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The Rise of the West—or Not?
A Revision to Socio-economic History*

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The debate over the “Rise of the West” has generally been over which factor or factors—cultural, geographic, or material—in European history led Europe to diverge from the World’s pre-industrial civilizations. This article aims to shift the terms of the debate by arguing that there were no causal factors that made Europe’s industrialization inevitable or even likely. Rather, most of Europe would not and could not move toward industrialization any more than China or India or Japan. Rather, a very accidental combination of events in the late seventeenth century placed England on a peculiar path, leading to industrialization and constitutional democracy. These accidents included the compromise between the Anglican Church and Dissenters, and between Crown and Parliament, in the settlements of 1689; the adoption of Newtonian science as part of the cosmology of the Anglican Church and its spread to craftsmen and entrepreneurs throughout Britain; and the opportunity to apply the idea of the vacuum and mechanics to solve a particular technical problem: pumping water out of deep mine shafts in or near coal mines. Without these particular accidents of history, there is no reason to believe that Europe would have ever been more advanced than the leading Asian civilizations of the eighteenth and nineteenth centuries.

“Any number of individual factors have been cited to explain Western Europe’s peculiar path, but one suspects that an extraordinarily complex, poorly understood synergy was at work”

[Lieberman 1997:499]

“The study of technological progress is...a study of exceptionalism, of cases in which as a result of rare circumstances, the normal tendency of societies to slide toward stasis and equilibrium was [somehow] broken.”

[Mokyr 1990:16]

INTRODUCTION

Looking back at the past from the standpoint of the present, we believe we can sort out the pathways of various societies and determine what happened. However, while this is skill-

*SBeyond citations, I owe particular obligations to the work of Mark Elvin (1973), Daniel Chirot (1994), Randall Collins (1986), S.N. Eisenstadt (1995, 1998), and Michael Mann (1986). Their conversations, insights, and writings have provided a continual stimulation and inspiration for my efforts. I am also indebted to Harriet Zurndorfer, Peer Vries, and Wim van den Doel, who invited me to the University of Leiden for visits that greatly stimulated my thinking on this topic; to Ralph Crozier, who encouraged me to produce an earlier version of this article for a meeting of the World History Association in Vancouver, B.C., in June 1999; and to Jonathan Turner, who urged me to prepare this version for publication. Special thanks are due the colleagues who joined me in a conference at UC-Davis dealing with issues in modernization in October 1999, and to UCD deans Steve Sheffrin and Barbara Metcalf, the all-UC group in Economic History, and the American Sociological Association’s grants for Advancement of the Discipline which provided funds for the conference, thanks to the outstanding efforts of my colleague John R. Hall. Finally, this paper could not have been conceived or written without the outstanding scholarship, and the willingness to share that scholarship, of my friends and colleagues at UC-Davis, and in what I have come to call “The California School.”
fully done for individual national histories, and occasionally for regional histories (e.g. Europe, Latin America, east Asia), it is all too rarely done for world history. That is, we can readily find histories of economic and political development in Europe, or in Asia, and even comparisons of those trajectories. But what is not often undertaken is a rigorous, step-by-step investigation of how history unfolded in various regions from a global viewpoint (although see Frank, Wong, and Abu-Lughod for outstanding examples of such an approach).¹

Such an approach is particularly important for the history of Europe’s industrial development. This story is sometimes told from the perspective of England and its late-eighteenth-century industrialization, and sometimes told from a broader European perspective reaching back to the late Middle Ages. But either way, it is a European story that proceeds by connecting elements of the more distant European past to Europe in the late eighteenth century. Geographic, cultural, technical, or social factors that make European civilization “special” or unique are asserted. Comparisons then take the form of looking at other national or regional histories and finding differences: either “missing” facilitating elements or inherent “obstacles” that prevented similar industrial development outside of Europe.

A major problem with this approach to world history—comparing already-composed national and regional histories—is that it depends on the outcomes being known, and this biases our views. It becomes overwhelmingly tempting to emphasize elements of the past that seem well-connected to the present, and to ignore elements that lack such connections, and pronounce the former to be causally significant and the latter to be irrelevant. Often, what seems like a plausible connection is simply the result of our biases. As James Blaut² has so well pointed out, the European colonizers of the world have in fact done a similar colonization of history, marking out favored territory and “occupying” it with their selected facts to the exclusion of others.

To give a simple example, which dramatizes the way that facts are exaggerated or minimized, let us consider the connection between empiricism and medicine. Explanations for the rise of Europe often stress its “empiricism,” arguing that Chinese science, for example, was not empirical in the way that Western medicine was. Yet it now appears that Chinese traditional medicine, in particular, acupuncture and herbal remedies, was in fact based on remarkably precise empirical observation, whose value is being proven today even in the West.³ If Chinese medicine was often empirical and accurate, how can we simply dismiss all of Chinese science as “not empirical” and therefore fatally flawed?

Or again, David Landes⁴ poses the question of nineteenth-century European dominance in terms of Europeans’ eagerness to trade, asking why European (and American) sailing vessels called at Shanghai and Canton while no Chinese junks came to London. In fact, in the fourteenth century China sent forth the largest ships and greatest fleets the world had ever seen, voyaging from Japan to the coast of Africa. SENDING ships to London was well within China’s technological capabilities. After a few great voyages, however, Chinese shipping pulled back behind the Indian Ocean. Why didn’t China continue its voyages? Landes argued that China—governed by ignorant despots and lacking in thirst for profits or adventure—turned its back on maritime trade, dooming it to an inward, closed economy.

Yet China did nothing of the sort. To argue that China lost its maritime prowess because it ceased to send its own ships to Africa would be like arguing that the United States must

²Blaut 1993.
³Sivin 1990.
⁴Landes 1998.
have entered a sharp decline in its economic, trading, and technological capacity in the last decades of the twentieth century because after a bout of daring exploration in the 1970s, it completely ceased sending manned voyages to the moon. The Chinese ceased voyaging to the coast of Africa for the same reason the United States stopped sending men to the moon—there was nothing there to justify the costs of such voyages. The farther China sailed, the poorer and more barren the lands that they found. Goods of value came mainly from India and the Middle East, and they had already been pouring into China by established land and sea routes for hundreds of years. Rationally, what should the Chinese have done? The prevailing pattern of monsoon winds in East Asia, which blow south down the China coast and east from India, and then reverse, leads to a highly rational (and inexpensive) sailing pattern in which ships from China, India, and the Arab world converge on Malacca and Aceh in Southeast Asia, exchange their cargoes there, then sail home on favorable winds with the shift in seasons. Quite reasonably, Chinese maritime merchants therefore aimed to master the seas from Korea and Japan to the Philippines and southeast Asia, a mastery that they gained early and which provided China with a thriving international maritime trade well into the nineteenth century. The evidence for Chinese domination of Southeast Asian trade is still before us in the Chinese trading communities of Southeast Asia which from Singapore to Indonesia still dominate commercial enterprise in the region.

