyone. The philosophy of the moment was summed up in a single sentence: "Growth is a rising tide that lifts all boats." A similar optimism can also be seen in Robert Solow's 1956 analysis of the conditions necessary for an economy to achieve a "balanced growth path," that is, a growth trajectory along which all variables—output, incomes, profits, wages, capital, asset prices, and so on—would progress at the same pace, so that every social group would benefit from growth to the same degree, with no major deviations from the norm.[10] Kuznets's position was thus diametrically opposed to the Ricardian and Marxist idea of an inegalitarian spiral and antithetical to the apocalyptic predictions of the nineteenth century.

In order to properly convey the considerable influence that Kuznets's theory enjoyed in the 1980s and 1990s and to a certain extent still enjoys today, it is important to emphasize that it was the first theory of this sort to rely on a formidable statistical apparatus. It was not until the middle of the twentieth century, in fact, that the first historical series of income distribution statistics became available with the publication in 1953 of Kuznets's monumental *Shares of Upper Income Groups in Income and Savings*. Kuznets's series dealt with only one country (the United States) over a period of thirty-five years (1913–1948). It was nevertheless a major contribution, which drew on two sources of data totally unavailable to nineteenth-century authors: US federal income tax returns (which did not exist before the creation of the income tax

Notes

In order to avoid burdening the text and endnotes with technical matters, precise details concerning historical sources, bibliographic references, statistical methods, and mathematical models have been included in a technical appendix, which can be accessed on the Internet at http://piketty.pse.ens.fr/capital21c.

In particular, the online technical appendix contains the data from which the graphs in the text were constructed, along with detailed descriptions of the relevant sources and methods. The bibliographic references and endnotes in the text have been pared down as much as possible, with more detailed references relegated to this appendix. It also contains a number of supplementary tables and figures, some of which are referred to in the notes (e.g., "see Supplementary Figure S1.1," in Chapter 1, note 21). The online technical appendix and Internet site were designed as a complement to the book, which can thus be read on several levels.

Interested readers will also find online all relevant data files (mainly in Excel or Stata format), programs, mathematical formulas and equations, references to primary sources, and links to more technical papers on which this book draws.

My goal in writing was to make this book accessible to people without any special technical training, while the book together with the technical appendix should satisfy the demands of specialists in the field. This procedure will also allow me to post revised online versions and updates of the tables, graphs, and technical apparatus. I welcome input from readers of the book or website, who can send comments and criticisms to piketty@ens.fr.

Introduction

1. The English economist Thomas Malthus (1766–1834) is considered to be one of the most influential members of the "classical" school, along with Adam Smith (1723–1790) and David Ricardo (1772–1823).
2. There is of course a more optimistic school of liberals: Adam Smith seems to belong to it, and in fact he never really considered the possibility that the distribution of wealth might grow more unequal over the long run. The same is true of Jean-Baptiste Say (1767–1832), who also believed in natural harmony.
3. The other possibility is to increase supply of the scarce good, for example by finding new oil deposits (or new sources of energy, if possible cleaner than oil), or by moving toward a more dense urban environment (by constructing high-rise housing, for example), which raises other difficulties. In any case, this, too, can take decades to accomplish.
4. Friedrich Engels (1820–1895), who had direct experience of his subject, would become the friend and collaborator of the German philosopher and economist Karl

Marx (1818–1883). He settled in Manchester in 1842, where he managed a factory owned by his father.

