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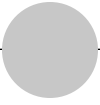
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# Introduction

Dora L. Costa and Naomi R. Lamoreaux

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This volume honors the memory of Kenneth L. Sokoloff with essays by colleagues, coauthors, students, teachers, mentors, and friends on themes associated with his work. The aim is to showcase Sokoloff's influence on the field of economic history and beyond and to carry forward the intellectual endeavors for which he was most renowned.

Sokoloff devoted his career to understanding the sources of long-run growth, particularly the role played by factor endowments and institutions in creating the conditions for sustained economic development. One of his most important contributions was his work with Stanley Engerman on the effect that initial factor endowments in different parts of the Americas had in shaping the subsequent development paths of the countries carved out of these regions (see Engerman and Sokoloff 2002). We open the volume with a new article from this project and then continue with two chapters that explore the argument and push it in new directions. The rest of the chapters in the volume range further afield, but all engage the central idea that underpinned Engerman and Sokoloff's work: that geography shapes patterns of institutional development and that one can use the resulting differences in growth trajectories to understand how institutions, as well as geography, matter for economic development.

There has been much scholarly debate in recent years about whether institutions are determined exogenously or whether they develop endogenously as

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part of the growth process. Sokoloff recognized that the answer could never be exclusively one or the other. Rather, he was primarily concerned with advancing the knowledge needed to further economic development by tracing out the implications for growth of particular sets of factor endowments and particular institutional choices. His usual *modus operandi* was to exploit aptly chosen comparisons, over time and across regions and countries, to make inferences about the direction of causation. The chapters in the volume pursue this basic method, using comparisons of different countries and also different parts of the same county to explore a number of topics that figure prominently in Sokoloff's work: how markets expand along both their extensive and intensive margins, the mechanisms that facilitate technological discovery, and the factors that encourage investment in human capital. As Sokoloff emphasized throughout his career, these topics are all interconnected. Ongoing technological change is the key to long-run economic growth, but it does not just happen. Inventors devote resources to technological discovery when expanding markets create new opportunities for profit and when there are institutions, like the patent system, that provide security for their intellectual property. They also need access to new sources of knowledge and incentives to make costly investments in human capital. Successful economies are those whose governments provide an infrastructure that facilitates the growth of markets, the security of property rights, and the development of human capital without encouraging rent seeking. How human societies create such successful economies is the larger question that structured Sokoloff's scholarly career. It is also the question that structures this volume in his honor.

At the time of his death, Engerman and Sokoloff had nearly completed their project on differential paths of economic growth in the Americas.<sup>1</sup> Their starting point was the observation that the societies with the best growth records in the nineteenth and twentieth centuries were generally those that had not been particularly well off during the colonial era, and they hypothesized that the pattern was not accidental. The richest, most prized colonies were those whose factor endowments were conducive to the production of high value crops using slave labor or the exploitation of large native populations in mining or other extractive activities. These colonies were characterized from the beginning by highly unequal distributions of wealth, and the elites at the top of the resulting social hierarchies put in place institutions that ensured their continued dominance. By contrast, in colonies where factor endowments were not so favorable to these high-value activities, wealth was more evenly distributed among the settler populations, and the institutions that developed were, for the time, more democratically structured. Engerman and Sokoloff argued that these early institutional differences were the key to the differential growth experi-

1. The book is forthcoming from Cambridge University Press under the title, *Economic Development in the Americas since 1500: Endowments and Institutions*.

ences of these economies after independence, and they developed this idea in a series of papers that looked at the implications of these differences for the subsequent evolution of suffrage rules and for the provision of public goods such as schooling (see Engerman and Sokoloff 2002, 2005; Engerman, Mariscal, and Sokoloff 2009).

The first chapter in this volume, “Once Upon a Time in the Americas,” continues this work by exploring the connection between factor endowments and the policies colonial governments adopted toward immigration and the distribution of land. The basic argument is that elites allowed broad access to land only when it was necessary to attract labor. In the main Spanish colonies, where dense populations of Native Americans meant there was little need for additional European labor, the government actually imposed restrictions on immigration. Where land was suitable for the production of sugar and other similarly valued crops—in Brazil, for example, and the Caribbean islands—the forced migration of Africans solved the labor problem. Only in British North America, where labor had to be induced to come voluntarily, did governments pursue policies to make migration affordable (by regulating contracts for indentured servitude) and attractive (by making land available to migrants who completed their terms of servitude).