How can we overlook centuries of China’s dominance in Asian maritime trade? The answer is simply that, via hindsight, we have often drawn from China’s nineteenth-century “laggard” status the conclusion that China lacked capitalism. Indeed, even a generation of Chinese scholars, much as they borrowed clothing and technology from colonizers, adopted the European idea of Marxist stages of development and described their own nation as “feudal” until well into the twentieth century. In fact, China was the site of enormous capitalist enterprises, from the vast export-oriented ceramic works of the Ming, to the huge internal trade in cotton and cotton textiles, to the enormous internal trade in processed foods (e.g., soy sauce). Why doesn’t this tremendous capitalist activity stand out in world history? Because all too often, we view world history in terms of “winners” and “losers,” elevate to prominence much in the “winners’” history, and obscure or lose sight of similar items in the history of retrospective “losers.”

As a last warning, we can point to a few other errors that come from this retrospective approach. All too often, comparative historians extrapolate backwards into Chinese history a condition of being “overpopulated” and “undernourished.” True as these observations may be for late-nineteenth- and early-twentieth-century China, those decades were exceptional, not typical; as late as the end of the eighteenth century, southern England had equal or lesser levels of nutrition and agricultural output per capita than the major economic hub regions of China. Calculating per capita consumption of calories, of pounds of tea and of sugar, of clothing and of furniture, Kenneth Pomeranz has shown that in material terms, the average Chinese in the eighteenth-century lower Yangzi and coastal provinces was at least as well off as contemporary English. If the proof of this pudding is in the eating, then the Chinese apparently ate well enough to outlive Europeans: Life expectancies calculated for tens of thousands of Chinese from genealogies and village studies show that in the seventeenth and eighteenth centuries, Chinese males could ex-

Bentley 1998.
7Brook 1998.
9Pomeranz 2000.
pect to live into their late thirties at birth; roughly the same as the English into the late eighteenth century and substantially longer than the French and even the Dutch in the same period.\textsuperscript{10}

Indeed, this view of China as “overpopulated” led to the further erroneous belief that Europeans were somehow wiser, more prudent, more individualistic, or more “something” that enabled them to control fertility and restrict population growth while Chinese families bred without limit.\textsuperscript{11} We now know that while Chinese women married at younger ages than European women, the Chinese delayed childbearing longer after marriage, spaced their births further apart, and ended fertility at an earlier age than European women, and thus had on average the same size families as Europeans. It is true that northern Europeans restricted access to marriage, but Chinese families achieved the same fertility reductions by restrictions on fertility within marriage. Indeed, age-specific marital fertility for Chinese women in their twenties was only one-half that of married women in their twenties in Europe.\textsuperscript{12} For most of China’s imperial history, its population growth has been equal to or less than that of such European countries as England and Russia. For the two and a half centuries that led up to the Industrial Revolution in England, c. 1500–1750, England’s population grew much faster than that of China: England increased 150\% from 2.3 million to 5.7 million inhabitants; over the same period China grew only 100\% from 125 to 250 million.\textsuperscript{13} Thus, aggregate population growth was half again greater in England than in China over the long period preceding industrialization, and China—but not England—added substantial new territories to the north, west, and south during these centuries. It is thus impossible to claim that greater prudence or slower aggregate population increase was crucial to the emergence of industrialization in England, or to its absence in China: The facts are simply the opposite.

How could we miss such simple facts? Because of our eagerness to find “the factor” or factors that produce what from our present perspective appears as a powerfully convergent outcome, we grasp at any obvious factors that differentiate Europe and Asia (such as apparently greater population density and poverty in the latter for much of the twentieth century) and treat it as the long-standing and historical roots of that outcome.

In the last decade, a variety of formerly accepted “facts” about the differences between European and Asian societies have been overturned. This research forces us to be skeptical about the “colonizer’s view” of the advantages of European civilization.

THE RECEIVED WISDOM VS. THE “CALIFORNIA” SCHOOL.

Since Max Weber’s comparative study of world civilizations,\textsuperscript{14} scholars have believed that some factors that were unique to the nations of Europe—or perhaps to Europe west of the Russian and Ottoman empires, the unit known as “Latin Christendom”—conferred on them a collective comparative advantage relative to other societies. Western scholars have differed mainly on when this advantage arose, and which factors constituted this advantage. Some, such as Lynn White, place the advantage in the High Middle Ages (c. 1000 AD), pointing to advances in heavy-soil cultivation and use of water-power; others, such as Alfred Crosby and David Landes, place the advantage in the later Middle Ages (c. 1300), with the spread of mechanical clocks, spectacles, and a variety of measuring and mechan-

\textsuperscript{10}Lavely and Wong 1998; Livi-Bacci 1989, 109.
\textsuperscript{11}Hajnal 1982.
\textsuperscript{12}Lee and Wang 1999a, 46; 1999b.
\textsuperscript{13}Lee and Wang 1999a, 36, confirmed by private communication from James Z. Lee; Wrigley and Schofield 1981.
\textsuperscript{14}Weber 1950.
ical devices.\textsuperscript{15} Eric Jones points to these factors plus an unusually favorable geography and environment in Europe for the accumulation of physical capital over many centuries. Immanuel Wallerstein finds the advantages of the West rooted in the gains from leadership in an expanding world-system of trade that developed from the sixteenth century; still others, such as Joel Mokyr, point to a growth of knowledge begun in Medieval Europe that flowered in the seventeenth and eighteenth centuries.\textsuperscript{16} A number of scholars, including Douglass North, Robert Thomas, Jean Baechler, John A. Hall, and Michael Mann, stress the influence of government; for them Asian governments were generally too disordered, or too rapacious, to provide a stable framework for private enterprise.\textsuperscript{17} In short, the "received view" is that the divergence of Europe and Asia, a "big outcome," if you will, was rooted in a "big" difference in their histories or cultures that can be traced back two centuries or perhaps many centuries before the onset of Europe's dominance in Asia in the nineteenth century.

