



# The Lever of Riches: Technological Creativity and Economic Progress

*Joel Mokyr*

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What were the causes of technological creativity? Mokyr distinguishes between the relationship of inventors and their physical environment--which determined their willingness to challenge nature--and the social environment, which determined the openness to new ideas. He discusses a long list of such factors, showing how they interact to help or hinder a nation's creativity, and then illustrates them by a number of detailed comparative studies, examining the differences between Europe and China, between classical antiquity and medieval Europe, and between Britain and the rest of Europe during the industrial revolution. He examines such aspects as the role of the state (the Chinese gave up a millennium-wide lead in shipping to the Europeans, for example, when an Emperor banned large ocean-going vessels), the impact of science, as well as religion, politics, and even nutrition. He questions the importance of such commonly-cited factors as the spill-over benefits of war, the abundance of natural resources, life expectancy, and labor costs. Today, an ever greater number of industrial economies are competing in the global market, locked in a struggle that revolves around technological ingenuity. *The Lever of Riches*, with its keen analysis derived from a sweeping survey of creativity throughout history, offers telling insights into the question of how Western economies can maintain, and developing nations can unlock, their creative potential.

## The Lever of Riches: Technological Creativity and Economic Progress Details

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# From Reader Review **The Lever of Riches: Technological Creativity and Economic Progress** for online ebook

## **Adora says**

A brief comparative history of technological progress (up to the 1990s) from an economic historian. In particular, why some societies are technically creative and why some are not. The part about Luddites is enlightening. The last chapter about how evolution framework maps to technological progress is a bit forced / dumb, best to skip it.

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## **Mk Miller says**

I prefer the way Fernand Braudel treats the economic history of technical innovation. Found this to be a little narrow. But I wanted to read Mokyr's Gifts of Athena instead of this, which I suspect is a bit more broad in scope.

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## **Jack says**

Where does innovation come from? Why were the classical civilizations able to flourish, create towering intellectual achievements in mathematics, law and philosophy, yet not develop much in the way of fundamentally new technology, nor particularly advance the standards of living of their people? Why was China able to lead the world for over a thousand years in new discoveries, then suddenly regress and involute, losing the most complex clock and best seafaring navy the world had seen? And how did a louse- and tb-infested runt end of the Eurasian land mass suddenly explode and take over nearly the entire known world?

These modest questions are at the heart of Mokyr's book. He wants to understand where innovation -- particularly sustained innovation -- comes from, and how it generates longterm economic growth. He wants to do so by looking hard at the history of technology, understanding it in the details to limit the facile one-off anecdote used to "prove" so many speculations.

The result is an impressive book. Mokyr lays out in about 150 pages a rough history of European technology from the classical era to World War I. He demonstrates, impressively, that science as often followed technology as lead it. He gives enough detail to really understand why some of the remarkable advances (now taken for granted) really were remarkable advances.

In the second half of the book he looks at existing explanations for innovation and economic growth. Pertinently, he is able to show that most of the ideas out there in the popular milieu are inconsistent with most of the historical record. His own answer is not entirely satisfying, but that's rather beside the point -- I think he would argue that sustained innovation and growth is about combination of individual remarkableness and inventiveness, in a society that nurtures, values and rewards such inventiveness, in an political culture that tolerates diversity and sustains property rights. But, again, Mokyr's answer isn't so much the point; rather, his incredibly clear thinking on the limitations of existing explanations, and remarkable condensation of so much historical material is worth the price of admission.

Now, truth requires me to point out this is not a book for everyone. The details get a little dense here and there. Mokyr is an economist, and this is an academic book written for social scientists. He presumes the reader has a working knowledge of microeconomics and transaction cost economics, and can recognize Smith and Schumpeter. The work does not have any mathematical formalism, mind you, so it is certainly readable by those with only a passing knowledge, and I think those readers would still enjoy it. But if you understand why quibbling that "sometimes there ARE free, or very cheap, lunches" would constitute apoplexy-inducing heresy in some circles, then you can really enjoy this book.

(This book is heavily leaned on by David Christian's Maps of Time An Introduction to Big History. It is substantially shorter, but more academic than that ambitious book -- if you found Christian hard-going, you'll probably not enjoy Mokyr. But if you liked Christian, you may love this book.)

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### **Igor says**

The first half, covering the history of technological progress through 1914, is fascinating. The other half lists all the theories that tried to explain technological creativity or lack of it, with pros and cons for each. Very interesting and readable book.

