

## TECHNOLOGICAL CREATIVITY AND THE RISE OF THE WEST

Joel Mokyr, *The Lever of Riches: Technological Creativity and Economic Progress*  
(Oxford: Oxford University Press, 1990)

By the dawn of the twentieth century, nations that constitute “Western Civilization” appeared to hold a position of economic and technological dominance over those of the rest of the World, despite the earlier advantages of the economies of Eastern and Near Asia. Historians and economists have put forth many explanations for this shift, including exceptionalist theories of European science, *mentalité*, or economic and socio-political organization; others have attempted to explain it through geographic determinism or the questions of resources or of population. In *The Lever of Riches* (Oxford University Press, 1990), however, Joel Mokyr claims that the previous focus of historians upon “Smithian” growth – economic shifts through expanded commerce – or upon “Solovian” growth through capital investment ignores or downplays an important, potentially vital, factor in the rise of the West. Neither, he maintains, can truly explain the explosive growth of the West between the fifteenth and nineteenth century. Rather, he avers the relative surge of the Western economies was the result of “Schumpeterian” growth through technical change. The increase in the “stock of human knowledge” led to the development and expansion of technologies that allowed the efficient production of more and better products and improved utilization of existing resources.<sup>1</sup> Mokyr therefore focuses upon this means of growth, examining the process of technological change from the Roman period through to the early twentieth century and analyzing the nature of the change and why some regions or nations managed to show “technological creativity” while others did not.<sup>2</sup>

Mokyr identifies two distinct narratives of technological change. The “great man” narrative predominated in early historiography, in which the story of

technology focused upon a limited number of heroic inventors. More recent historiography emphasizes the gradualist approach that denies the importance of such inventions and stresses instead the continual accumulation and refinement of knowledge and techniques. Mokyr argues that neither fully explains the evidence. Using a historical survey of technological inventions and innovations over two thousand years, he maintains that any narrative should merge both ideas. Through much of Western European history, the majority of change in technology was gradual. In particular, agricultural and naval technology did not show sudden surges from big inventions but rather an ongoing, steady improvement. Nevertheless, some inventions did utterly alter the technological paradigm. Although there may well have been precursors to inspire the invention and although the invention may have needed further development to be adopted widely, some inventions were too groundbreaking and critical to ignore. Henry Bessemer’s idea for a technology to manufacture cheap steel had no real precursors.<sup>3</sup> Similarly, Johannes Gutenberg’s “profoundly brilliant” invention of the movable type printing press so changed the technological and socio-economic landscape that historians should recognize it as such.<sup>4</sup> The former gradual refinements, Mokyr defines as “microinventions,” the latter as “macroinventions.” Only when a society can exhibit both can it continue to progress. Without macroinventions, a society’s progress will slow and ultimately reach stasis; without microinventions, undeveloped big ideas will rarely find traction and power change.

For Western Europe, Mokyr appears to make a convincing *prima facie* case for both being factors in technological change with the evidence from his survey. However, given he considers only Europe in depth, one

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<sup>1</sup> Joel Mokyr, *The Lever of Riches: Technological Creativity and Economic Progress* (Oxford: Oxford University Press, 1990) 6.

<sup>2</sup> *Ibid.*, 11.

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<sup>3</sup> *Ibid.*, 116.

<sup>4</sup> *Ibid.*, 49

must question whether or not his thesis similarly applies to other societies or in other periods. Especially instructive would have been a deeper consideration of the technological achievements of Sung China. Although he compares China and Europe briefly and acknowledges the clear superiority of Chinese technology in the fifteenth century, he does not differentiate explicitly between macroinventions and microinventions when surveying Chinese achievements. His implication is that rapid Chinese technological progress was predominantly through continual “innovations” rather than specific inventions and that the Chinese ignored or cast aside potentially important macroinventions such as Su Sung’s water clock.<sup>5</sup> This, he infers, led to a slowdown and ultimately to stagnation in technological progress. Then, discussing the reasons for the Chinese “failure” to achieve their full technological potential and industrialize, he takes as a given the Chinese reliance upon innovation over invention without having provided any concrete proof or even discussion of this assumption. By deleting this step, he not only weakens his Chinese argument, but also weakens the overall line of reasoning.

Moreover, Mokyr underestimates a third potential thread in the history of technology, one emphasized by John Hobson in *The Eastern Origins of Western Civilization* (Cambridge, 2004). Hobson argues that many of the “inventions” of Western Europe actually originated in Asia, especially in China.<sup>6</sup> What part did technologies external to the West thus play in Western progress? Mokyr does admit the place of technological borrowing. Indeed, comparing Europe with Islamic society, he asserts that Europe was “equally willing to learn from other cultures, but never lost its capacity to improve upon and refine others’ ideas.”<sup>7</sup> Yet he barely acknowledges any such borrowings within the text. Instead, his narrative is one of European “technical brilliance” and ingenuity, brushing over the influence of Muslims and the Chinese upon Europe

as irrelevant to European technological creativity.<sup>8</sup> Perhaps this is the case. Yet without entering into a dialogue with the ideas that Hobson expresses, his assertions remain unconvincing.