Against this received wisdom, a number of scholars, building on prior outstanding regional histories, especially that of Mark Elvin,\textsuperscript{18} have staked out differing claims. I give these scholars the collective label "the California school," because the majority of them are affiliated with universities in that state; but they include scholars across the United States and around the world. Among them are R. Bin Wong, Jack A. Goldstone, Kenneth Pomeranz, Richard von Glahn, Wang Feng, and Cameron Campbell in the University of California system; Dennis Flynn and Arturo Giraldez of the University of the Pacific in Stockton, California; James Lee of the California Institute of Technology; Robert Marks of Whittier University in southern California; Andre Gunder Frank (a scholar with multiple bases, but whose major anti-Eurocentric work on development was published by the University of California Press); Jack Goody of Cambridge; James Blaut of the University of Illinois; Janet Abu-Lughod of the New School for Social Research; and many others whose research is reshaping our sense of Asia/Europe differences.\textsuperscript{19}

These scholars, in a wide variety of publications, have documented the following arguments: (1) Chinese family structure, although differing from that in Europe, produced neither unlimited fertility nor unusually large or rapid population growth;\textsuperscript{20} (2) Chinese and Indian domestic economic activity in such areas as textile production and food processing was quite sophisticated with regard to large-scale mass production and trade;\textsuperscript{21} (3) Chinese and Indian merchants operated with substantial autonomy and had far larger commercial fortunes than most European merchants well into the late eighteenth century;\textsuperscript{22} (4) Chinese international economic activity was vigorous and dynamic through the entire Ming and Qing periods;\textsuperscript{23} (5) Chinese agricultural productivity and standards of living were comparable to those in the leading regions of Europe as late as the eighteenth century;\textsuperscript{24} (6) China's eighteenth and nineteenth centuries were marked by substantial geographical expansion and economic integration of new regions;\textsuperscript{25} (7) it was not European

\textsuperscript{16}Jones 1987, 1988; Wallerstein 1974; Mokyr 1990.
\textsuperscript{17}North and Thomas 1973; Baechler, Hall, and Mann 1988; Hall 1986.
\textsuperscript{18}Elvin 1973
\textsuperscript{20}Lavelly and Wong 1998; Lee and Wang 1999a, 1999b.
\textsuperscript{21}Pomeranz 1993, 2000; Blaut 1993.
\textsuperscript{22}Goody 1996, Frank 1998.
\textsuperscript{23}Frank 1998, Blaut 1993.
\textsuperscript{24}Pomeranz 1998.
\textsuperscript{25}Marks 1997.
eagerness for trade, but China’s desire to obtain silver bullion via trade, that was the motivating force in the global trading system of the sixteenth through early nineteenth centuries; and (8) Chinese and Ottoman political dynamics were not wholly different in nature from those of European monarchies, for the major political crises in seventeenth-century China and the Middle East had similar fiscal, social, and material causes, and often greater institutional consequences, than European revolutions and rebellions of the same era. There were thus no large and systemic differences between China and Europe that entailed Europe’s divergence; rather, the divergence between European and Asian economies in the late nineteenth and twentieth centuries was due to relatively recent changes that occurred in parts of Europe—particularly in England—and in Asia, and not to long-standing comparative advantages of European civilization as a whole vs. other civilizations.

While the members of the California school are unanimous in opposing the idea that European civilization had a deep-rooted basis for eventual superiority over other societies, they do differ among themselves in explaining why that divergence developed. Frank suggests that Chinese demography eventually imposed an excessive burden on land; Blaut and Pomerantz stress the chance acquisition of assets in the New World. My own approach places more emphasis on culture. I have argued that conservative cultural formations that took root in major non-European civilizations after 1650 blocked progress. But what separates this view from the received view of Eurocentric scholars is that I argue that such cultures were not long-standing but a recent development, and that, moreover, they also developed in most European nations at about the same time. England was a rare exception, and this was due to a rather chance combination of political, social, and ecological trends that produced a tolerant religious culture, a pluralist political system, and an emphasis on coal-powered heating, motive power, and metallurgy. Indeed, I have suggested that if not for this very unlikely chance combination of events, England c. 1800 would have looked very much like the Netherlands, or like the Yangtze delta in China or the Kanto plain in Japan—that is, a highly advanced but pre-industrial manufacturing society engaged in large-scale international trade, with a rich urban culture and wealthy merchant class under the political rule of a conservative noble elite.

If the California school is right, we shall have to rewrite a lot of the standard world history. At present, the major theme of world history from the beginning of the Near Eastern fertile crescent civilizations is the rise of the West. This is told as dominated by a series of rises and falls in which the “West” always advances. That is, from the rise of agriculture in the Near East to the triumph of Greece over Persia and the spread of Hellenism under Alexander, then to the conquests of Rome, the rise of the Carolingian empire, then the founding of independent kingdoms in England, France, and Germany; onward to the Crusades, the turning back of Islam in Spain and on the Austrian frontier; the conquest of the New World by Spain and Portugal, the founding of overseas empires by Britain and France, and finally on up to the colonization of Africa in the late nineteenth and twentieth centuries—all is told as part of “Europe’s” progress. Other civilizations feature in this story mainly as passive recipients of European trade and conquest, and as oddly unimaginative bestowers of great inventions—stirrups, gunpowder, the compass, the sternpost rudder, paper and printing—whose potential was only realized in European hands.

The California school reverses this emphasis and sees Europe as a peripheral, conflict-ridden, and low-innovation society in world history until relatively late. Superiority in

29Goldstone 1998.
living standards, science and mathematics, transportation, agriculture, weaponry, and complex production for trade and export, has multiple centers in Egypt, Mesopotamia, the Indus Valley, and the Yellow River Basin. From these regions civilization spreads outward, with the rise of further centers in Crete/Southern Greece/Western Turkey, Palestine, Anatolia, Persia, India, and China, while western Europe remains a primitive backwater. When civilization spreads west with Carthage and the Roman Empire, it remains rooted in the Mediterranean and then—with Byzantium—in Anatolia. From the eighth century, Islamic civilization then rises to unify the core of the Western civilized world from Spain to India, while Sinic civilization spread through Korea and Japan, and Indic civilization throughout southern Asia. By 1000 AD, complex global trading routes link the centers of manufacturing production in the Middle East, China, India, and Southeast Asia to underdeveloped suppliers of raw materials in Russia and Europe. For the next six hundred years, the world will be dominated by China; Chinese ceramics and textiles spread throughout Asia and even find their way en masse to Europe.

China pioneers new technologies in textiles, metallurgy, ceramics, and seaborne transport, as well as completing engineering works—the Great Wall and the Grand Canal—of unequalled size and complexity. China adopts the world’s first mainly meritocratic system of officialdom, and brings the largest population yet known under centralized rule. True, the Mongols briefly conquer China and most of Asia, but they are quickly absorbed into Chinese culture, and their century of control ends with a new Chinese dynasty that will last nearly three hundred years. During this period, from 1000 AD to 1600, China explores central Asia and sends enormous fleets of ships westward to the coast of Africa, but can find no civilization producing goods that it does not produce better at home. In contrast, Chinese goods are sought throughout the known world.