Engerman and Sokoloff argue that these different experiences mattered after independence because elites had much more power in societies where there had been no need to attract migrants during the colonial era. In Mexico and other places with large numbers of Native Americans, those in control ensured that their preferred access to labor would continue by grabbing the natives’ land. In colonies that had depended on slave labor, they blocked policies that would distribute frontier lands to those further down on the social ladder, even as they subsidized immigrants to come work on their plantations. Elites in the former British North American colonies also tried to restrict access to land, but they did not prevail, and land distribution policies in the United States and Canada became more generous over time. Although factor endowments continued to play a role in shaping land policy in the nineteenth century, the institutional heritage of the colonial period was a more dominant factor. The United States and Argentina both had large frontiers, but their distribution policies were radically different. By the end of the century 75 percent of adult males residing in rural areas of the United States owned land. In Argentina the figure was only about a third as much.

The second chapter in the volume, “The Myth of the Frontier” by Camilo García-Jimeno and James A. Robinson, develops similar themes. Robinson and his coauthors, Daron Acemoglu and Simon Johnson, have been engaged in research closely related to that of Engerman and Sokoloff, and the two teams continually exchanged ideas and information. In this chapter with García-Jimeno, Robinson employs a cross-country regression framework to study the relationship between factor endowments (in this case the exis-

tence of a frontier) and institutions. Over a century ago, Frederick Jackson Turner delivered his famous paper connecting the emergence of democratic institutions in the United States to the availability of free land in the West (see Turner 1894). García-Jimeno and Robinson note that many countries in the Americas had large frontiers but did not develop similar democratic political systems, and they set out to try to understand whether Turner was wrong or if there was a more complex relationship between factor endowments and institutions. Their findings reinforce those of Engerman and Sokoloff in “Once Upon a Time in the Americas.” What mattered was not simply whether there was a physical frontier, but how governments allocated frontier lands in the nineteenth century, and that in turn depended on the institutions the countries had inherited from the colonial period. According to García-Jimeno and Robinson’s “conditional frontier thesis,” frontiers are conducive to democracy only where existing institutions facilitate a wide distribution of land. Where existing institutions allow elites to engross the land themselves, frontiers can actually make outcomes worse by helping to entrench wealthy groups in power.

The degree to which elites were able to dominate the various American governments in the nineteenth century mattered for relative economic performance as well as for political structure. As Stephen Haber shows in “Differential Paths of Financial Development: Evidence from New World Economies,” control by elites of the banking system was an important cause of financial underdevelopment. Haber worked with Sokoloff as a graduate student at UCLA and later collaborated with Engerman and Sokoloff on their comparative study of the Americas (see Engerman, Haber, and Sokoloff 2000). In this chapter, he uses case studies of three countries (Mexico, Brazil, and the United States) to explore the relationship between the institutional heritage of the colonial era and the structure of the financial system. In both Mexico and Brazil, he shows, nineteenth-century governmental leaders granted powerful members of the elite monopoly power over banks in exchange for the financial and political support they needed to stay in power. Although the banks financed industrial enterprises, access to capital was largely restricted to enterprises associated with the ruling coalition. In the United States, by contrast, similar efforts by elite groups to limit entry into banking did not succeed. The widespread franchise led instead to free entry into banking and a financial system composed literally of tens of thousands of small unit banks. Although such a system had its own problems, it effectively channeled savings into economic development.

Governments ruled by entrenched elites tend to be highly centralized, and Sebastian Galiani and Sukko Kim, who received his PhD under Sokoloff’s direction at UCLA, explore the implications of this tendency for the structure of cities in “Political Centralization and Urban Primacy: Evidence from National and Provincial Capitals in the Americas.” Inspired by Mark Jefferson’s influential observation that in most countries the largest, most

important city is also the political capital (Jefferson 1939), Galiani and Kim investigate the relationship between a city's political status (whether it was a national or provincial/state capital) and its relative size, controlling for other economic and geographic variables. Using data for the twentieth century, they find that the effect of a city's political status on the size of its metropolitan area was much stronger for most Latin American countries than for the United States. Following Engerman and Sokoloff, they attribute this difference to the kinds of institutions each region inherited from the colonial era. In Latin America political power was more concentrated in the hands of elites, both national and provincial, who were also more likely to reside in capital cities. One consequence was that government spending on public goods was much more concentrated in capital cities in Latin America than in the United States.