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### **Mark Isaak says**

A very thoughtful and well-written book about the factors which are responsible for helping and hindering technological advance. Mokyr does an excellent job of writing clearly about an issue which is extremely complex. Almost half of the book is devoted to a history of technological advance, from antiquity through the 19th century. This seemed excessive to me as I read it, but it is necessary to contextualize the examples which help make the analyses clear. Although Mokyr does dismiss some factors as unimportant (e.g. population growth) and call others essential (e.g. openness to new ideas), he does not shy from noting that most are more complicated and/or uncertain. The relationship between science and technology, for example, is not nearly as straightforward as I had thought. In a late chapter, he draws an extended analogy between change in technological ideas and biological evolution. Even here, he is scrupulous in detailing the limits to such an analogy and how it should \*not\* be used. This is not a book to turn to for simple answers. It is a book to turn to for real answers, insofar as they are possible.

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### **So Hakim says**

An interesting book about relationship between technological inventions and their economical impacts. Roughly divided into three parts:

- History of technological inventions (very compressed),
- Analysis of inventions' economical impacts,
- What is the possible mechanism behind it?

In world history, there is one big question, namely: how did the West rise as technological powerhouse? Why did Renaissance happen in Italy, and Industrial Revolution take place in England? While nowadays

taken for granted, those events were actually rather miraculous -- in that they defied the odds.

Those familiar with history of science will recall that, before Renaissance, there were two cultures unrivaled in their mastery of science and technology: Islamic and Chinese civilizations. Yet for some reason they *didn't* make the leap to industrialization. Instead the Europeans, who were comparatively backward, gained momentum to pass the two... and even weirder: the Muslims and Chinese just let themselves stagnate. Somehow they were reluctant to absorb or adapt 'Western' technologies.

In the end this bit them in the rear. European countries became superpower, eclipsing the glories of Muslims and Chinese, and the rest is history. But... *what the hell happened?*

Well, that question is among the topics Joel Mokyr investigated. His general theme can be summed thus: what is the relationship between people, technology, and their prosperity? Is there some law behind it?

Big part of the book is spent to analyze the rise of Industrialization in England. Why England, not France or Germany? (Some detailed explanation ensues)

Another part deals with The China Question. Why did this big civilization, who had compass, gunpowder, and big ships that ruled Pacific in 1400s, stop in its track? Here Mokyr details his fellow scholars' argument, agreeing with some, debunking others. In the end, though, there's no clear answer. At least not yet. Still, we are treated to what the experts think.

Unfortunately, Mokyr didn't talk much about the stagnation of Islamic culture which -- at least for me -- is as baffling as China's. In that era they were the best in mathematics; their astronomers revolted against Ptolemaic model (although not to the level of Copernicus'); their medical books went on to inspire European doctors. Yet they failed. Surely this idiosyncrasy deserves a chapter or two.

All in all, though, Mokyr built and presented his case well. Clearly there is interplay between technological advancement and a culture's political and economical prowess. What *exactly* it is, still rather vague -- I don't think he cracked it. But in following him, we glimpse clearer picture of it.

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### **David says**

super academic, slow reading but great.

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### **Bradleypeacock says**

An interesting reading, this book challenges some economic assumptions; for example, that there are no such thing as a free lunch. He argues that technological advancement spurred by creative innovation creates free lunch for the society through rising living standards.

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### **Jerry Ward says**

I could not improve on the Jack's excellent review of Joel Mokyr's *The Lever of Riches*. I will just add a few

thoughts.

In my judgment Prof. Mokyr appears to have underestimated the important and fundamental significance of the steam engine, the iconic invention of the Industrial Revolution. He noted its original use in pumping water out of coal mines, and that “it was the first economically useful transformation of thermal energy (heat) into kinetic energy (work).” (p. 85 of the paperback).

He fails to amplify on the significance of this step: this discovery opened the door to the use of new sources of energy. Until the steam engine, Europe’s primary source of power on land was the muscles of the horse (and when nature obliged, wind and gravity acting on water). Muscle—derived from grass, oats, and hay—had gone about as far as it could go. The steam engine and its later progeny allowed the use of the much higher energy embodied in coal, oil, and (much later) nuclear fission.