After this long survey of European technological achievement, Mokyr proceeds to analysis reasons for this success. Interestingly, and in contrast to Toby Huff, he downplays the part of European “modern” science as a factor.<sup>9</sup> Differentiating between the theoretical nature of science and the practical nature of technology he argues that technological creativity could exist without a scientific background. Indeed, many of the technologies that emerged from Europe did so before anyone could explain the science behind them. Only by the end of the nineteenth century did science catch up to European technology. Certainly, some of his survey examples give credence to this assertion, including the steam engine.<sup>10</sup> However, Mokyr’s subsequent implication that France and Germany pulled ahead of Britain because of superior science does not sit easily with such claims.<sup>11</sup>

Analyzing other theories of technological progress, Mokyr similarly finds little in many of them supported by the historical evidence. He disposes rapidly of arguments linking life expectancy, nutrition, labor costs, war and geographical environment to technological progress. However, he does admit that cultural and political factors, such as religion and Annalist concept of *mentalité*, “had an evident effect on technological creativity”. In particular, he cites the case of India, arguing that the Brahmanist caste system severely hindered technological creativity.<sup>12</sup> Nevertheless, he appears to reject Alfred Crosby’s suggestion that the shift from qualitative to quantitative reasoning in the late Medieval and Early Modern periods was essential, instead to portraying *mentalité* and social

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<sup>5</sup> Ibid., 209, 220.

<sup>6</sup> John M. Hobson, *The Eastern Origins of Western Civilization* (Cambridge: Cambridge University Press, 2004), *passim*.

<sup>7</sup> Mokyr, 44.

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<sup>8</sup> Ibid., 49

<sup>9</sup> See Toby E. Huff, *The Rise of Early Modern Science: Islam, China and the West*, 2<sup>nd</sup> edition, (Cambridge: Cambridge University Press, 2003), *passim*.

<sup>10</sup> Mokyr, 90.

<sup>11</sup> Ibid., 244.

<sup>12</sup> Ibid., 172.

values as contributory.<sup>13</sup> Likewise, he depicts property rights, institutionalization and state structure as crucial contributory factors. While this approach lacks the clarity of an essentialist thesis such as Eric Jones that institution formation lay at the heart of the European “miracle,”<sup>14</sup> its complexity seems to far better reflect the evidence as presented. According to Mokyr, no single explanation is available or even possible for the incredible spurt in European technology. Indeed, different factors had shifting impacts depending upon time and place. This complex nexus of influence he illustrates with his examples in chapters eight through ten. Nevertheless, he concludes that the two predominant foundations behind Europe’s technological creativity were the “materialistic pragmatism” that encouraged Europeans’ attempts to manipulate nature and the divided nature of European political structure that spurred competition and made slipping into secure stasis too dangerous to contemplate.<sup>15</sup>

These factors may explain European technological flowering but Mokyr is less convincing in his attempt to translate technological dominance into economic dominance. While Schumpeterian growth through technology is certainly plausible, Mokyr gives little analysis of why it should triumph over other forms of growth. If China, as he maintains, continued to grow in the Manchu period without technological progress, then why did it not maintain its lead over Europe in the late nineteenth and twentieth centuries? Moreover, how could it maintain domination until the beginning of the nineteenth century, long after Europe had surpassed it in technology? This suggests that the interplays of Smithian, Schumpeterian and Solovian growth and their effect upon the overall economic health of a society are rather more complex than Mokyr admits and that scholars should not

rely upon technological progress alone to explain twentieth century Western hegemony.

Nevertheless, Mokyr does make a good case that technological creativity and subsequent growth was, if not a causative factor, then a contributory one in the rise of the West and that various factors played into that technological creativity. Certainly, he does not shy from admitting the complexity of the picture nor the research that still remains to be done. It is therefore a potentially useful text on this aspect of world history. However, due to the lack of more in depth consideration of other societies, and in particular the regrettable briefness of his comparison between China and Europe, it does not stand alone but should be read as one of a range of texts that together might shine a light upon what remains a contentious and important question.

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<sup>13</sup> Alfred W. Crosby, *The Measure of Reality: Quantification in Western Europe 1250–1600*, Reprint edition (Cambridge: Cambridge University Press, 1997).

<sup>14</sup> Eric Jones, *The European Miracle: Environments, Economies and Geopolitics in the History of Europe and Asia*, 3<sup>rd</sup> edition (Cambridge: Cambridge University Press, 2003).

<sup>15</sup> Mokyr, 302