On the far western periphery of Eurasia, in western Europe, is a savage but nimble race of warriors, skilled forgers of arms and armor, clever with clockworks and other trinkets but dependent on crude iron and cruder steel, and with no skills in the production of silks, fine cottons, or other rich textiles, nor in the production of ceramics, lacquers, nor any resources of precious jewels, jade, spices and aromatics, or other valuables. From the perspective of Europe (and of the rest of Eurasia), the Orient is the fountain of all riches; thus, the western Europeans scheme on how to get there. For centuries, they have relied on Persians and Turks to convey the luxuries of the Orient to the Eastern Mediterranean, whence they can be carried by Venetian and Genoan traders to other parts of Europe. But having borrowed the compass and ideas on ship construction and navigation, the Europeans set out courageously for a direct route to the riches of the Orient. In the fifteenth and sixteenth centuries, they send small fleets to the Indian Ocean and adjacent seas, and manage to establish a few outposts on the fringes of eastern civilizations. From there, they compete with vaster fleets of Arab, Chinese, and Indian merchants in the carrying trade of East Asia, creating a small fortune for some lucky merchants but having no real impact on Asian civilizations for the next two hundred years. In fact, “at the turn of the eighteenth century Indian shipping fully held its own against the English and Dutch vessels” (Das Gupta 1994:XIV, pp. 28–9).

They have better luck, if a poorer sense of direction, in seeking a direct route to the Orient across the Atlantic. This “mistake” leads them to the New World, quite fortunately for them at a time when the native civilizations are riven by internal feuds. Taking advantage of alliances with enemies of the Aztecs, and of a civil war in the Inca empire, small bands of Spanish soldiers are able to seize and kill the native rulers of vast empires. European diseases, unknown and horrifically fatal to the indigenes, wipe out vast numbers of New World natives and make it possible for the Spanish and Portuguese to intimidate and colonize the key silver- and gold-producing regions of the Americas.
Curiously, it is this “mistake” in direction that actually does lead to the riches of the true Orient because the silver mines of Latin America finally give the poor Europeans something of value to bring to Asian markets. As Frank puts it, Europe “used its American money to buy itself a ticket on the Asian train” (Frank 1998, p. xxv). For the Chinese, seeking to streamline their economy and fiscal system, are converting to a silver-based economy, yet without domestic sources of the precious metal. They thus are willing to pay a premium for good-quality silver, which the Europeans can now produce in abundance. Both via a Pacific route through Acapulco and Manila and via an Atlantic route through Seville and Amsterdam, American silver pours into China.30

From 1500 to 1650, the global silver trade helps familiarize Europeans with the Orient, and their view is quite similar to the one expressed by the California school. They are repeatedly impressed with the wealth and sophistication of China as compared to Europe. They are also impressed with the wealth—if dismayed by the absolute power—of the Turkish sultans and the Indian Grand Mughals. European nations remain eager but marginal players on the world’s economic and political stage, obsessed with trying to catch up to the wealth, sophistication, and power of the Asian civilizations that dazzle them, and that—in the Ottoman Empire—confront them with expansion into the heart of Europe and to the walls of Vienna.

Yet in the seventeenth century, the dominant powers of the world—the Spanish Habsburg empire in Europe, the Ottoman empire in the Middle East, and the Ming Empire in China—are beset with internal rebellion. The combination of sustained population growth since the fading of the plague circa 1450, plus a vast infusion of silver, has raised prices in a dizzying spiral; taxes have not kept pace, weakening these regimes. At the same time, increasing numbers of elites intensify their competition for places in the army and the court bureaucracy while a vastly increased peasantry burdens the land, fighting against increases in rents and taxation. Cities grow larger and more unruly; merchant classes and commercial farmers grown richer in the preceding age of commercialization and silver trade chafe under tax impositions and exclusion from power. Rebellions against Spanish power occur in Portugal, Catalonia, and Italy; provincial rebellions (jelalis) undermine central power in the Ottoman empire; and peasant rebellions in China pave the way for the Manchus to seize Beijing and begin their conquest of China.

From this point onward, different members of the California school offer somewhat different scenarios, so let me make clear that what follows is solely my own view. After the wars and internal struggles of the seventeenth century, elites and rulers seek to reestablish unity and stability. In China, the Manchus promote an orthodox and unusually rigid form of Confucian culture, and enforce their rule throughout not only the Chinese heartland, but also the southeast coast and central Asia; in the Ottoman empire, the viziers seek to restore order through reinforcing the “traditional circle of equity” based on orthodox Sunni Islam, eschewing innovation and Western influences; in the Habsburg domains in Spain, Italy, and Austria, the Catholic Counter-Reformation takes hold; in France, Louis XVI revokes the Edict of Nantes and expels all Protestants, and even in England, Charles II upholds the unity and authority of the Anglican church and cracks down on dissenters. Everywhere in Eurasia, the old empires are restored and gain new strength and unity, economic growth and political expansion return; but that strength and unity comes at the price of cultural conformity and intensifying traditional orthodoxies regarding beliefs, social hierarchy, and state power.31

30Flynn and Giraldez 1995a, 1995b.
Except that something goes haywire in England. Charles II dies without an Anglican heir, and the throne passes to his Catholic brother James. The conundrum of a Catholic monarch reigning over a Protestant state and its Protestant state Church upsets all the desired unity of this period. James II, secretly allied with France, schemes to create a Catholic army to preserve the throne for his Catholic son while a segment of the English elite schemes to put a Protestant claimant—William of Orange, leader of the Netherlands—in his place. The result, in one of the turning-point events of world history, is William’s invasion of England in 1688, supported by the English political elite, and the exile of James and his descendants. Instead of James II leading England into a Catholic alliance with France that would aim to destroy the independence of the Protestant Netherlands, England now joins with its erstwhile enemy, whom it had fought repeatedly in the seventeenth century. As King of England, William leads an Anglo-Dutch Protestant alliance against France that contains Catholic power in Europe.\textsuperscript{32} The Protestant leaders of the Royal Society, such as Isaac Newton (who led the battle at Cambridge against the Catholicization program of James II), emerge in glory instead of being suppressed.

But this event is not of world-historic importance simply because it prevents a Catholic domination of the whole of Europe. Two very particular, chance factors also are critical. First, William’s triumph is not total. He needs to compromise with the diverse religious and political factions in his new kingdom of Great Britain; facing the need to defend the Netherlands from French aggression, he has no time or energy to spare for imposing a uniform orthodoxy in the British Islands. Thus, the 1689 settlement establishes limited but secure tolerance for Catholics and Dissenters—they may not hold political office but are otherwise free and secure in their persons and property. This creates the same kind of pluralistic, open culture (and a substantial minority that can only advance economically) as was found in pluralistic and innovative periods in other societies, such as the Netherlands in their Golden Age, Spain in the Muslim/Jewish Golden Age, Italy in the Renaissance after the influx of Byzantine and Arab influences, the early Ottoman Empire, the Caliphate of Baghdad, and China in the Era of Warring States and again in Northern and Southern Song. In the space opened by this settlement, innovators and entrepreneurs emerge and flourish.

Second, a distinctive Newtonian culture takes hold, in which the Anglican Church—unlike all continental Churches—favors and even promulgates the new mechanical world view. In strongholds such as the Royal Society, and in new schools and academies throughout Britain, scientists, engineers, and entrepreneurs come together to learn mechanics and discuss how this knowledge may be applied to improve production and society.