Urban structures matter because the concentration of population in cities can have agglomeration effects that foster economic growth. Adam Smith famously postulated that the expansion of markets made possible a more productive division of labor. Sokoloff took the idea further in his own work and, inspired by Jacob Schmooker (1966), used patenting data to show that the growth of markets encouraged inventive activity. He showed, for example, that patenting rates per capita were higher in cities than in other areas and that they soared wherever transportation improvements provided broader access to markets (Sokoloff 1988).

Similar agglomeration effects play an important role in the contribution to this volume by Jean-Laurent Rosenthal, Sokoloff's longtime colleague, and two other friends, Philip T. Hoffman and Gilles Postel-Vinay. The three coauthors have written extensively on the role notaries played in intermediating credit transactions in Paris before the twentieth century (see Hoffman, Postel-Vinay, and Rosenthal 2000). In "History, Geography, and the Markets for Mortgage Loans in Nineteenth-Century France," they examine the relationship between access to markets and the provision of medium- and long-term loans in mid-nineteenth century France, based on data they collected from notarial records for a large sample of villages and cities across the country. They find that the volume of lending was greatest in towns located near other towns. Geographic proximity mattered because it facilitated the development of networks among notaries that integrated the credit markets of neighboring localities. These networks alleviated problems of asymmetric information between borrowers and lenders and also reduced search costs. The result was significantly higher levels of lending per capita compared to towns of comparable sizes that were more geographically isolated.

In his work with Engerman, Sokoloff aimed to answer a question posed some years ago by Richard Easterlin, another of his longtime friends: "Why isn't the whole world developed?" (Easterlin 1981). Sokoloff was also interested, however, in comparing countries within the set that had successful records of economic growth. By studying the different development paths

that rich economies had taken, he believed, one could gain an understanding of the alternative ways in which countries could make the transition to sustained economic growth. Sokoloff was particularly interested in understanding how the United States experience diverged from that of its former colonizer, Great Britain, given that the two countries had so much in common, culturally and institutionally. For example, he and his coauthor, David Dollar, sought to understand why early manufacturing growth primarily took the form of cottage industry in England, whereas small factories were much more important in the United States. They found that the difference owed to the greater seasonality of agriculture in England. British manufacturers could not afford to hire labor during peak periods of agricultural demand. Rather than invest their capital in plant and equipment that would lay idle part of the year, they focused instead on bringing manufacturing tasks to the farm (Sokoloff and Dollar 1997).

Dan Bogart and John Majewski explore another difference between the United States and the United Kingdom in their contribution to this volume. Bogart and Majewski both got their PhDs from UCLA and benefited greatly from Sokoloff's guidance as they worked on their dissertations. In "Two Roads to the Transportation Revolution: Early Corporations in the United Kingdom and the United States," they try to understand why state legislatures in the United States chartered many more transportation corporations in the late eighteenth and early nineteenth centuries than the British Parliament, and why charters in the United States were so much less costly to obtain than in Britain. Like Sokoloff and Dollar, they find much of the explanation in geography. The United States had a large, dispersed rural population. It badly needed a transportation system to bring agricultural goods from the interior to coastal markets, but its low population density meant that only a few of these projects were likely to be profitable to investors. If charters had been costly to get in the United States, no one would have sought them. By contrast, Britain's much higher population density made transportation projects profitable and provided a surplus that Parliament could extract. Institutions were also an important part of the story, according to Bogart and Majewski. Although the United States had inherited many institutions from Britain, its political structure differed from that of the parent country in two key respects: Its franchise was more democratic, and its decentralized federal system meant that power over matters like corporations resided largely with the states. The former difference forced state legislatures to be more responsive to popular demands for low-cost transportation; the latter put them in competition with each other to build transportation projects that would channel agricultural products from the interior to their own Atlantic ports.

Although much of Sokoloff's work emphasized the importance of factor endowments and other geographic factors for the course of economic development, he recognized that the choice of institutions could also play an