5. The historian Robert Allen recently proposed to call this long period of wage stagnation "Engels' pause." See Allen, "Engels' Pause: A Pessimist's Guide to the British Industrial Revolution," Oxford University Department of Economics Working Papers 315 (2007). See also "Engels' Pause: Technical Change, Capital Accumulation, and Inequality in the British Industrial Revolution," in *Explorations in Economic History* 46, no. 4 (October 2009): 418–35.
6. The opening passage continues: "All the powers of old Europe have entered into a holy alliance to exorcise this specter: Pope and Tsar, Metternich and Guizot, French Radicals and German police-spies." No doubt Marx's literary talent partially accounts for his immense influence.
7. In 1847 Marx published *The Misery of Philosophy,* in which he mocked Proudhon's *Philosophy of Misery,* which was published a few years earlier.
8. In Chapter 6 I return to the theme of Marx's use of statistics. To summarize: he occasionally sought to make use of the best available statistics of the day (which were better than the statistics available to Malthus and Ricardo but still quite rudimentary), but he usually did so in a rather impressionistic way and without always establishing a clear connection to his theoretical argument.
9. Simon Kuznets, "Economic Growth and Income Inequality," *American Economic Review* 45, no. 1 (1955): 1–28.
10. Robert Solow, "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics* 70, no. 1 (February 1956): 65–94.
11. See Simon Kuznets, *Shares of Upper Income Groups in Income and Savings* (Cambridge, MA: National Bureau of Economic Research, 1953). Kuznets was an American economist, born in Ukraine in 1901, who settled in the United States in 1922 and became a professor at Harvard after studying at Columbia University. He died in 1985. He was the first person to study the national accounts of the United States and the first to publish historical data on inequality.
12. Because it is often the case that only a portion of the population is required to file income tax returns, we also need national accounts in order to measure total income.
13. Put differently, the middle and working classes, defined as the poorest 90 percent of the US population, saw their share of national income increase from 50–55 percent in the 1910s and 1920s to 65–70 percent in the late 1940s.
14. See Kuznets, *Shares of Upper Income Groups,* 12–18. The Kuznets curve is sometimes referred to as "the inverted-U curve." Specifically, Kuznets suggests that growing numbers of workers move from the poor agricultural sector into the rich industrial sector. At first, only a minority benefits from the wealth of the industrial sector, hence inequality increases. But eventually everyone benefits, so inequality decreases. It should be obvious that this highly stylized mechanism can be generalized. For example, labor can be transferred between industrial sectors or between jobs that are more or less well paid.

15. It is interesting to note that Kuznets had no data to demonstrate the increase of inequality in the nineteenth century, but it seemed obvious to him (as to most observers) that such an increase had occurred.
16. As Kuznets himself put it: "This is perhaps 5 percent empirical information and 95 percent speculation, some of it possibly tainted by wishful thinking." See Kuznets, *Shares of Upper Income Groups,* 24–26.
17. "The future prospect of underdeveloped countries within the orbit of the free world" (28).
18. In these representative-agent models, which have become ubiquitous in economic teaching and research since the 1960s, one assumes from the outset that each agent receives the same wage, is endowed with the same wealth, and enjoys the same sources of income, so that growth proportionately benefits all social groups by definition. Such a simplification of reality may be justified for the study of certain very specific problems but clearly limits the set of economic questions one can ask.
19. Household income and budget studies by national statistical agencies rarely date back before 1970 and tend to seriously underestimate higher incomes, which is problematic because the upper income decile often owns as much as half the national wealth. Tax records, for all their limitations, tell us more about high incomes and enable us to look back a century in time.
20. See Thomas Piketty, *Les hauts revenus en France au 20e siècle: Inégalités et redistributions 1901–1998* (Paris: Grasset, 2001). For a summary, see "Income Inequality in France, 1901–1998," *Journal of Political Economy* 111, no. 5 (2003): 1004–42.
21. See Anthony Atkinson and Thomas Piketty, *Top Incomes over the Twentieth Century: A Contrast between Continental-European and English-Speaking Countries* (Oxford: Oxford University Press, 2007), and *Top Incomes: A Global Perspective* (Oxford: Oxford University Press, 2010).
22. See Thomas Piketty and Emmanuel Saez, "Income Inequality in the United States, 1913–1998," *Quarterly Journal of Economics* 118, no. 1 (February 2003): 1–39.
23. A complete bibliography is available in the online technical appendix. For an overview, see also Anthony Atkinson, Thomas Piketty, and Emmanuel Saez, "Top Incomes in the Long-Run of History," *Journal of Economic Literature* 49, no. 1 (March 2011): 3–71.
24. It is obviously impossible to give a detailed account of each country in this book, which offers a general overview. Interested readers can turn to the complete data series, which are available online at the WTID website (http://topincomes.parisschoolofeconomics.eu) as well as in the more technical books and articles cited above. Many texts and documents are also available in the online technical appendix (http://piketty.pse.ens.fr/capital21c).
25. The WTID is currently being transformed into the World Wealth and Income Database (WWID), which will integrate the three subtypes of complementary data. In this book I will present an overview of the information that is currently available.