China in the Early Modern World: Shortcuts, Myths and Realities

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Peter C. Perdue

Massachusetts Institute of Technology

I. Introduction

China has attained new importance in world history. Recent textbooks now regularly include a historian who specializes in China. [1] Asia's spectacular economic growth in the past two decades,.and awareness of China's huge global demographic and economic weight have gained her new recognition. Consequently, specialists now need to push beyond their focused research to address broader questions raised by historians of other areas of the world. [2]

Writing and teaching world history is not easy. Unavoidably, we must simplify the story by knitting together a few strands of the voluminous historical record. Anyone who tries to draw such a grand picture deserves respect. There is nothing wrong per se with thinking big. But large-scale explanatory schemes are fraught with dangers. Too often the big thinkers merely repeat old stereotypes held by eighteenth and nineteenth century Europeans about classical Asian civilizations. Tired cliches are dressed up as new theories, ignoring recent research. My goal in the following comments is to explore the implications of some recent work on imperial China in the early modern period [ca. 1500-1800 CE]. I hope to undermine the popularity of excessively oversimplified descriptions of imperial China and to point the way to more nuanced discussions. I am not trying to present a final answer; more important is the process of thinking through the question: How do we assess long term social and economic change in China comparatively? Consider these remarks as sketches for lecture notes, or for class discussion, rather than finished research.

A central question for European historians is the origin of the Industrial Revolution. For China, the inverse question is often raised: why did imperial China 'stagnate', or fail to break through to sustained industrial growth by 1800, when it had led the world in economic dynamism and technological innovation at least up to 1200 CE? Both of these questions have generated a great deal

of discussion. We are plagued, however, by 'fast-food' explanations which attempt to take a shortcut through complex empirical and theoretical issues.

These shortcut explanations have a common pattern. First, they construct a binary contrast between social and economic features of China [or Asia], on the one hand, and 'the West', on the other. They describe the essential features of each civilization in generalized terms, and explain economic development in one, and the lack in another, as deriving inevitably from these fundamental characteristics. They claim that there is an unmediated link between one undifferentiated factor -- a cultural or economic system -- and another. For example, the supposed exclusive focus of Confucian classics on moral philosophy, by contrast with Western exploration of the natural world, is taken to explain the lack of development of natural science in China by comparison with the West. Or the purported 'hostility' of China's imperial state to 'commerce' , revealed in the classification of merchants as the lowest group in the four-class status system [scholar-peasant-artisan-merchant], it is argued, explains why trade flourished in Europe and not in China. The notorious 'Wittfogel thesis' argued that China was an 'Oriental Despotism' where the imperial state controlled crucial supplies of irrigation water. There could thus be no freedom in the East, unlike the West.

People like these big, bold assertions: they simplify the world. If they were true, we would have settled easily some very difficult problems. But in their simplest form, these generalizations are so obviously wrong that most historians of China hardly take them seriously. Still, we cannot ignore these pervasive stereotypes. We do need to present evidence to refute them, but we should also try to see why so many well-informed people still believe them. Perhaps, as William McNeill argues, 'mythistory' is an inescapable part of humans attempts to explain their past.[3] The historian's job, then, is twofold: of to separate myth from history, as Thucydides and Sima Qian did, and to explain why myths have such a tenacious grip on the imagination.

But our most difficult task is to transcend critique by creating a really convincing account of why social and economic developments did differ around the globe. We need to embrace a truly global history, one that does not separate societies into closed compartments, but one that recognizes the constant structured interactions between the peoples of the world over long periods of time.