I believe the fundamental importance of the Industrial Revolution was this huge magnification of the power made available by this switch in basic sources of energy. The dramatic increase it permitted in the productivity of labor was the central enabler of the hockey stick growth that started in the 19th century.

This criticism notwithstanding, *The Lever of Riches* is an important book, a tour de force. It conveys a message that more people need to understand: the central importance of innovation to our wealth today and in the future. Everyone pays lip service to the need for innovation, but few understand it well enough to translate that need into policy.

I have drawn heavily and gratefully from Prof. Mokyr’s work in my own book, *The Evolution of Wealth: An Economic History of Innovation and Capitalism, The Role of Government, and the Hazards of Democracy*.

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## **Rick says**

In a world of supercomputers, genetic engineering, and fiber optics, technological creativity is ever more the key to economic success. But why are some nations more creative than others, and why do some highly innovative societies--such as ancient China, or Britain in the industrial revolution--pass into stagnation? Beginning with a fascinating, concise history of technological progress, Mokyr sets the background for his analysis by tracing the major inventions and innovations that have transformed society since ancient Greece and Rome. What emerges from this survey is often surprising: the classical world, for instance, was largely barren of new technology, the relatively backward society of medieval Europe bristled with inventions, and the period between the Reformation and the Industrial Revolution was one of slow and unspectacular progress in technology, despite the tumultuous developments associated with the Voyages of Discovery and the Scientific Revolution.

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spill-over benefits of war, the abundance of natural resources, life expectancy, and labor costs. Today, an ever greater number of industrial economies are competing in the global market, locked in a struggle that revolves around technological ingenuity. *The Lever of Riches*, with its keen analysis derived from a sweeping survey of creativity throughout history, offers telling insights into the question of how Western economies can maintain, and developing nations can unlock, their creative potential.

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#### Review

"An excellent volume outlining in great detail, yet wide ranging in scope, the role of technological change in history. Will make a great supplemental text for our future World Economic History course that I'll be teaching."--Michael Hauptert, Univ. of Wisconsin-LaCrosse

"Mokyr has demonstrated, yet again, that he is one the best economic historians around. His book is a treasure trove of facts and insights about technological progress often overlooked in other accounts. Further, his argument that economics might do well to adopt the methodology of evolutionary biology instead of the standard application of Newtonian physics is cogent and convincing."--Howard Bodenhorn, St. Lawrence Univ.

"An informative and well-written study of humankind's progress."--J.M. Skaggs, Wichita State Univ.

"The history and the examples Mokyr uses are a delight to read."--Business Week

"Joel Mokyr is a first-rate scholar who has read a wide body of literature. The book is very well written, lively and engaging. It is closely reasoned and well executed"--Nathan Rosenberg, Stanford University

"Joel Mokyr likes telling his story and he tells it well; his book makes for good reading and rereading, and this in itself sets him apart from many of his fellow economic historians."--The New York Times Book Review

"[Mokyr's] examples are so comprehensive, his knowledge so detailed, and his conclusions so broad and firmly drawn that the reader comes away full of insight."--The Christian Science Monitor

"[A] rich, subtly flavored buffet of theories, ideas, insights and examples."--Wall Street Journal

"Lucid and accessible."--Reason

"Raise[s] some very insightful questions."--Informationweek

#### About the Author

Joel Mokyr is Professor of Economics and History at Northwestern University, and is the author of *Why Ireland Starved*, *The Economics of the Industrial Revolution*, and other books in economic history.

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#### **Chuck Kollars says**

About "technological change"; thorough, detailed, accurate, logical, very well organized, and an easy read, if



a bit dated a quarter century after its publication. The book revolves around "why did the Industrial Revolution happen in Great Britain and not somewhere else?". By way of background covers so much more though it's easy to forget that -- covers everything from the early Middle Ages through the 1980s, and all of the West; makes excursions into Rome, Greece, Islam, and China too.

The "life's work" of a professor in the field, partly from lecture notes and partly from fresh research. Very broad and deep, almost a survey of the field - yet extremely well organized and an easy read. It's refreshing to me to find a semi-academic book where it's easy to find things and where paragraphs actually have identifiable topic sentences. He dips fairly deeply into some other academic fields too (for example societal economics and biological evolution). He even contributes his own evaluations once in a while, and --unlike what usually happens when an academic strays into some other field-- his offerings seem knowledgeably accurate, well-reasoned, and helpful.