important role. For example, he and B. Zorina Khan compared the features of the U.S. patent system with those of Britain and other European countries (Khan and Sokoloff 1998, 2004) and showed that the U.S. patent system provided better security for property rights in invention at lower cost than its counterparts elsewhere in the nineteenth century. The result was not just higher rates of patenting per capita, but greater involvement by nonelites—mechanics, artisans, and farmers—in the process of technological improvement. Khan and Sokoloff attributed the United States' more open system to a rejection of the European view that only a small part of the citizenry had the education and resources to generate valuable inventions. In Britain, for example, efforts to lower the cost of obtaining a patent ran up against the objection that lower fees would only encourage the common people to seek protection for trivial improvements. Khan explores the implications of this elitism further in "Premium Inventions: Patents and Prizes as Incentive Mechanisms in Britain and the United States, 1750–1930." Using data on great inventors in the United States and Britain that she and Sokoloff collected from biographical dictionaries and other sources, she compares systematically the attributes of those who won prizes for technological discovery with those who did not. British great inventors were far more likely than their American counterparts to come from elite backgrounds. But even given this difference, prizes were much more likely to be awarded to members of the elite in Britain than they were in the United States. In recent years, critics of the patent system have embraced prizes as a superior way of encouraging technological discovery, but Khan's findings suggest that prize committees can be "captured" by elite groups who bestow the awards on their own members to an extent disproportionate to merit.

The secure property rights that the American patent system conferred on inventors made possible the growth of a market for patented technology, which in turn facilitated a division of labor that allowed inventors to specialize in the generation of new technological ideas and sell or license those ideas to others better positioned to exploit them commercially. Sokoloff and Naomi R. Lamoreaux have documented the rise of this market (see Lamoreaux and Sokoloff 2003). They have also studied the factors that led to its decline in the early twentieth century. In their view, the new technologies of the second Industrial Revolution increased the amount of capital (both human and physical) required for effective invention, making it more difficult for technologically creative people to embark on careers as independent inventors. One consequence of the higher barriers to entry was the rise of in-house research laboratories in large firms, a familiar story in the literature. Another—less well known—was the emergence in the Midwest of a Silicon Valley-like economy where overlapping networks of venture capitalists, entrepreneurs, and inventors founded large numbers of high-technology startups (Lamoreaux and Sokoloff 2009; Lamoreaux, Levenstein, and Sokoloff 2007). In "The Reorganization of Inventive Activity in



the United States During the Early Twentieth Century,” Lamoreaux and Dhanoos Sutthiphisal, whose dissertation Sokoloff supervised at UCLA, continue this line of inquiry. The authors challenge the conventional scholarly wisdom that large firms’ research and development (R&D) labs came to dominate inventive activity because they were a superior way of organizing technological discovery. Using a new sample of patent data from the late 1920s, they show that innovative regions in the Midwest held their own as sites of technological creativity until the 1930s. The ascendancy of large-firm R&D in the post–World War II period was a result more than anything else of the Great Depression, which disrupted the networks of venture capitalists that had fueled the small-firm economy of the Midwest. Large firms by contrast had more abundant internal resources. Not only did they survive the economic turmoil in greater proportions but during the Depression greatly expanded their investments in R&D, stockpiling technologies that would enable them to grow rapidly with the return of prosperity.

The continuous stream of new technological ideas spewed forth by American inventors, whether they operated independently or worked for large or small firms, would never have been possible without widespread schooling. The U.S. educational system enabled ordinary people to obtain the knowledge needed for effective invention, particularly in the science-based technologies of the second Industrial Revolution. Sokoloff had always been interested in understanding why countries differ so much in their willingness to invest in the human capital of their populations. In another paper on the Americas with Engerman and Elisa Mariscal (2009), he traced the relationship between initial factor endowments and colonial institutions, on the one hand, and literacy rates and the availability of schooling in the nineteenth and twentieth centuries on the other. In this comparison, the United States stands out for its high rates of literacy early on and for the extent of its public school system.

No one has done more to illuminate the United States’ unique educational history than Claudia Goldin, Sokoloff’s erstwhile coauthor and his teacher in graduate U.S. economic history, and Lawrence F. Katz (see Goldin and Katz 2008). In their chapter for this volume, Goldin and Katz study the provision of mass secondary schooling in the twentieth century. They are particularly interested in understanding the extent to which compulsory schooling and child labor laws were responsible for the high levels of secondary education attained by the U.S. population, as some had asserted. They find that although some aspects of the laws had a positive effect on enrollment, the effect was small relative to the enormous expansion in high school attendance during the period. Part of the reason for the small effect was that the laws’ primary aim was not so much to encourage children to stay in school, but rather to ensure that they were either in school or in the workforce and not idle. The main explanation, however, was that school attendance was endogenous to economic opportunity. Most parents wanted

their children to stay in school and reap the substantial pecuniary returns to additional education. Moreover, economic growth led to increases in family wealth that made it easier for parents to provide their children with this opportunity.

