

to understand “coloniality” and the subaltern, as Burns does, or if one reads it as an account of property rights and power structures, as I have suggested one could, Walter Mignolo and Daron Acemoglu would both insist that there should be something particularly colonial about this story. Yet, Burns struggles to find anything that would look very different from notaries’ activities in Spain. She suggests that a particular kind of document was uncommon in Seville and that Cuzco notaries were more likely to add irreverent “doodles” to their dry tasks.

That is hardly the stuff of exploitative colonial institutions. It sounds more like the difference between a more specialized and competitive notariat in a large city (Seville) and its more pedestrian cousin in a smaller town (Cuzco). Having spent a decent amount of time in peninsular Spanish small town notarial archives, Burns’ account sounds all too familiar. A Basque-speaking illiterate iron worker from the Vizcayan valleys had to rely on the notary’s truthfulness in just the same way as the Quechua peasant in Cuzco.

Issues such as if colonial institutions were systematically exploitative and how property rights were created and enforced do not have to remain a question of faith though. Hopefully, creative economic historians with some language skills will delve deeper into these archives and mine the exceptionally rich contractual evidence for their model building. Thanks to Burns, that is now a little easier.

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GENERAL AND MISCELLANEOUS

Prime Movers of Globalization: The History and Impact of Diesel Engines and Gas Turbines. By Vaclav Smil. Cambridge, MA: MIT Press, 2010. Pp. 261. \$29.95, hardcover.

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Economic historians love technology. From Karl Marx to David Landes and Nathan Rosenberg, our tribe has always felt machines and devices to be endlessly fascinating. Whether or not one feels that “technology drives history,” it is clear that we cannot do economic history without it. Yet there has been a rather quaint estrangement between economic history and the history of science and technology as currently practiced. Despite our best efforts, economic historians have never felt quite comfortable with “social constructivism.” Somehow economics and postmodernism never really got on. Fortunately, the history of technology is a big field, and within it a few scholars continued to work as if the entire SCOT program did not exist. What they see was technological advances, the solution of bottlenecks, inventors and engineers struggling to get things to work better and make us richer and more comfortable, to raise productivity through persistence and ingenuity, and improve living standards. Among those, none is better and more accomplished than Vaclav Smil.

Smil is something of a phenomenon. Arguably in the field of Science and Technology Studies, he may himself be regarded as a “prime mover.” The author of about a book a year for the past decade, he counts among his admirers none other than Bill Gates, and has been designated as one of *Foreign Policy* “top 100 global thinkers” (whatever that means). Smil, working solo from the Canadian prairies in Winnipeg, is somewhere between a historian of technology and an environmental scientist, a historian of the planet and what humans have been doing to it through their technological prowess.

Computing, he feels, has been overrated in the technological advances of the twentieth century. For him it is hardware, chemistry, and energy that counts. [He even agreed to participate in a rather inane discussion initiated by *The Economist* last year in which he and another pundit debated what was more important, the computer or the prime movers, a debate that reminded this reviewer of the insipid story of Richard Strauss's opera *Capriccio* which is devoted to a risible debate which one is better, music or poetry.]

Smil is quite clear what he means by globalization. For him the internet, a world of instant communications and huge instantaneous data processing and access to information is at best secondary. Globalization is about moving *things* and *people* from here to there cheaply, rapidly, and safely. To do that, we need the technological means he calls "prime movers." This book is about two of the main breakthroughs that made this possible: the diesel engine and the gas turbine. While neither of these inventions is new, their full impact was only felt in the past twenty years. More than any other technological innovation, these two have made the world smaller, reduced the importance of distance and national borders, and allowed the integration of markets for goods and services to accelerate at a rate nobody could have predicted in 1950. The former moves the vast majority of all goods in the world, the latter has made personal freedom of movement a global reality.

Was this integration of the world "caused" by these two innovations (plus a few other, scarcely less important ones, such as cargo containers)? Did technology drive history? Smil points out that these two inventions have not received the credit they deserve in reducing transport costs and that their "Cinderella roles" in doing "virtually all the work of modern globalization" deserves much better understanding. It is hard to disagree. The book is chock-full of technical details and pictures of these two inventions, and Smil cannot hide his admiration for the breathtaking achievements of human ingenuity that they embody. The diesel, he notes, is one of those prime movers "that have had the most profound impact on the course of the global economy and . . . the everyday lives and expectations of billions of people."