Much of what he says though lists others' theories of why the IR was in Britain, followed in each case by the reason that theory is wrong. And the extensive coverages of what were burning academic controversies at the time of publication seems irrelevant now. Most significantly for me, he never seriously covers -or in many cases even asks- the questions I really want to read about: 1] why do periods of technological change appear to have a "life arc" from birth to youth to adulthood to old age to death? 2] what is the relationship between the technological aspect and the societal aspect of change (i.e. just because it's technologically possible is it societally a good idea, and vice versa)? 3] how do technological improvements affect human-related values other than population and economic living standard? and 4] was the lack of an IR in China (and many other countries) the result of a conscious decision to not risk completely reorganizing that society?

He's very very careful about logical reasoning, something I generally applaud because it's all too rare even in academic circles. He often makes a theory look silly, then dismisses it, simply by pointing out the logical flaw in the reasoning behind it. But (and I didn't really understand until now) when this is used again and again throughout an entire book, it becomes tedious. This is particularly the case because his one big positive contribution that would otherwise break up the naysaying is easy to thoroughly discount and even ignore, as it now feels strained and dead-end and not very useful. (In brief, his big positive contribution is analogizing technological change to biological evolution.)

All in all, my suggestion is to make your default behavior skimming rather quickly, then slow down and dig in whenever something interests you.

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### **Jim Angstadt says**

Linking technology and progress just makes sense. Understanding why seems like a worth goal.  
But, my goodness, this book is slow and boring.  
Bailed

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### **David says**

A classic look at the evolution of technology from an economic historians perspective. Engagingly written and erudite.

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## **Bertrand says**

Mokyr is an accessible, relatively jargon-free and not overly dogmatic economic historian. *The Lever of Riches* strikes the right balance between historical narrative and a modicum of economic theory, in order to defend a vision of growth which I think I am not entirely in agreement with, but which is well argued, coherent and which readily acknowledges its critics.

The author identifies early on four vectors of economic growth: investment (increased availability of funds), commercial expansion (opening of new markets), population growth (encouraging the division of labour) and, finally, what he terms 'Schumpeterian growth', essentially growth driven by technological progress, that is, by 'any change in the application of information to the production process in such a way as to increase efficiency, resulting either in the production of a given output with fewer resources (i.e. lower costs), or the production of better or new products' (6). As such, then, it does not entail scientific 'discovery' but rather, often, the novel application of existing knowledge. Mokyr claims that technological change is 'spasmodic' - concentrated in specific periods (a comparison with Kuhn's time-table of scientific revolutions would be interesting!) and for most of history was rarely the result of rational planning but is rather the result of 'creativity', 'an attack by an individual on a constraint that everyone else takes as given'(9). He divides technological change between innovation, the spread of best practices which he finds to be social and collective, and invention, which is some sort of qualitative leap taken by Great Men, and as such is a more individual and maybe heroic feat: That's the bit I am not too comfortable with: too Schumpeterian probably. This solitary inventor struggling to tease out the secrets of nature (11) sounds to me like the not-so-unlikely love-child of a romantic artist and a captain of industry (Doctor Frankenstein or Elon Musk, take your pick!) The two aspects, collective innovation and solitary invention, however, are deeply intertwined, so that the growth of the one without the other is at best unlikely. Innovation, then, the spread of best-practices and technological know-how, is crucial, and luckily is the focus of most of the book. So even if, like me, you don't buy the whole solitary genius scenario, the book is still very much readable, enjoyable and informative! Mokyr identifies three necessary conditions for technological growth to take place: first, the presence in the given society of class willing to take risks and to challenge the common ways and beliefs. Second, economic and social institutions that encourage and incentivize such innovation. Third, a society that encourages diversity and tolerance. The book is divided in two parts, first a general and relatively rapid history of Western technology, from antiquity to the XXth century, which covers a wide range of topics and is both stimulating and accessible. The second part is composed of small comparative studies, tackling some of the most well known quandaries of world history: a comparison between classical and medieval technology, another between China's and Europe's 'Great divergence', and the last one tackling the question of why the Industrial Revolution took place in Britain rather than the continent.

All in all it's well written, it's polished and measured, a good introduction to the subject even for someone like me who knows next to nothing about either economic or technological history.

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## **Kelly says**

Starts off a bit dry, but really gets interesting. I learned a lot of interesting details about our historical technological progress, especially the Industrial Revolution at a more detailed level.

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