POLITICS AND INDUSTRIALIZATION

EARLY RAILROADS IN THE UNITED STATES AND PRUSSIA

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Preface

THIS BOOK explores the manifold ways in which two contrasting political structures—the antebellum American and the *Vormärz*[1] Prussian—shaped the contours of early railroad development. Implicit in the study is an effort to construe "politics" more broadly than usual. We normally think of politics in terms of ideas and actors, whether individuals (voters, politicians, judges, presidents) or institutions (political parties, legislatures, bureaucracies, and so on). This book forwards a sense of everyday politics that encompasses the larger *structure* of political institutions as well. Much of the book seeks to demonstrate why political structure matters for political and economic affairs alike and why, therefore, it should be part of our customary understanding of politics, past as well as present.

It would be too much to say that I set out with that goal firmly in mind. All that remains of my initial formulation is a portion of its empirical core, the comparison of early American and Prussian railroad development. Alternating bouts of research, reading, and rumination brought the initial puzzle into sharper focus. In the process, I became persuaded that the key to understanding systematic differences in the political and economic contours of early railroad development in these two industrializing nations lay in the two political structures themselves.

The historical understanding at which I arrived may be summed up as follows: The ambient political structure,[2] which defined the political context within which (capitalist) industrial change took place, had an enduring impact on that process. In ways that have been largely overlooked, it shaped the process of economic policy-making, the content of economic policy, the organizational form of economic institutions, the nature of the technological community in the newly industrializing nations of the nineteenth century, and, ultimately,

[1] *Vormärz* refers here to the period from the Congress of Vienna in 1815 to the revolution in March of 1848. On periodization, see Wolfgang Hardtwig, *Vormärz: Der monarchische Staat und das Bürgertum* (Munich: Deutscher Taschenbuch Verlag, 1985), pp. 7–8.

2 On the ambience of technological change, see John M. Staudenmaier, S.J., *Technology's Storytellers: Reweaving the Human Fabric* (Cambridge: Society for the History of Technology and M.I.T. Press, 1985), esp. p. 6.

the very process of technological choice itself. In short, the ambient political structure left its indelible imprint on the polity (policy), on the economy (technology), and on the institutional interface between them (economic institutions). In time, however, the railroads—as the nation's "first big business," to borrow Alfred Chandler's phrase—set in motion a process of industrial change that worked its own changes on the ambient political structure. The basic lesson is simple: understanding the process of industrial change requires due attention to its political context, just as understanding the process of political change must take account of its industrial context. Understood in structural terms, the two are inextricably linked.

LIKE ALL such works, this one owes a great deal to many people. Richard M. Abrams at the University of California-Berkeley started it off by encouraging me long ago to shift my undergraduate major from physics to the history of technology. I remain deeply grateful. At the Massachusetts Institute of Technology, my graduate experience turned out to be all that one dreams of, due to the remarkable collection of faculty and students who enlivened the Program in Science, Technology, and Society, the Department of Political Science, and various niches at Harvard University. The reader will find in these pages clear traces of those with whom I worked most closely: Suzanne Berger, Alfred D. Chandler, Jr., Joshua Cohen, and Merritt Roe Smith. This book, like the dissertation from which it stems, seeks to integrate the diverse perspectives that they represent and, to the extent that it is successful, it casts their own work, I believe, in a new light. A number of others who populated the Cambridge community in the early 1980s also shaped my thinking: Lindy Biggs, Joel Genuth, Peter Hall, Victoria Hattam, George Hoberg, Gary Herrigel, Frank Laird, David F. Noble, Charles F. Sabel, Richard Sclove, and Langdon Winner. For the conceptualization of this project, the writings of Jürgen Kocka, Harry N. Scheiber, Theda Skocpol, Stephen Skowronek, and Richard Tilly meant much more than the footnotes alone convey. During my research in West Berlin and environs, Rainer Fremdling of the Free University (now at the University of Groningen, The Netherlands) consistently offered encouragement and sound advice, as did Elfriede Rehbein and her colleagues at the now-defunct *Hochschule für Verkehrswesen "Friedrich List"* in Dresden. At a critical moment,

