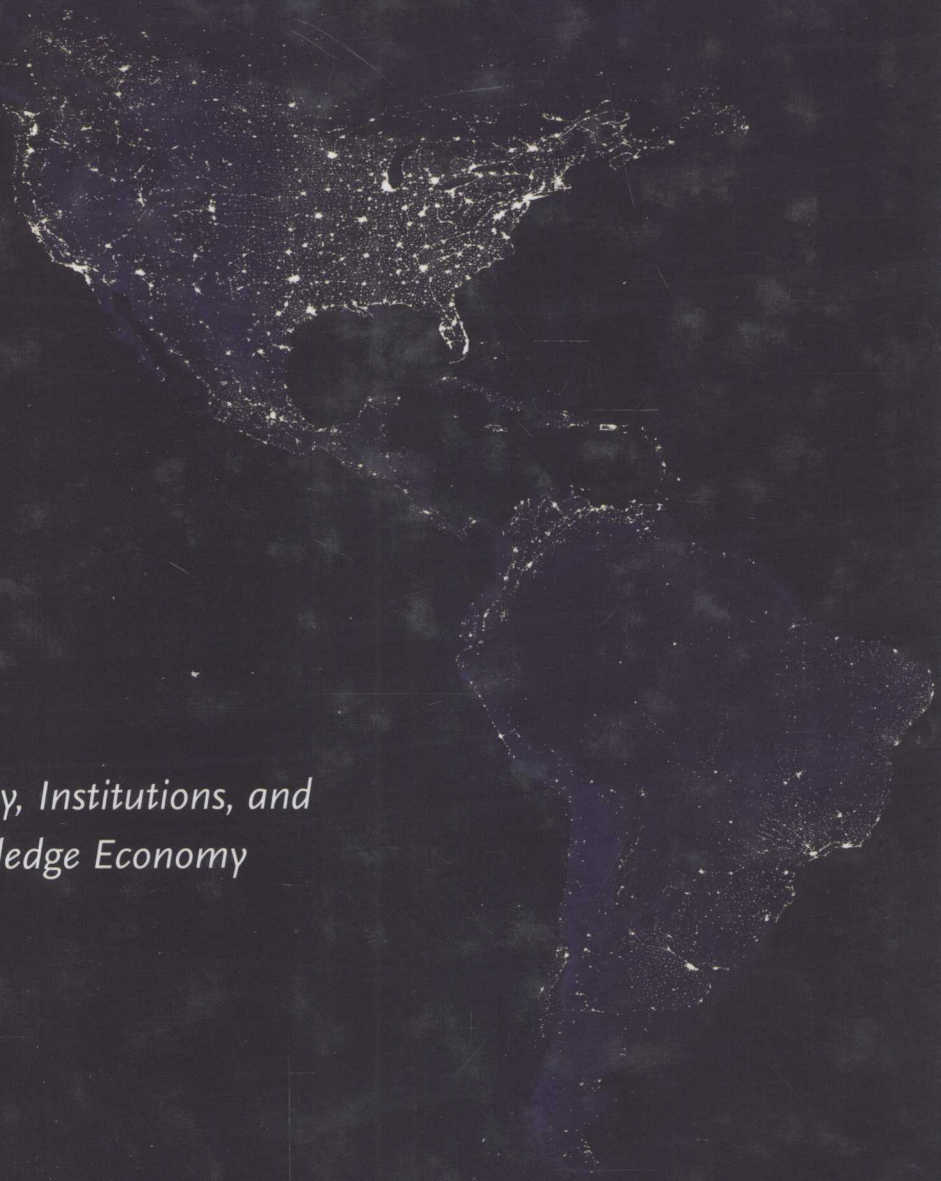
National Bureau of Economic Research

UNDERSTANDING LONG-RUN ECONOMIC GROWTH



Geography, Institutions, and the Knowledge Economy

Edited by
Dora L. Costa and **Naomi R. Lamoreaux**

Understanding Long-Run Economic Growth
Geography, Institutions, and the Knowledge Economy

Edited by **Dora L. Costa and Naomi R. Lamoreaux**

The University of Chicago Press

Chicago and London

DORA L. COSTA is professor of economics at the University of California, Los Angeles; associate director of the California Population Research Center; and a research associate and director of the Cohort Studies Working Group at the NBER. NAOMI R. LAMOREAUX is professor of economics and history at Yale University, a fellow of the American Academy of Arts and Sciences, and a research associate of the NBER.