It is true that there were contributors to scientific innovation throughout Europe, and that changes in economics and technology are found in all societies to some degree. Yet innovation usually has been slow in most societies, while the explosion of power and output based on applications of fossil-fuel power to manufacturing and transport was dramatic and occurred only in one place and time. Could this have happened anywhere else? I do not believe so. It required three fundamental breakthroughs: one cultural, one scientific, one technical, all centered in England.

First, toward the end of the seventeenth century, Isaac Newton published his \textit{Principia}, showing that universal laws of gravitation could explain the elliptical motion of the heavenly bodies by the same principles used to explain the motion of falling bodies on the earth. The impact of this was not practical—Galileo had already shown how to calculate projectile trajectories, and Leibnitz had already developed the calculus as a tool for com-

\textsuperscript{32} Kishlansky 1996.
putations involving time and motion. Rather, the effect was a tremendous break in culture. Despite all that we are told about how Europeans were uniquely “innovative,” “empirical,” and “numerical,” the fact remains that until the seventeenth century, they relied mainly on the physics of Aristotle and the astronomy of Ptolemy, both of which postulated a complete discontinuity between the heavenly and earthly spheres. The former was perfect and immutable, the realm of perfection and (for the Church) the realm of God; the latter was imperfect, irregular, and changeable, for the Church a realm of sin and redemption. Though many scholars had challenged classical wisdom—as they had done in China and in the realm of Islam—Newton’s demonstration of universal principles for heavenly and earthly motion wholly subverted the classical cosmology of the West. Though Copernicus, Kepler, and Galileo all accepted a sun-centered solar system, with a spinning earth just one among the planets, all still believed in varying degrees in the separation of heavenly and earthly motions; Kepler’s mystical “harmony of the spheres” was as central to his work as the discovery of elliptical orbits and proportional periods of movement around the sun. Newton’s comprehensive proofs that the motion of projectiles on earth, the movements of the tides, and the orbits of the planets around the sun could all be explained by the same, identical principle, elevated Newtonian science to the level of a fully alternative cosmology. The Renaissance had seen a revival of classical learning. The early and mid-seventeenth century had witnessed a crisis in natural philosophy as Copernicus and Galileo challenged key classical assumptions, and yet throughout the continent the Catholic Church had withstood those blows and maintained its orthodoxy, treating the solar-centered view as a useful hypothesis. Only by the late seventeenth century in England could the entire elite culture agree that “the ancient understanding of the natural world bears little or no relation to our own.” 33

Other civilizations, also experiencing turmoil, heterodoxy, and pluralism during the seventeenth-century upheavals, responded by seeking stability, unity, and orthodoxy along classical principles. Only in Protestant Europe was the entire corpus of classical thinking called into question; Catholic regions under the Counter-Reformation preferred to hold to the mix of Aristotelian and Christian cosmologies received from Augustine, Ptolemy, and Aquinas. And only in England, for at least a generation ahead of any other nation in Europe, did a Newtonian culture—featuring a mechanistic world-view, belief in fundamental, discoverable laws of nature, and the ability of man to reshape his world by using those laws—take hold. The spread of such beliefs to a wide variety of engineers, merchants, ministers, and craftsmen reshaped the entire nation’s approach to knowledge and technology. 34

Although France had Descartes, and the Netherlands (where Descartes fled and published after France banned his works) had Huygens and relative freedom for writers, neither moved in the direction of England—to a Church-endorsed and widely preached anticlassical Newtonian mechanical world-view, with practical instruction for craftsmen and businessmen in the tools of the new science. Descartes’ physics, although it gradually spread in France, was widely suspected of encouraging atheism. More profoundly, Descartes believed that all matter was extension and that all forces were conveyed by the impact of particles of matter; thus, there could neither be a vacuum nor action-at-a-distance. While like Locke, Descartes challenged the Aristotelian idea that color, taste, and shape were inherent properties of things, arguing instead that only mass and extension mattered, in other ways his physics was not nearly so radical as that of Newton. Indeed, in Descartes’ physics, both vacuums (and thus steam engines) and gravitational force were ruled out as impossible. Nor were Descartes’ followers inclined to discover these errors,

33 Cited in Jacob 1988, 3.
34 Dobbs and Jacob 1995; Jacob 1988.
for Descartes’ physics was deeply non-experimental, relying instead on logical deduction from simple observations. Throughout Catholic Europe, even where science was taught in a mechanistic, Cartesian mode, it was taught mainly as a theoretical, deductive practice rather than as experimental and inductive. Thus after the mid-seventeenth century, “science . . . became an increasingly Protestant . . . phenomenon.” While scientific innovation continued for another half-century in the Netherlands, the separation of the English and Dutch monarchies after 1714 also led to a change in Dutch religious culture.

While Calvinism in the seventeenth century may have produced scientific rationalists . . . by the eighteenth century its orthodox clergy had grown fearful of heresy among the laity, and the power of Calvinist orthodoxy in popular culture produced widespread public opposition to aspects of the new science, for example, smallpox inoculation.

While the new science continued to be taught at Leiden, it became a more elite, more deductive, more abstruse practice. Only in England was the new science actively preached from the pulpit (where Anglican ministers found the orderly, law-ordained universe of Newton both a model for the order they wished for their country and a convenient club with which to beat the benighted Catholic Church), sponsored in the Royal Society, and spread through popular demonstrations of mechanical devices for craftsmen and industrialists.

The second breakthrough was in the understanding of the principles of atmospheric pressure and the vacuum. Continental Europeans—Torricelli and Pascal—had long since shown that the atmosphere had weight and could support a column of fluid. But it was Robert Boyle who, in his systematic experiments with the vacuum, made widely known how these principles operated and that air not only had a vertical weight, but presented a “spring” or pervasive pressure. This knowledge filtered down to craftsmen like Thomas Newcomen, who solved a particular engineering problem with the third and crucial breakthrough, the steam-powered pump, forerunner to James Watt’s steam engine.

Pumping apparatus had a history of thousands of years: Egyptians used water wheels to lift water for irrigation; the Chinese had used pumps on locks on the Grand Canal; and the Dutch had perfected the use of the windmill to pump water to reclaim land from the sea. But pumping, milling, manufacturing, transportation, and every other operation that required the movement of things had from time immemorial been powered by the movement of other things. The human body, animal bodies, wind, falling weights, falling water—all could be set in guided motion, and thereby used to power moving components. Motion to motion was the principle on which all human manufacturing and transportation had relied. Unfortunately, most raw motion was expensive and irregular. Animals and people had to be fed and sheltered, and their muscles gave out periodically with heavy use; falling weights and water and air provided cheaper motive power, but were far more difficult to harness. Wind changed direction and intensity moment by moment; water changed its flow depending on the weather and the seasons. Thousands of years of experiment and innovation had produced clocks, sails, water wheels, spinning wheels, and other mechanisms to take the raw motion of the sources and transform that into steady, directed motion in boats, mills, clockworks, and factories (going back to ancient factories for producing bricks to more

35 Jacob 1988, 24–25.
36 Jacob 1988, 189.
37 Jacob 1988, 112 ff.
38 Shapin 1998.
recent ones producing textiles and ceramics for export, China and Islam had factories with mechanized power using ramps, wheels, and mills). But what was not available was a cheap primary source of dependable and regular motion, for—except in the heavenly bodies—no such primary motion was known.