Elmer Altvater's lectures at the Free University also reoriented my thinking in a fundamental way that I am at a loss to reconstruct. On the American side, Robert C. Post, Joan Mentzer, Carlene Stephens, and John H. White, Jr., aided and abetted my research in a variety of ways at the National Museum of American History (Smithsonian Institution), while my "fellow fellows"—especially Elizabeth Blackmar, Carolyn Cooper, Gail Cooper, Wayne Durrill, Grace Palladino, and honorary-fellow-for-life Pete Daniel—made it a real community, particularly on Tuesday evenings. The study of American history would be much the poorer if the Museum were ever to abandon its fine tradition of encouraging academics engaged in broad-based studies to mix it up with museum professionals. During the process of revision, I benefited at various points from the research assistance of Sean Adams, Susan Boettcher, Andrew Larsen, Elizabeth Miller, and David Varana; from the continued advice of individuals named above; and from another collection of generous people who read all or part of the book-in-the-making: Richard Bensel, Frank Dobbin, David Hounshell, Thomas P. Hughes, Richard R. John, Peter Katzenstein, Maury Klein, Stanley Kutler, Steven Lewis, Diane Lindstrom, Philip Scranton, Theda Skocpol, Cecil O. Smith, Jr., Ulrich Wengenroth, Glenn Yago, and Jonathan Zeitlin.

Along the way, archivists and librarians provided vital aid at a number of institutions: the *Zentrales Staatsarchiv, Historische Abteilung II* in Merseburg; the *Staatsarchive* in Dresden, Hamburg, and Magdeburg; the *Staatsbibliothek Preußischer Kulturbesitz Berlin*; the Library of Congress; the Baker Library, Harvard Business School; the library of the Association of American Railroads in Washington, D.C.; and the libraries of the University of Wisconsin-Madison. I am particularly indebted to Dr. Kohnke at the *Zentrales Staatsarchiv*, for making my stay in Merseburg as productive as it was; and to Dr. Hans-Günter Klein, curator of the *Mendelssohn-Archiv* in the *Musikabteilung* of the *Staatsbibliothek Berlin* for allowing me early access to the *Bankhaus Mendelssohn* papers.

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Portions of this book have appeared previously in *Wissenschaftliche Zeitschrift* (Dresden), Sonderheft 54: *Friedrich List—Leben und Werk* (1990): 51–60; *Business and Economic History*, 2d ser., 19 (1990): 133-42; *Studies in American Political Development* 5 (Spring 1991): 1–35; and *Structuring Politics: Historical Institutionalism in Comparative Analysis*, ed. Sven Steinmo, Kathleen Thelen, and Frank Longstreth (Cambridge: Cambridge University Press, 1992), pp. 114–54. I am grateful to be able to use the material in revised form here.

Finally, some special people deserve special mention: my parents, who teach by example; Victoria Hattam, for more than a decade of intellectual and personal give-and-take; Christiane Hartmann, for a modern-day kinship that transcends culture and distance; my colleagues in the Department of History at the University of Wisconsin-Madison, for their early confidence; Howard Dunlavy, Nancy Dunlavy, Thomas Dunlavy, and Helena Wright, for standing by when my fellowship luck ran out; and Barbara Davis and Patricia Weets, for all of that and much more over the last twenty-odd years. For Ronald M. Radano, who makes life interesting in so many ways (not least because he types his own manuscripts, seldom reads mine, and disagrees with almost all of it), no words are quite good enough.

Note on Weights, Measures, and Currency

For converting weights, measures, and currency, a number of foreign reports on American railroads provide valuable assistance. See especially Franz Anton Ritter von Gerstner, *Die innern Communicationen der Vereinigten Staaten von Nordamerica* (Vienna: L. Förster, 1842–43), 1:ii, 2:viii; and G. Tell-Poussin, *Öffentliche Bauwerke in den Vereinigten-Staaten von Amerika*, Part II: *Eisenbahnen*, trans. H. F. Lehritter (Regensburg: Friedrich Pustet, 1837), pp. 175n, 407. Following these sources,

1 German mile (*deutsche Meile*) = 7.4 kilometers
1 American (English) mile = 1.6 kilometers
1 Prussian *Fuß* = 0.31 meters
1 American (English) foot = 0.30 meters
1 Prussian *Pfund* = 0.47 kilograms
1 American (English) pound = 0.453 kilograms.