The University of Chicago Press, Chicago 60637
The University of Chicago Press, Ltd., London

Printed in the United States of America
20 19 18 17 16 15 14 13 12 11 1 2 3 4 5
ISBN-13: 978-0-226-11634-1 (cloth)
ISBN-10: 0-226-11634-4 (cloth)

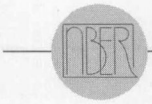
Library of Congress Cataloging-in-Publication Data

Understanding long-run economic growth : geography, institutions, and the knowledge economy / edited by Dora L. Costa and Naomi R. Lamoreaux.
p. cm. — (National Bureau of Economic Research conference report)
Includes bibliographical references and index.
ISBN-13: 978-0-226-11634-1 (cloth : alk. paper)
ISBN-10: 0-226-11634-4 (cloth : alk. paper) 1. Economic development. 2. Economic history. 3. Sokoloff, Kenneth Lee. I. Costa, Dora L. II. Lamoreaux, Naomi R. III. Series: National Bureau of Economic Research conference report.
HD78.U544 2011
339.9′009—dc22

2010051605

♾ This paper meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper).

Understanding Long-Run Economic Growth



A National Bureau
of Economic Research
Conference Report

National Bureau of Economic Research

Officers

John S. Clarkeson, *chairman*
Kathleen B. Cooper, *vice-chairman*
James M. Poterba, *president and chief executive officer*
Robert Mednick, *treasurer*
Kelly Horak, *controller and assistant corporate secretary*
Alterra Milone, *corporate secretary*
Gerardine Johnson, *assistant corporate secretary*

Directors at Large

Peter C. Aldrich
Elizabeth E. Bailey
Richard B. Berner
John H. Biggs
John S. Clarkeson
Don R. Conlan
Kathleen B. Cooper
Charles H. Dallara
George C. Eads
Jessica P. Einhorn
Mohamed El-Erian
Jacob A. Frenkel
Judith M. Gueron
Robert S. Hamada
Peter Blair Henry
Karen N. Horn
John Lipsky
Laurence H. Meyer
Michael H. Moskow
Alicia H. Munnell
Robert T. Parry
James M. Poterba
John S. Reed
Marina v. N. Whitman
Martin B. Zimmerman

Directors by University Appointment

George Akerlof, *California, Berkeley*
Jagdish Bhagwati, *Columbia*
Glen G. Cain, *Wisconsin*
Alan V. Deardorff, *Michigan*
Ray C. Fair, *Yale*
Franklin Fisher, *Massachusetts Institute of Technology*
John P. Gould, *Chicago*
Mark Grinblatt, *California, Los Angeles*
Marjorie B. McElroy, *Duke*
Joel Mokyr, *Northwestern*
Andrew Postlewaite, *Pennsylvania*
Uwe E. Reinhardt, *Princeton*
Nathan Rosenberg (Director Emeritus), *Stanford*
Craig Swan, *Minnesota*
David B. Yoffie, *Harvard*

Directors by Appointment of Other Organizations

Bart van Ark, *The Conference Board*
Jean-Paul Chavas, *Agricultural and Applied Economics Association*
Martin Gruber, *American Finance Association*
Ellen L. Hughes-Cromwick, *National Association for Business Economics*
Arthur B. Kennickell, *American Statistical Association*
Thea Lee, *American Federation of Labor and Congress of Industrial Organizations*
William W. Lewis, *Committee for Economic Development*
Robert Mednick, *American Institute of Certified Public Accountants*
Alan L. Olmstead, *Economic History Association*
John J. Siegfried, *American Economic Association*
Gregor W. Smith, *Canadian Economics Association*

Directors Emeriti

Andrew Brimmer
Carl F. Christ
George Hatsopoulos
Saul H. Hymans
Lawrence R. Klein
Franklin A. Lindsay
Paul W. McCracken
Rudolph A. Oswald
Peter G. Peterson
Nathan Rosenberg

Relation of the Directors to the Work and Publications of the National Bureau of Economic Research

1. The object of the NBER is to ascertain and present to the economics profession, and to the public more generally, important economic facts and their interpretation in a scientific manner without policy recommendations. The Board of Directors is charged with the responsibility of ensuring that the work of the NBER is carried on in strict conformity with this object.