Nearly all studies of the origins of the Industrial Revolution in Europe have examined it in a narrow,

local context. The vast bulk of work concerns only late eighteenth-century England. Explanations tend to fall into two categories, which may be dubbed the 'secret elixir' and the 'laundry list'. The first class singles out one factor held to be unique to England, or most predominant there, and lacking elsewhere. Absolute individual property rights, in the influential paradigm of Douglass North, were guaranteed to land and commercial owners in England after the Restoration settlement of the 1680s. This security of tenure encouraged investment and technological change, because property owners could be certain of reaping the gains.[4] Other explanations stress the proximity of coal supplies to water transport, the sixteenth-century enclosure movement that ousted independent peasant proprietors, creating a potential proletariat, etc. Those who do not find any single explanation decisive try to group them together , creating a long list of the factors that made England distinctive. But by listing a group of explanations we only describe the situation; we do not single out what mattered most.[5]

Here is where comparative explanations are useful. History is not a science of controlled experiments, but careful examination of different cases can help single out the most salient differences, and underline commonalities. Comparisons of England to France in the eighteenth century have helped to extend the debate. The upshot is that no single factor stands out as a crucial determinant present in England and absent elsewhere; and in fact French growth rates were almost the same as those of England. [6]

Many of the comparative questions raised by the France vs. England debate also appear in comparisons of Europe to Asia. Once again, scholars try to single out special factors present in Western Europe that are not found in China. But nearly every attempt to find decisive differences between East and West has been refuted. This is the most important conclusion of a generation of research on the socio-economic history of imperial China. Of course, Europe and China were not identical, but many of the long-standing myths about the contrast of East and West have been shown to be unfounded. The most enduring myths refer to property rights, demography, and commerce.

Let me summarize some of this recent research:

First, let us examine the claim that secure property rights are necessary for economic growth. Because seventeenth-century England protected property, investment in agriculture generated

increasing productivity, and eventually investment in industry. Without security of tenure, owners of capital will not invest in productive activity; instead, their profits will be taken away by 'rent-seeking' governments. Imperial Spain provides an example of an absolutist regime that suppressed economic growth by increasing its power. Because the Spanish empire extracted taxes from entrepreneurial capitalists and landowners, production stagnated. Spain, despite its supplies of New World precious metals, failed to generate self-sustaining economic growth. This model has been extended to imperial China. Both North and David Landes explicitly endorse Wittfogel's thesis that China had a despotic imperial regime that granted its subjects no freedom and no protection for property. [7]

Older studies in Chinese legal history seemed to support this view. Scholars who examined the Qing code, or model legal cases prepared for magistrates' guidance, found that the code paid very little attention to 'trivial' civil cases. Only criminal cases, like homicide and tax resistance, appeared to concern the state. Bodde and Morris concluded that imperial Chinese officials had no interest in securing the rights of their subjects to own and alienate property. [8] But recent research, based on archival materials of real cases brought to Chinese courts, has overturned this assumption. It is now clear that civil cases did constitute a large percentage of a magistrate's docket; that magistrates did adjudicate cases according to the code; and that even ordinary peasants had some access to the courts.[9] Of course, this does not mean that all Chinese had equal access to the law; but in what legal system has this ever been true? Just look at Dickens *Bleak House*, or the OJ Simpson trial.

Ingenious Chinese litigators knew how to get a magistrate s attention. Even though magistrates constantly castigated "pettifoggers" [*songshi*] as wicked disruptors of harmonious relationships, the litigation masters brought complex property disputes into the magistrate's yamen. What if a magistrate insisted that he would only hear homicide cases? Brokers provided corpses, snatched from local graveyards, so that a civil dispute could masquerade as a criminal one.[10] Chinese people, as seen by their own officials, were by no means passive victims of a totalitarian state. Instead, officials, and modern scholars, see them as unruly, litigious, active agents, who found many legal and illegal methods of enlisting the state in the defense of their economic interests. Even if it was not the most efficient way to do business by our standards, people did do business. Early modern Europe, with its landed elites, its religious restrictions, and its tangled jurisdictions over land

and commercial property, hardly meets the free market ideal either. Add in religious warfare, the expulsion of entrepreneurial minorities like the Huguenots, Moriscos, and Jews, state confiscations of monastic lands, and pogroms, and Europe hardly looks like the land of secure property. There was a rough equivalence between the nature of property rights in China and Europe. We cannot conclude that there was a decisive difference in the security of property that significantly affected economic growth.