In much of his work, especially his project with Engerman, Sokoloff was concerned with understanding why some economies failed to make the transition to sustained economic growth. But he was also interested in the experience of countries that recently had negotiated the transition successfully, particularly the so-called Asian Tigers. Sokoloff wrote several papers critiquing the notion that governmental industrial policy was behind these achievements (see, for example, Dollar and Sokoloff 1992), and he participated in the design and execution of an industrial census, conducted by the World Bank in a number of Asian countries, to provide the raw data for further exploration of the issue.

Sokoloff's thesis advisor and mentor, the Nobel Prize-winning economist Robert W. Fogel, takes up the topic of the Asian growth record in his contribution to this volume. "The Impact of the Asian Miracle on the Theory of Economic Growth" reviews the origins and evolution of growth theory, showing how theory has responded to, and often been surprised by, global events, and how the writings of economic historians have often anticipated theoretical advances. Fogel begins with the seminal work of Robert Solow, which shifted the attention of economists from labor productivity to total factor productivity as the principal measure of changes in economic efficiency or technological change (Solow 1957). Moses Abramovitz, writing prior to the publication of Solow's work, had discovered that increases in labor, capital, and land could account for only 14 percent of the increase in U.S. output over the 75 years between 1869 to 1878 and 1944 to 1953. The remaining 86 percent was due to an unexplained increase in productivity, variously described as either the measure of our own ignorance or as technological change (Abramovitz 1956). Solow's model and other formal growth models of the 1950s and 1960s treated this technological change as exogenous, but again economic historians and other "verbal theorists" were out in front, writing about technological change as endogenous well before theorists began to write down formal models of endogenous technological change. Simon Kuznets, for example, pointed out that economic growth both required and produced major changes in the structure of the economy (Kuznets 1966). Increases in agricultural productivity were necessary for the growth of manufacturing and manufacturing in turn stimulated changes in agricultural technology.

Growth theory has not yet caught up with the Asian miracle and Fogel argues that growth theory needs to be informed by historical perspective. Growth theory in the 1980s was mainly responding to the post-World War II developments in Europe and the United States, and the debates were about convergence between Europe and the United States. In the first half of the

1990s attention shifted to Korea, Hong Kong, Singapore, and Taiwan, countries whose rapid growth rates in the preceding decades earned them the nickname of “Four Asian Tigers.” Prior to the early 1990s, there was the widespread belief that these high growth rates were a fluke and could not last. China and India did not even enter the debate until the second half of the 1990s, but Fogel predicts that by 2040 China may be richer in terms of gross domestic product (GDP) per person than the current fifteen European Union nations and will have 40 percent of the world’s GDP compared to 14 percent for the United States. Fogel emphasizes that much of the success of the developing countries was due to changes in labor productivity. Because most of China’s labor force is still in agriculture, there is a substantial potential for growth through a shift to industry and services as China continues to catch up to the economic frontier. Agreeing with Dwight Perkins (2006), he argues that the main future challenge for China is to maintain a stable environment for economic growth while the Chinese political system evolves to one more suitable for an educated, high income country. Fogel points out that the United States is currently at the economic frontier, and its continued growth depends on the rate at which it can develop new technologies. Much therefore will depend on the willingness of the United States to invest heavily in scientific research and development and increase the share of the population educated in the sciences.

The volume concludes with three shorter chapters that convey the influential character of Sokoloff’s scholarship and the critical role he played in the profession. Joel Mokyr surveys Sokoloff’s contributions to the economic history of technology, Peter Lindert to the comparative history of inequality. Finally, Manuel Trajtenberg captures in a few broad brushstrokes the remarkable man who had such a deep impact on us all. As these memorials make clear, with Sokoloff’s death, the profession lost not only an intellectual giant, but an important source of its vitality. By the sheer force of his personality, Sokoloff helped channel potentially divisive scholarly debates in productive directions that pushed out the frontiers of knowledge. We hope his memory will inspire others to do the same.

## References

- Abramovitz, Moses. 1956. “Resource and Output Trends in the United States Since 1870.” *American Economic Review* 46:5–23.
- Dollar, David, and Kenneth L. Sokoloff. 1992. “Labor Productivity Growth in Follower Countries: The Case of South Korea.” In *Studies in Labor Markets and Institutions*, edited by Kenneth L. Sokoloff, 97–125. Los Angeles: Institute of Industrial Relations, University of California, Los Angeles.
- Easterlin, Richard A. 1981. “Why Isn’t the Whole World Developed?” *Journal of Economic History* 41:1–19.