2. The President shall establish an internal review process to ensure that book manuscripts proposed for publication DO NOT contain policy recommendations. This shall apply both to the proceedings of conferences and to manuscripts by a single author or by one or more co-authors but shall not apply to authors of comments at NBER conferences who are not NBER affiliates.

3. No book manuscript reporting research shall be published by the NBER until the President has sent to each member of the Board a notice that a manuscript is recommended for publication and that in the President's opinion it is suitable for publication in accordance with the above principles of the NBER. Such notification will include a table of contents and an abstract or summary of the manuscript's content, a list of contributors if applicable, and a response form for use by Directors who desire a copy of the manuscript for review. Each manuscript shall contain a summary drawing attention to the nature and treatment of the problem studied and the main conclusions reached.

4. No volume shall be published until forty-five days have elapsed from the above notification of intention to publish it. During this period a copy shall be sent to any Director requesting it, and if any Director objects to publication on the grounds that the manuscript contains policy recommendations, the objection will be presented to the author(s) or editor(s). In case of dispute, all members of the Board shall be notified, and the President shall appoint an ad hoc committee of the Board to decide the matter; thirty days additional shall be granted for this purpose.

5. The President shall present annually to the Board a report describing the internal manuscript review process, any objections made by Directors before publication or by anyone after publication, any disputes about such matters, and how they were handled.

6. Publications of the NBER issued for informational purposes concerning the work of the Bureau, or issued to inform the public of the activities at the Bureau, including but not limited to the NBER Digest and Reporter, shall be consistent with the object stated in paragraph 1. They shall contain a specific disclaimer noting that they have not passed through the review procedures required in this resolution. The Executive Committee of the Board is charged with the review of all such publications from time to time.

7. NBER working papers and manuscripts distributed on the Bureau's web site are not deemed to be publications for the purpose of this resolution, but they shall be consistent with the object stated in paragraph 1. Working papers shall contain a specific disclaimer noting that they have not passed through the review procedures required in this resolution. The NBER's web site shall contain a similar disclaimer. The President shall establish an internal review process to ensure that the working papers and the web site do not contain policy recommendations, and shall report annually to the Board on this process and any concerns raised in connection with it.

8. Unless otherwise determined by the Board or exempted by the terms of paragraphs 6 and 7, a copy of this resolution shall be printed in each NBER publication as described in paragraph 2 above.

Acknowledgments

The editors of this volume owe a large debt of gratitude to the National Bureau of Economic Research, the Social Sciences Division and the Economics Department at the University of California, Los Angeles, and the All-UC Group in Economic History, joint sponsors of the conference at which these papers were originally presented. We particularly thank Martin Feldstein, James Poterba, Scott Waugh, Reynaldo Macias, Gary Hansen, and Alan Olmstead for their support. The papers benefited from the comments of the formal discussants: David Card, Jeffrey Frieden, Edward Leamer, Peter Lindert, Joel Mokyr, Ariel Pakes, Ronald Rogowski, Manuel Trajtenberg, Daniel Treisman, and John Wallis. They also benefited from the suggestions of anonymous referees and from the many ideas offered by conference participants. Finally, we would like to thank David Pervin of the University of Chicago Press and Helena Fitz-Patrick of the NBER for their advice and work on this volume.

Contents

Introduction

Dora L. Costa and Naomi R. Lamoreaux

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

Dora L. Costa is professor of economics at the University of California, Los Angeles; associate director of the California Population Research Center; and a research associate and director of the Cohort Studies Working Group at the NBER. Naomi R. Lamoreaux is professor of economics and history at Yale University, a fellow of the American Academy of Arts and Sciences, and a research associate of the NBER.

We are grateful to Stanley Engerman and Claudia Goldin for their helpful comments.

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.[1] 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 Sukkoo 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