A second short-cut explanation invokes demography. According to this thesis, western Europeans stand out for their unique marriage system. West of the line from Leningrad to Trieste most women married late [at an average age of 24.5 to 26.5 years], and a relatively high ten to twenty percent of the population remained unmarried.[11] This demographic structure has been held responsible for the European miracle, because it kept aggregate population growth rates down, allowing for the accumulation of an agrarian surplus. In Asia, by contrast, nearly all women were married by age twenty-one, and many scholars assumed that no woman could control her fertility once married. Once again, they invoked undifferentiated cultural norms: Chao Kang claims that Confucian norms supported large extended families, therefore peasants were induced to have large numbers of [male] children. This fertility is supposed to have eaten up the productive surplus with population growth. [12]

The myth of unregulated fertility in Asia goes back at least as far as Malthus. David Landes perpetuates the myth in a pithy phrase: "Early, universal marriage and lots of children. That takes food, and food in turn takes people. Treadmill". [13] But Malthusian myths have yielded to realities. Chinese families, despite early marriages, began births later and stopped earlier than Europeans, and used extensive □post-natal abortion□ [infanticide] and birth spacing to keep family sizes in balance with economic resources. James Lee and Cameron Campbell state: "In contrast with the European demographic system where there was only one form of voluntary control over population growth -- marriage --the imperial Chinese demographic system was characterized by multiple forms of control □[it] exhibits a form of rationality that was in many ways proto modern" [14] Thus Malthusian pressures were broadly similar in both Europe and China for most of their histories.

We should have known long ago that there cannot be a long-lasting, culturally determined contrast

between Chinese and European demographic growth. China□s population has consistently been about 25 to 35% of the world, as Europe has ranged from 20 to 25%. Today, China has declined to 20 percent, while Europe has declined to 12 percent. China looks □big□ demographically because we apply the same label to all the people in this continental land mass. If we compare China to □Europe□ as a whole, once again we see rough equivalence.

Finally, a third common stereotype describes China as a land inhospitable to trade. Several misconceptions have contributed to this view. The cultural essentialists first take China to be predominantly a 'Confucian' society , by which they usually mean the endorsement of the Confucian classical texts as required reading for advancement in the bureaucratic examination system. Then, this 'Confucianism' is described as an 'agrarian' philosophy, which only recognizes agriculture as a source of wealth, and demeans commerce. Finally, invoking the despotism thesis, imperial state officials are seen as interested only in repressing merchants in order to raise tax income.

To be brief, I can only cite a few objections here. The stereotype boils down China to the official Confucian orthodoxy, ignoring its multiple belief systems. Buddhism, for example, had a powerful economic impact throughout the imperial period. Buddhist monasteries pioneered land clearance in many regions, developed pawnshops, and generated extensive trade at pilgrimage sites. The 'other worldliness' of Buddhist religious teaching by no means prevented monks or believers from engaging in active commerce. Chinese families energetically tried to build up wealth inherited from ancestors. Gentry elites often collaborated with merchants in joint ventures. 'Statecraft' writers, who attempted to apply principles from the classical texts to questions of economic policy, often urged allowing merchants to move freely in order to facilitate trade. Low license taxes on markets were designed to maintain stable trading conditions, not to extract wealth from merchants. Wu Bingjian [Howqua], worth US$56 million in 1834 was one of the wealthiest men in the world, comparable to his contemporary, Nathan Rothschild. [15] In comparative perspective, Chinese commercial wealth in total was at least equal, and probably superior to European wealth, and state attitudes to commerce seem quite enlightened.