In so doing, he asks the Fogel question: what would have happened without those two prime movers? Is there some kind of "indispensability axiom" here? Smil clearly thinks so. Some future economic historian is likely to compute that there were closer alternatives to diesel engines and turbo-fan plane than Smil lets on, and that the "social savings" of these two inventions as a proportion of GDP is less than overwhelming. Perhaps economic welfare in the world would not have been vastly reduced if Walmart's supply pipeline from China did not have modern diesel engines driving enormous container ships or British tourists did not take advantage of low-fare airlines, driven by modern gas turbine engines, to dissipate the fruits of human ingenuity through beer-laden weekends in German towns. The point is that perhaps these prime movers have driven the marginal utility of globalization down to a point at which we may want to pause and reflect on its full effects.

Smil's own views on this are clear. He realizes fully that the costs of globalization are high, in terms of the environment and many other variables besides. Moreover, these costs are likely to go up as non-reproducible inputs, above all fuel, will become scarcer and as some of the negative externalities become internalized by a public increasingly concerned with both global (rising temperature) and local (airplane noise) side effects. Yet in the end he shares the view that in the long run, there will always be more globalization, not less, and that these two prime movers will continue to be central to the technology driving it. He is reluctant to pass judgment: there are costs and there are benefits, and he admits being unable to weigh them against one another.

What might be added is that the achievements of these magnificent machines may be undone at any moment by the folly and fanaticism of a few, as happened to the proto-globalization of the decades before 1914 and as was (mercifully briefly) threatened following 9/11. The world has become richer and in many ways better thanks to those and similar machines, but the global economy is brittle. Container ships, for example, are not inspected very carefully, and one highly successful act of terrorism utilizing just one container would undo the cost reductions of decades of technological progress in diesel engines. The same is true, a fortiori, of Boeing 747s. Against the actions of fools, even those mighty engines themselves are powerless.

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Reconceiving the Industrial Revolution. Edited by Jeff Horn, Leonard N. Rosenband, and Merritt Roe Smith. Cambridge, MA: MIT Press, 2010. Pp. vii, 356. \$24.00, paper.
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This volume, the result of a 2005 conference, presents essays by leading scholars about industrialization in a dozen countries. The editors and conference organizers, Jeff Horn, Leonard N. Rosenband, and Merritt Roe Smith, brought together economic, technological, political, and social historians, and the multiplicity of approaches of the resulting essays adds to the comprehensiveness of the research. After the editors' able introduction identifying the themes of the book and situating them in the literature, the volume includes three essays largely on Britain, five on the Continent, two on the United States, and four on leading latecomers.

In spite of the diversity of place and approach, several themes give the book coherence. First, industrialization was not a simple break from existing economic structures; it had substantial continuity with earlier practices and institutions. The continuity was partly geopolitical. Patrick K. O'Brien argues that Britain first industrialized not because of its greater entrepreneurship or unique inventiveness. Rather, its resource base, especially its cheap coal, proved advantageous, and its navy provided internal and external security, protected markets, and supported metallurgical, shipbuilding, and other innovations. These factors do not explain the generation of new techniques, but they help to understand how techniques formed internally and abroad found a profitable home. Geopolitics could also limit development. According to Peter C. Perdue, the expansion of the Chinese empire in the eighteenth century led to Smithian growth that made China the economic and technological equal of Europe, but decisions to protect the land empire in the nineteenth century rather than developing a navy and investing in infrastructure limited industrialization. This geopolitical focus is nicely complemented by the important research of Jean-Laurent Rosenthal and R. Bin Wong, *Before and Beyond Divergence: The Politics of Economic Change in China and Europe* (Cambridge, MA: Harvard University Press, 2011). Continuity extended to labor markets, input markets, and family structures. Marta V. Vicente demonstrates how the flourishing, mechanizing calico industry around Barcelona from the 1770s through the 1830s rested on families for labor, capital, and management, and how large firms relied on outsourcing to ascending smaller firms.

Second, paths were diverse, and not only because latecomers benefitted from diffusion from early starters. In Jeff Horn's interpretation, French industrialization