The problem that faced England was as follows: As an island of limited extent, with few regions of significant mountains (most of those, in Scotland, covered with scrub and grass instead of forest), the natural forest cover shrunk as the population took more land for agriculture. Fortunately, coal was plentiful and readily transportable by seacoast and riverine transport, so England came early to rely on coal for much heating, cooking, and industry. By the seventeenth century, however, the shafts of the deep vertical seams were filling with ground-water, and it was becoming ever more difficult to keep them clear. Newcomen, who was familiar with the high cost of using horses to pump water from tin mines in his native Cornwall, realized that if a vacuum could be created in a chamber holding a piston, air pressure would push the piston into the chamber; the motion of the piston could then be harnessed to drive a pump. One way to create a vacuum would be to fill a chamber with steam, then cool the chamber so that the steam condensed to water. Using the scientific principles of air temperature and pressure discovered by Boyle, Newcomen was able to create and use a vacuum to power machinery: a true breakthrough.

Of course, the early engine developed by Newcomen was horribly inefficient. Of the huge amount of heat energy needed to create the steam and to move water in and out of the cylinder, only a tiny fraction (less than 1 per cent) was available as usable energy from the motion of the piston.39 However, efficiency was not the main point; what was sought, and accomplished, was the conversion of one form of energy (heat) into another (motion) on a regular and dependable basis. Still, the inefficiencies were so enormous that this awkward contraption was only worth using in circumstances where there was abundant and extremely cheap fuel for heat, and abundant water to channel for steam and cooling. (Martin Clare, a schoolmaster and lecturer on mechanics—a uniquely English combination, incidentally—recognized that a steam engine would not return a profit if used “where fewel is not very cheap.”)40 In short, initially, the early steam engine was only practicable to develop for one particular purpose—pumping water out of mines near ample sources of coal. Still, within a few decades of its first installation in 1712, over a hundred such engines were operating in Britain. In 1765, James Watt and Matthew Boulton made a further significant leap; they moved the condensation process to a separate condenser, so the entire cylinder did not have to be heated and cooled at each cycle, and they added a rotary mechanism and flywheel to produce uniform circular motion from the up-and-down movement of the piston. As a result, Great Britain had what no other nation on earth had or would have for more than a generation: a cheap and reliable means of converting heat energy (mainly from coal) into uniform rotary motion. This made it possible to free the entire range of manufacturing, transportation, and grinding/milling processes from the costs and limitations of animal, human, and wind/water motive power.

A plethora of inventions followed that opened up the world to British industry. The steam-powered spinning factory employing spinning mules made huge advances in efficiency and output over the early ring-spinning factories. Railroads and steamships opened continents and oceans to upstream and upwind transport of bulk commodities and weapons platforms. Of course, England and its Newtonian culture also made notable advances in mass production of ceramics, in agriculture, and in metallurgy throughout the eighteenth century. But these latter advances, however laudable, simply helped England and

39Mokyr 1990, 85.
40Cited in Jacob 1988, 146.
Europe catch up to the more advanced manufacturing of Asia. Novel as they were in England, none of these advances—coke smelting of iron and steel, factory production of porcelain for mass export, mass production of cotton textiles for distant sale—were new in global history. And, as critics of the concept of an “Industrial Revolution” have pointed out, these advances did not significantly increase living standards for many decades.\textsuperscript{41} Such improvements in production of consumption goods increased production output; energy conversion of coal-heat to regular motion transformed the production frontier.

The rest of the story is familiar. Newtonian science became the accepted mode of studying nature, producing further advances in the understanding of chemistry and electricity; railroads opened up new territories to the market and to new agricultural and production techniques; European gunboats steaming upriver forced open China and the interiors of Africa and Brazil; further refinements in engines, steel, and manufacturing processes brought cars, bulldozers, elevators, machine guns, tanks, and eventually the full panoply of the horrors and blessings of twentieth-century military and civilian technology. But without the ability to move beyond the constraints of muscle, wind, and water power as primary motive force, none of this would have been possible. Contemporaries had a better grip than many modern scholars on the importance of the steam engine in transforming their world: Matthew Boulton advertised his engines by saying, “I sell here, gentlemen, what all the world desires: power.”\textsuperscript{42} In 1824, still early in industrialization, the French scientist Sadi Carnot, who would be the first to lay out the laws of thermodynamics, was moved to observe: “To take away England’s steam engines today would amount to robbing her of her iron and coal, to drying up her sources of wealth, to ruining her means of prosperity.”\textsuperscript{43}

This transformation in history was brought about by the most freakish of accidents—the prevention in England of the global trend to cultural conformity and religious orthodoxy as the basis for strong and stable political structures; the rise in that space of both a Newtonian culture and the dissenting but protected religious groups who would take up the challenge of using a mechanistic view to create new economic assets; and the occurrence in that same space of a particular technical problem—the pumping of deep mines near abundant coal supplies—that made feasible and desirable the bringing of these particular resources to bear in such a way as to create a breakthrough in energy conversion, something that in fact \textit{was} wholly new in the thousands and thousands of years of prior civilization.

**COUNTERVIEWS**

Let us quickly consider two arguments that seem to counter this odd and quirky story, that seem to indicate that the rise of Europe and industrial civilization would have come about regardless of small details of political conflict in England. First, there is the argument from conquest. It was not just English, but Europeans—first Spanish and Portuguese, then English, French, and Germans (and in some areas Russians)—who captured the rest of the world. From the New World colonies of the sixteenth century and the Dutch conquest of the East Indies, both of which predate industrialization, to the British raj in India and French empires in West Africa and Southeast Asia, Europeans as a whole have been defeating and elbowing aside other civilizations for the last five hundred years. Second, there is the comparison case of Japan. Japan responded so quickly to Western influence that by 1905 it was defeating a European power in war (in the Russo-Japanese war), building a modern industrial economy and military, and developing its own colonies in Korea, Taiwan, and (later) Manchuria. Whatever comparative advantages European civilization had over most others,

\textsuperscript{41} Crafts and Harley 1992.

\textsuperscript{42} Cited in “Steam Engines: Puffed Up,” \textit{The Economist} (December 31, 1999), 99.

\textsuperscript{43} Cited in Mokyr 1990, 90.
Japan apparently had something of the same; thus (as Eric Jones and David Landes explicitly argue\textsuperscript{44}), even if Europeans had not developed an industrial society, Japan, left alone, might well have done so.