These are some of the basic conclusions that have emerged from recent research on imperial China's social and economic history. In some intellectual backwaters, the significance of these results has not

yet been appreciated. Modernization theorists persist in drawing up lists of distinctions between 'traditional' Asian societies and 'modern' industrial ones. Others resolutely refuse to revise their views in light of new research. Clinging to outmoded works of decades past, they simply ignore, or reject, dissenting views. It is not only narrow-mindedness, or laziness, that explains such resistance. The hold of the Eurocentric myth is strong. Embracing the myth, instead of the reality, is comforting. It leads to the complacent view that Western technological superiority derives inevitably from Western special features of 'freedom', 'Judaeo-Christian values', or 'pluralism'. The cultural short-cut explanation diverts attention from divisions within both societies. A concentration on Western 'freedom' as a universal characteristic avoids mentioning our agonizing conflicts over slavery, a practice deeply embedded in the West. Although certain forms of human bondage did exist in imperial China, they never reached the vast extent of commercialized slave trade and plantation labor found in the New World colonized by Europeans. Celebrations of 'pluralism' as found in the diversity of the European state system play down the role of interstate warfare. In general, the role of military mobilization in advancing technological change is minimized by economic historians, but it is well recognized by historians of technology.

II. Beyond Mythology: Alternative Explanations

After demolishing outdated, oversimplified dichotomies, what□s next? Certainly, we can continue to pursue binary comparisons , but much more subtly. In the classic grain riot, for example, local people claimed the right to buy food at a fair price, before merchants took it away. Widespread in both Europe and China in the eighteenth century, it disappeared from Europe in the nineteenth, but persisted in China up through the twentieth century. By looking at why the grain riot vanished from Europe but not China, R. Bin Wong develops original comparative insights into the transformation of both societies in the modern era. [16]

Here, however, I want to explore a different route: the incorporation of China into a larger global context that includes Europe. There are many advantages to viewing the industrial revolution as a single, global process, rather than as a horse race between nations or civilizations. In a global perspective, many different regions play a role. The spice harvesters of Asia were just as much a part of global discovery missions as were the European explorers. It was the fame of the great Asian

commercial centers that drew Columbus and others out to sea. British textile manufacturers were driven to reduce costs because of the competitive power of Indian domestic production, and the appeal of the Indian market. Even the earliest manufacturers conceived of global markets. As Matthew Boulton wrote to his partner James Watt in 1769: "It is not worth my while to manufacture [your engine] for three countries alone; but I find it very well worth my while to make it for all the world" [17] By the early nineteenth century imperialists used new technologies like the steamship and railroad to penetrate global markets. Their primary targets were the commercial centers of Asia. [18]

Andre Gunder Frank's *ReOrient,* essential reading for anyone trying to place Asia in the world, insists on the interactions between different parts of a single unit, instead of looking for special features in one isolated region. Frank's holistic perspective recognizes that the individual parts are directed by their interactions with the outside world. The Chinese peasant who paid his taxes in silver participated just as much in a global economic network as did the London banker, the Peruvian miner, or the Spanish galleon captain. Causes of economic and technological change, in a global perspective, cannot be reduced to a list of special characteristics of any single area. The rise to dominance of one region depends on its position within the world network.

Power and wealth, of course, were not equally distributed in the world system. Some areas dominated others, either through direct colonial rule, or through superior economic strength. Much of global economic history is the story of the rise and fall in relative strength of different regions, and the shifts of concentration of resources from one place to another. On the small scale, we can discuss the shift of economic centrality from Antwerp to Amsterdam to London, or from Hangzhou to Shanghai and Hong Kong. On the large scale, we can examine the replacement of England by Germany as the dominant European economic power, or the dominance of the entire world by European powers in the age of imperialism. In a global perspective, these shifts in power are analogous changes within a wider structure instead of events unique to one country or time.