- Engerman, Stanley L., Stephen Haber, and Kenneth L. Sokoloff. 2000. "Inequality, Institutions, and Economic Growth: A Comparative Study of New World Economies Since the Sixteenth Century." In *Institutions, Contracts, and Organizations: Perspectives from New Institutional Economics*, edited by Claude Menard, 108–36. Cheltenham, UK: Edward Elgar.
- Engerman, Stanley L., Elisa V. Mariscal, and Kenneth L. Sokoloff. 2009. "The Evolution of Schooling Institutions in the Americas, 1800–1925." In *Human Capital and Institutions: A Long Run View*, edited by David Eltis, Frank Lewis, and Kenneth L. Sokoloff, 93–142. New York: Cambridge University Press.
- Engerman, Stanley L., and Kenneth L. Sokoloff. 2002. "Factor Endowments, Inequality, and Paths of Development among New World Economies." *Economia* 3:41–109.
- . 2005. "The Evolution of Suffrage Institutions in the New World." *Journal of Economic History* 65:891–921.
- Goldin, Claudia, and Lawrence F. Katz. 2008. *The Race between Education and Technology*. Cambridge: Harvard University Press.
- Hoffman, Philip T., Gilles Postel-Vinay, and Jean-Laurent Rosenthal. 2000. *Priceless Markets: The Political Economy of Credit in Paris, 1660–1870*. Chicago: University of Chicago Press.
- Jefferson, Mark. 1939. "The Law of the Primate City." *Geographical Review* 29: 226–32.
- Khan, B. Zorina, and Kenneth L. Sokoloff. 1998. "Two Paths to Industrial Development and Technological Change." In *Technological Revolutions in Europe, 1760–1860*, edited by Maxine Berg and Kristine Bruland, 292–313. Cheltenham, UK: Edward Elgar.
- . 2004. "Institutions and Democratic Invention in 19th-Century America: Evidence from 'Great Inventors,' 1790–1930." *American Economic Review* 94: 395–401.
- Kuznets, Simon. 1966. *Modern Economic Growth: Rate, Structure, and Spread*. New Haven: Yale University Press.
- Lamoreaux, Naomi R., Margaret Levenstein, and Kenneth L. Sokoloff. 2007. "Financing Invention during the Second Industrial Revolution: Cleveland, Ohio, 1870–1920." In *Financing Innovation in the United States, 1870 to the Present*, edited by Naomi R. Lamoreaux and Kenneth L. Sokoloff, 39–84. Cambridge: MIT Press.
- Lamoreaux, Naomi R., and Kenneth L. Sokoloff. 2003. "Intermediaries in the U.S. Market for Technology, 1870–1920." In *Finance, Intermediaries, and Economic Development*, edited by Stanley L. Engerman, Philip T. Hoffman, Jean-Laurent Rosenthal, and Kenneth L. Sokoloff, 209–46. New York: Cambridge University Press.
- . 2009. "The Rise and Decline of the Independent Inventor: A Schumpeterian Story?" In *The Challenge of Remaining Innovative: Lessons from Twentieth Century American Business*, edited by Sally H. Clarke, Naomi R. Lamoreaux, and Steven Usselman, 43–78. Stanford: Stanford University Press.
- Perkins, Dwight. 2006. "Stagnation and Growth in China over the Millennium: A Comment on Angus Maddison's 'China in the World Economy, 1300–2030.'" *International Journal of Business* 11:255–64.
- Schmooker, Jacob. 1966. *Invention and Economic Growth*. Cambridge: Harvard University Press.
- Sokoloff, Kenneth L. 1988. "Inventive Activity in Early Industrial America: Evidence from Patent Records, 1790–1846." *Journal of Economic History* 48: 813–50.

- Sokoloff, Kenneth L., and David Dollar. 1997. "Agricultural Seasonality and the Organization of Manufacturing in Early Industrial Economies: The Contrast Between England and the United States." *Journal of Economic History* 57: 288–321.
- Solow, Robert M. 1957. "Technical Change and the Aggregate Production Function." *Review of Economics and Statistics* 39:312–20.
- Turner, Frederick Jackson. 1894. "The Significance of the Frontier in American History." In *Annual Report of the American Historical Association for the Year 1893*, 197–227. Washington, DC: Government Printing Office.