\textit{Conquest, yes, but so what?}

It is quite true that Europeans had a good run in geopolitical expansion after 1500. But that indicates absolutely nothing about either any general long-term advantages of European civilization or of general potential for industrialization. The reasons for large-scale geopolitical conquests are many and familiar from world history. It has been a general pattern that smallish groups of underdeveloped, barbarian peoples on the periphery of great and populous civilizations can achieve stunning geopolitical victories when the great civilizations are in decline. This does not mean that the barbarians were in any way superior to the advanced civilizations that they conquered, nor that they are destined for anything greater than a few centuries in the sun before being overwhelmed by a new turn of geopolitical events.

Let us start with the Huns—arbitrarily, as they are not the first barbarians to sweep aside more civilized peoples, but one of the most famous. They accomplished absolutely nothing except conquest. What about the crude Macedonians who not only swept over the more civilized regions of classical Greece but also defeated the civilizations of Egypt and Persia? After a few centuries in which they seemed to rule and transform the civilized world, their triumph was reduced to ashes by the Romans and renewed Persian power. Of course, the Romans had claims to be a superior civilization, with more advanced military organization. But in the West, they were eventually overrun by the Visigoths, Franks, and Vandals; in the East the Byzantines lost their empire first to simple Arab tribesmen and secondly to the Turks. If we were simply to equate military conquest of vast lands and civilizations with greatness, then the Mongols outshone all civilizations and societies prior to the twentieth century; but I know of few European scholars who would want to give the Mongols the prize for “world’s greatest and most advanced civilization” simply because of their military conquests.

The triumphs of the West prior to industrialization turn out, on closer inspection, to be made of similar material. The most stunning conquests were those of the Aztecs and the Incas by Spain. But how was this accomplished? Like the Mongols, the Spanish used horses to good effect; like the Mongols, whose bows were superior, the Spanish also had cutting weapons of steel that were superior to the bronze and wooden weapons of the New World. But the three biggest keys to their success were also familiar from world history: Their opponents were weak and divided, epidemic disease crushed the spirit and people of their enemies, and the Spanish pursued and exploited these advantages with unbelievable ruthlessness and brutality.

As already alluded to above, the Spanish were most fortunate to come to the New World at a time of great opportunity. The classic Maya civilization was long decayed, and central Mexico had been wracked by a series of wars won by marauders from the North, the Aztecs. But these wars had left the Aztecs with many enemies, and their so-called “empire” was not a centrally controlled realm but a tributary system in which recently subdued tribes—anxious to turn the tables—agreed to pay benefices to their recent conquerors. These tribes were more than happy to help the Spanish in destroying Aztec power. Similarly, when Pizarro came to Peru, although the Incas did have a centralized empire with enormous resources, it was in the midst of a ruinous succession struggle between one of the deceased emperor’s heirs and one of his leading generals. As one of Pizarro’s lieuten-

\textsuperscript{44}Jones 1988, Landes 1998.
ants observed, "If the land had not been divided by the war between Washkar and 'Ataw Wallpa we could not have entered or conquered it."\textsuperscript{45}

The role of disease, and of other European flora and fauna besides microbes, in aiding Europe's colonization of the New World is well-documented.\textsuperscript{46} Disease not only wiped out the natives \textit{en masse}, it gave the Europeans an air of invincibility (why did they not fall from the diseases that tore through the native populations?) and carried off key leaders of the Native Americans at crucial times. But when the tables were turned, Europeans did no better. The supposedly "superior" European civilization was absolutely helpless to penetrate into the African interior. Unable to establish any more than small trading footholds along the coast, except in the temperate far south of the Continent and the highlands of Kenya, Europeans depended even for their vital slaves on Arab and African slave traders who ranged into the interior, and on the African kingdoms who sold slaves in exchange for weapons. Africans—armed with the twin power of guns gained from Europeans and diseases of the tropics—held off European conquest until the very end of the nineteenth century, long after Indian and Latin American civilizations had fallen.

The Spanish also, it should not be forgotten, were no less ruthless than the Mongols and the Turks. They made and broke solemn agreements at whim, executed hostages for whose safety they had sworn, and committed ambushes and kidnappings after promising diplomatic immunity. Lack of civilized behavior, not advanced civilization, was often the key to Spanish victory. Of all the European colonial conquests, those of the Spanish and Portuguese were among the most extensive and certainly the longest-lasting, lasting nearly three centuries. Yet did conquest indicate superior civilization, or greater potential for economic and technological development? Despite (or perhaps because of?) their great conquests, Spain and Portugal remained far behind, not in the vanguard of, European economic development.

As to the British conquest of India, it was not greatly dissimilar to that by Spain in the Americas. The empire of the Great Mughals was in disarray, and the subcontinent was torn by divisions among competing successors. The British exploited those divisions with such skill that, by building alliances and gaining the allegiance of various local powers, they (in the common parlance) stumbled into possession of an empire without aiming at so doing. Elsewhere in Asia, the Europeans were stymied by superior Asian power. In China, until the Opium Wars of the mid-1800s, they were confined to small posts on the periphery of the Chinese Empire. In Japan, until the forced opening by American vessels in 1866, the Japanese excluded the Europeans almost entirely, eliminating contact with all but the Dutch and limiting them to one small post in the hinterland.

In sum, until well into the 1800s, the European conquests are not greatly different from the other great barbarian conquests of history: Ruthless and mobile bands coming on great civilizations torn by internal dissension and decay frequently emerge as conquerors. But this does not imply their superiority or lasting advantage. The truth of this should be clear simply by looking within Europe—the greatest empire-builders of European civilization prior to industrialization, namely Spain, the Austrian Habsburgs, and Russia, were generally agreed by 1850 to be the weakest and most backward societies in Europe.

\textit{Was Japan on its way to indigenous industrialization?}

Let us now turn to that remarkable nation which, alone of countries outside of Europe, attained something like parity with European economies by the early twentieth century. What are we to make of that parity and the early dominance of Japan over the other nations

of Asia? Did Japan share to some degree in the advantageous “something” that favored Europe?

It has been argued by scholars of Japan that it did indeed share something special with Europe.\(^{47}\) The candidates for that “something” include a feudal era that paved the way for capitalism, a competitive but honorable warrior ethic that functioned somewhat like the Protestant ethic in Max Weber’s explanation of Western capitalism, and—in my own argument\(^{48}\)—a predisposition to use female labor outside the household in a way that facilitated recruitment and staffing of early textile factories. I agree that all of these elements contributed to Japanese prosperity and aided its rapid adoption of Western technology and economic organization; but that is not the same as saying that these things would have fueled an industrial revolution.