Frank is absolutely correct to insist on global interconnectedness after 1500 CE. Critics of the world system perspective generally point to the very small percentage [perhaps 2%] of world production occupied by overseas trade , but this misses the point. It does not take a large amount of trade to

produce competitive pressures between two societies. As long as European producers knew that Asian goods were competitive, and adjusted their behavior in light of this knowledge, relatively small trading volumes had large effects. British textile manufacturers were well aware of the robust competition offered by Chinese producers. By 1859, England had still failed to increase significantly its textile exports to China. W.H. Mitchell noted that the British "were about to start in competition with the greatest manufacturing people in the world, with a people who manufactured cloth for themselves when the nations of the West wore sheepskins, and that any development of our manufactures in this country must necessarily be very slow", because the "beautiful and simple economy" of peasant household production "renders the system literally impregnable against all the assaults of foreign competition". [19] Even by the 1850s, British textile manufacturing had no cost advantages for mass markets in China; only opium and the 'country trade', both from their Indian colony, gave them profitable access to China. It was not cultural obstruction, or fiscal exactions, but sheer competitive power, that walled off China from foreign goods for so long.

That is how British textile manufacturers saw themselves linked to Chinese markets. What about the other way around? How did Chinese exports affect the rural Chinese economy? Sucheta Mazumdar's study of Guangdong's sugar industry shows that this important export crop transformed the way rural people worked their fields. As exports grew, peasants shifted over from rice to sugar cane cultivation in response to foreign demand. [20] Thus there is good evidence of connections between Britain and China in significant export trades, and they were only two components of a complex global network. Frank deserves great credit for pointing out the importance of these connections. I generally avoid his term 'world system', however, because I do not think that the linkages between regions were as tight, or determining, as he and other theorists believe.

The Industrial Revolution, however, was a dramatic breakthrough into new levels of technological advance and productivity. In trying to explain this shift, Frank, too, falls back on a tried and true shortcut explanation: the relative supply of labor. Simply put, the 'relative factor prices' thesis argues that labor was abundant in Asia and scarce in Europe; therefore inventors and entrepreneurs had incentives to substitute machines for men in the West, but they could easily increase production with more people in the East. This thesis, like the cultural and Malthusian ones above, has a long lineage. Like them, it draws large conclusions from a simple contrast between the two cultures. Unlike the

other dichotomies, it is based on one real fact: population density was higher in the core of China than in Europe. Although China and Europe had comparable populations, China has only seven percent of the world□s arable land. The contrast is, on the gross level, correct. But is this the right scale of comparison? Continental comparisons between 'Europe' and 'Asia' do not rest on any fundamental geophysical features: The 'Eurasian Oecumene' is a single unit.[21] Parts of Europe, like the Netherlands, are more densely settled than parts of China, like the Northwest. Which is the relevant scale for linking labor supplies with technological change? If laborers were very mobile, we might claim that continental comparisons matter, but generally, migration between countries, or regions, was slow. And clearly, low population density alone cannot induce technological innovation, else Siberia would be the most technologically advanced region of Eurasia. Markets, capital, inventiveness, and raw materials have to be present together, along with labor scarcity, if the thesis is to be valid. Northern England, and Northern America, stand out as the best cases, but how typical are they?

Let us look again at the sugar industry as an example of technological innovation. Guangdong , a southern province of China, by the eighteenth century became one of the largest sugar exporting regions in the world, rivalled by the European plantations in the Caribbean. In both regions, as production expanded in response to growing demand for sweets in Asia and Europe, expanded acreage demanded more labor. But there are other answers besides technology to labor shortage. Slavery was one. This was the solution used by European and American planters. They could not get white men or Indians to perform this backbreaking, dangerous labor, so they imported African slaves. According to David Landes, from a 'holistic perspective', the effect of slavery was to 'stimulate both agriculture and industry, increase wages and incomes in Britain, promote the division of labor, and encourage the invention of labor-saving devices'. It was a 'crucial part' of a whole production system. [22]

In China, thousands of free peasant smallholders converted much of their paddy fields from rice to sugar cultivation in response to market demand. Bondage could not be imposed on most Chinese peasants, but they were willing to work hard. In fact, many southern Chinese emigrated to the sugar regions of the New World in the nineteenth century to replace newly freed slaves in the fields. Chinese peasants, merchant and lineage purchasers, millers, and exporters created a large production

network that linked Guangdong to the growing world market.

In the nineteenth century, using cheap iron, Englishmen invented steam-powered sugar processing mills. Extending steam power into the Caribbean plantations, they developed new mechanized techniques for crushing, evaporating, and drying sugar. This technological revolution drove down labor costs and expanded production dramatically. China, by contrast, maintained its level of exports without mechanizing. Was it abundant labor that inhibited mechanization of the Chinese sugar industry? A comparison of the experience of Guangdong and Taiwan indicates that the answer is no. Taiwan, like Guangdong a densely settled subtropical region suited for sugar cane production, expanded its output significantly and maintained a level of exports varying from 15,000 to 60,000 tons during the nineteenth century. Taiwan's technology of production began to change dramatically in the late nineteenth century under the rule of Governor Liu Mingchuan and continued under the Japanese after they seized the island in 1895. Japanese colonial officials promoted many measures to develop Taiwan's agricultural exports to Japan. Agricultural extension stations spread new plants, and controls on quality ensured a standardized, continuous supply for the mills. Most important, after conducting a land survey, they assigned secure title to a single proprietor and eliminated Chinese guild control of marketing. Cultivators on Taiwan remained smallholders, but became in practice contract laborers producing sugar for the colonial industrialists. By 1908, Japan had established fifty new factories using steam machinery, and closed down smaller, unmechanized Chinese ones.

Crisis hit the sugar industry from 1900 to 1914, marked by falling prices and overproduction world wide. In China, peasants abandoned sugar cane as a crop and switched back to rice, fruits, and vegetables, but in Japan, industrialized milling allowed expansion of exports to both the protected Japanese and open Chinese markets. Taiwan's sugar exports boomed to over 256,000 tons in 1910, while Guangdong collapsed to 42,000.[23]

Thus the technological changes in the sugar industry had little or nothing to do with the relative price of labor, but a lot to do with the action of the two states. The colonial Japanese state could enforce social changes that supported a total system of industrial production, from the field to the factory to the ports, but the weakened Qing empire, despite its efforts at self-strengthening, had the will but not the strength to direct change. Liu Mingchuan's successful efforts on Taiwan show that Chinese

officials, like the Japanese, recognized the necessity for technical change, but the growing disunity of the empire allowed them only sporadic successes.

III. Conclusion

The powerfully embedded mythology of a despotic, unchanging, overpopulated East still continues to mislead us when we examine China's economic development comparatively. In teaching about Asia as part of global history, we need to overturn the opposition of an essential East to an essential West and examine the complex specific interactions between the various regions of the world. Cultural values do affect economic growth, but not by any one-to-one mapping of a single norm onto a single action. Cultural ideals are expressed in particular actions, which never coincide exactly with the prescribed pattern. They are both underdetermined and overdetermined.[24] Any one action can derive from multiple cultural and economic motives. You may buy fruit at the market to present at an ancestral altar, but also try to get it at the lowest price. But no one action expresses the whole of a cultural system. There is no simple direct link from 'filial piety' as a Confucian value to a family-centered firm. Mediation matters. In between values and behavior are institutional contexts, and individual decisions within those contexts.

Likewise, economic incentives derived from factor prices, like the cost of labor, do not directly drive major technological changes. Macroinventions, like biological mutations, happen rarely, and almost fortuitously. [25] Europe's industrial revolution could not be predicted in advance. Even as late as the 1770s, the greatest social analysts, Adam Smith included, thought in terms of an agricultural society. Since we cannot trace an inevitable path from the Middle Ages to industrialism, it is absurd to claim that "for the last thousand years, Europe has been the prime mover of development and modernity". [26]

In a global perspective, the rise of Europe in the nineteenth century was one more great shift in the locus of power within a larger network. Asian societies maintained unquestioned dominance at least until 1500 CE, and were equal in most respects until 1800 CE. Property rights, demographic dynamics, commercialization, and "proto-industrialization" displayed broad similarities across much of Eurasia. 'Big□ changes are not necessarily 'deep'. The Industrial Revolution was not the inexorable outcome of long established European superiority in technology, rationality, or

commerce. It was a late, and sudden shift in dominance of the global economy, the result of a particular combination of political and economic events.