It is interesting to note that seventeenth-century Japan had much in common with seventeenth-century Britain: limited forest cover and a fuel shortage arising by the eighteenth century; relatively strong if somewhat decentralized government; and military and economic competition with a vast continental power that was in many ways the source of its own culture. Yet it is instructive to note that Japan “solved” these problems in a manner almost exactly opposite from Great Britain. Japan invested heavily in forestry programs and conservation to resolve its fuel problems, instead of seeking to import coal or other substitutes. While Britain adopted a pluralist and representative government to resolve strong and decentralized government, Japan used an extremely burdensome semi-ransom form of governance, with the regional lords (daimyo) forced to undertake extravagant regular visits to the Shogunal court and leave family members at the court year-round as hostages. And while Britain engaged in near-constant military struggles on the continent, Japan isolated itself for nearly three centuries.

During those centuries of Tokugawa rule, Japan restricted international trade with Europe (though much less so with other parts of Asia), and most startling, completely discarded its technology for the mass production and mass utilization of firearms, in which it exceeded any European nation in quantity and quality by the late sixteenth century. Japanese steel was superlative but too expensive for any general use; and like Europe, Japan largely imported its silk and luxuries in return for bullion exports (silver and copper) to China. A few Japanese studied “Dutch science,” as the European natural history texts introduced by the Dutch colony in Nagasaki were called, but there was nothing approaching the kind of “Newtonian culture” of mechanistic views and insistence on progress that spread among Britain’s engineers, craftsmen, teachers, and entrepreneurs. The conversion of heat energy to motion energy—the key to an industrial revolution—remained as obscure in Japan as in any part of the world save Britain until the later nineteenth century.

What Japan’s success does demonstrate is something that has been shown in Korea and Taiwan as well: A unified people under firm government direction determined to import and implement Western industrial technology can do so in about four decades. This is about the time it has taken to transform South Korea from an African level of agricultural poverty to one of the world’s leading industrial economies; similarly for Taiwan. Both have risen to this level from minimal beginnings after the Korean War of the 1950s and the Chinese Civil Wars of the 1940s. In more recent years, Thailand, Indonesia, and Malaysia have shown similar progress and determination, though starting in the 1970s.

Let us more closely compare Japan and China in the mid-nineteenth century. Both countries had regions in contact with the West, where would-be reformers sought to learn from Western technology (the southeast coastal regions in China, the southwest coastal

\(^{47}\) Bellah 1957.
\(^{48}\) Goldstone 1996.
regions in Japan). Both countries also suffered a crisis of governance, due in part to weakness in the face of the Western powers. But in China, the Taiping rebellion was put down—in some measure due to support for the imperial court from those Western powers—while in Japan the rebellion against the Shogun won the day. The result was that in China, with the old imperial regime propped up for another half-century, it would be 1911 before China finally abandoned its traditional social, political, and economic organization. In Japan, however, the Meiji rebels overthrew the traditional social and political order in 1868 and put Japan on the path of Westernizing reform. Thus, Japan had at least a 43-year lead on China in freeing itself from traditional structures, just long enough for a determined modernization drive to succeed and fully bypass the other nations of Asia.

Today, having cast aside its largely fruitless experiment with state socialism, China is gaining fast on the world—by some measures it has already surpassed Japan in total output to become the world’s second-largest economy. While its per-capita income remains far lower than Japan’s, China is growing at a far faster rate; indeed, Japan’s economic growth seems to have stalled for at least the past decade. If there is any “inherent advantage of Japanese civilization” in economic development, the last decade—in which for the first time since the mid-nineteenth century these two nations were on anything like a level playing field—certainly does not indicate that it exists.

In short, if we examine closely why Japan (or for that matter Korea or Taiwan or Botswana) has shown unusually rapid adoption and implementation of Western-style economic organization and technology, we do not need to posit any special advantage of its culture or civilization. Indeed, prior to 1868, Japan was an unusually closed and conformist society, with sharp and manifest retrogression in its use of weapons and no clear lead in any form of technology. Just as in England, where a chance political sequence of events opened up space for exceptional development, so too the victory of the Meiji rebels opened up space for an early rejection of much of the traditional social and political structure (although under the guise of preserving imperial authority) and the implementation of Western models. If we simply imagined what would have been the result if the Western powers had decided—as they did in China—that it would be much better to keep the traditional government in power to bargain with, and thus propped up the Shogunal regime for another fifty years, I suspect that any illusions about Japan’s “inherent superiority” would never have arisen. Had the Taiping rebellion succeeded in overthrowing the Manchus, and creating a new regime that was egalitarian, partly Christianized, and open to Western influence and technology in the 1850s, China might never have lost its dominant position in Asia.

CONCLUSION

It will, of course, take continued detailed research into the economic, political, and social organization of Asian, African, Latin American, and European nations to confirm the story outlined above. But the California school’s documented findings regarding Chinese family structure, the global trade in silver and manufactures, and the standard of living in pre-industrial Asian countries, have already overturned many old “certainties” regarding the special or superior conditions of Europe. These findings force us to face two very simple principles: (1) most conditions in Europe do not seem broadly different from those in the advanced regions of Asia until relatively recently, e. 1800; and (2) the later great divergence need not be rooted in great and long-standing prior differences, but could well be the result of small differences and chance events that created oddly exceptional political and cultural conditions not in “Europe,” but in small parts of Europe and, much later, in Japan.
This reversal in the “colonizer’s history” may take away some grandeur and continuity from world history. Just as Copernicus’s placement of the earth as just one of many planets circling the sun, and Darwin’s placement of humankind as just another emergent species in the billions of years of random evolution, assaulted Europeans’ sense of “special” or “privileged” identity, so too the recasting of world economic history by the California school removes the “special and privileged” place of Europe among the world’s civilizations. Europe’s nineteenth-century dominance, far from being inevitable or due to long-standing advantages, resulted from a particular chance departure in a small region from the world’s (and Europe’s!) normal patterns of state-enforced cultural orthodoxy.

If this is true, then the source of the long-term exponential growth beginning in the eighteenth century in England was not capital accumulation, nor capitalist practices, nor even technical improvements per se (as occurred in Europe and Asia with water and wind power and agrarian production). Instead, the key to this unique departure seems to have been a fusion of market-orientation with an “engineering culture,” such that a free-wheeling entrepreneurship was combined with a world-view that saw all production processes as subject to continuous improvement through natural-law-guided optimization. The steam engine was the greatest immediate fruit of this fusion, but this combination produced continuous rapid technological progress. This may suggest why in modern efforts to jump-start economic development in the Third World, neither capital infusion, nor expansion of tertiary (mainly liberal, legal, and managerial) education, nor technology transfer have led to steady accelerated growth. Rather, the key seems to be building this fusion of entrepreneurial and practical engineering outlooks; this has produced remarkable success in Japan, Korea, and Taiwan. Ireland is the latest “backward” country to be rapidly turned around by a focus on building an entrepreneurial/engineering culture. Looking forward, the “magic” of Silicon Valley’s astounding growth and wealth creation today seems precisely to be another episode in this special blend of entrepreneurship and engineering approaches to rethinking production, now in the process of producing yet another Industrial Revolution.

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