Contingency and unpredictability are facts of the modern world, but they shape our views of the past. We need to accustom ourselves and our students to surprising, rapid, discomforting change. The metaphor of □punctuated equilibrium" used by evolutionary biologists finds the sources of species change in surprising transformations in small, somewhat isolated regions, which then spread rapidly to the whole.[27] In studies of climate change, scientists now realize that global temperatures in the past have changed rapidly in a short period of time, rising as fast as 10 degrees in a decade Despite sophisticated tools of analysis, we have seen many failures of prediction in the contemporary world, from the collapse of the Soviet Union to the current Asian financial crisis. Perhaps the historian can best contribute to understanding of modern global issues by stressing, first, that global linkages are not a product of the Internet age: they have always existed, in varying degrees of strength, in the human past; and second, that analysts should examine the evolution of countries, civilizations, or peoples within a global frame of reference, but without making assumptions that substitute Eurocentric mythology for empirical analysis. In our study of the past and present, Asia's prominence in a united world needs repeated emphasis. Contingency, hybridity, and interconnection within larger structures are useful tools for conceiving both of the modern world and of the past.

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[5] R. Bin Wong, *China Transformed: Historical Change and the Limits of European Experience* (Ithaca, 1997)

[6] N.F.R. Crafts, "Industrial Revolution in England and France: Some Thoughts on the Question 'Why was England First?', in Joel Mokyr, ed. *Economics of the Industrial Revolution*, pp.119-31

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[12] Eric L. Jones, *The European Miracle: Environments, Economies, and Geopolitics in the History of Europe and Asia*, Cambridge, 1987; Kang Chao, *Man and Land in Chinese History:An Economic Analysis*, Stanford, 1986.

[13] Landes, p.23

[14] *Fate and Fortune in Rural China: Social Organization and Population Behavior in Liaoning, 1774-1873*, Cambridge, 1997, p. 56. Total marital fertility in China was 6.3, in Europe 8.5.[Lee & Campbell, 90] First births among the eighteenth century Qing nobility came thirty-seven months after marriage, and women stopped bearing children at age 34; Europeans began after eighteen months and stopped at age 40. [Wong 23]

[15] Sucheta Mazumdar, *Sugar and Society in China: Peasants, Technology, and the World Market,* Harvard, 1998, p.117; Landes, p.1.

[16] R. Bin Wong, *China Transformed*.

[17] Andre Gunder Frank, *ReOrient: Global Economy in the Asian Age* (Berkeley, 1998), p.291.

[18] Daniel Headrick, *Tools of Empire,* Oxford 1981.

[19] W.H. Mitchell, "Correspondence relative to the Earl of Elgin's Special Missions to China and Japan, 1857-1859", in Masatoshi Tanaka, *Chugoku Kindai Keizaishi Kenkyu Josetsu* (Introduction to the Study of Modern Chinese Economic History), Tokyo, 1973, p.305-318.

[20] Mazumdar, *Sugar and Society in China.*

[21] Martin W. Lewis, Karen Wigen, *The Myth of Continents:A Critique of Metageography* (Berkeley, 1997)

[22] Landes, p. 120

[23] Mazumdar, p.357.

[24] Marshall Sahlins, *Islands of History,*

[25] For comparison of inventions to mutations, see Joel Mokyr, *The Lever of Riches: Technological Creativity and Economic Progress*, Oxford, 1990

[26] Landes, xxi.

[27] Stephen Jay Gould, *Wonderful Life:The Burgess Shale and the Nature of History*, Norton 1989