The Prussian currency, the *Thaler* (or *Taler*, as it is spelled today), I have converted at a rate of $.70. For contemporary reports on exchange rates, see the sources cited above and Kgl. Legations-Kasse, Berlin, September 17, 1840, Zentrales Staatsarchiv Merseburg, Historische Abteilung II, Rep. 2.4.1, Abt. II, no. 7694, vol. 1, p. 34r; [Ministry of Foreign Affairs] to Royal Prussian General Consul König in Alexandria [Egypt], February 25, 1861, in ibid., p. 108r. In using secondary-source data that have been converted to marks, I have reconverted at a rate of 3 marks per *Taler*.

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Introduction

An American railroad man,[1] touring Prussian railroads in 1847, would have envied their uniformity, solidity, and harmony (as he would have put it). Prussian railroads had all adopted the English gauge (4'8-½"). They enjoyed the operating advantages of comparatively moderate grades, easy curves, and heavy iron rails. They were in the midst of forming a national association that would facilitate the movement of traffic over what would rapidly become a national "system" of railroads.[2] Two decades into the "railroad era," American railroads, in contrast, remained mired in diversity. The United States could at least claim more than four times the track mileage of Prussia, but in what would become the birthplace of managerial hierarchies and scientific management,[3] paradoxically, the railroads

[1] Although a few women (such as Rebecca Lukens of Lukens Iron in the United States) headed industrial enterprises in the 1830s and 1840s, no women were to be found among railroad promoters or managers in either country, to my knowledge. Scattered evidence for Prussia indicates that they were more common among railroad stockholders, although still not numerous. See, for example, "Verzeichniss der Actionaire zur beabsichtigten Verlängerung der Berlin-Potsdam Eisenbahn über Brandenburg nach Magdeburg und Hamburg," in Zentrales Staatsarchiv Merseburg (hereafter, ZStAM), Rep. 93E, no. 3305/1, vol. 2, pp. 214r–223r and Rep. 77, Tit. 258a, no. 30, vol. I, pp. 91r–99v; and "Liste der Actien-Zeichnungen zur Berlin-Stettiner Eisenbahn," in Staatsbibliothek Preußischer Kulturbesitz, Musikabteilung, Mendelssohn-Archiv (hereafter, MA Nachl. 5), VIII. (I have generally preserved the original spelling and punctuation of bibliographic information and quoted material.) On railroad men, see Thomas Cochran, *Railroad Leaders, 1845–1890: The Business Mind in Action* (New York: Russell & Russell, 1965); Kurt Wiedenfeld, "Deutsche Eisenbahn-Gestalter aus Staatsverwaltung und Wirtschaftsleben im 19. Jahrhundert (1815–1914)," *Archiv für Eisenbahnwesen* 63 (1940): 733–824; T. Pierenkemper, "Die Zusammensetzung des Führungspersonals und die Lösung unternehmerischer Probleme in frühen Eisenbahn-Gesellschaften," *Tradition* 21 (1976): 37–49.

[2] On large-scale technological systems, see Thomas P. Hughes, "The Order of the Technological World," *History of Technology* 5 (1980): 1–16; idem, "The Evolution of Large Technological Systems," in *The Social Construction of Technological Systems*, ed. Wiebe E. Bijker, Thomas P. Hughes, and Trevor Pinch (Cambridge: M.I.T. Press, 1987), pp. 51–82.

[3] See Alfred D. Chandler, Jr., *The Visible Hand: The Managerial Revolution in American Business* (Cambridge: Harvard University Press, Belknap Press, 1977); Glenn Porter, *The Rise of Big Business, 1860–1920*, 2d ed. (Arlington Heights, Ill.: Harlan Davidson, 1992). For comparative perspectives, see Alfred D. Chandler, Jr., and

lagged far behind in building a national system. Some lines had the English gauge, but many did not. Some had been built in a style that resembled the Prussian, but others coped with high grades, sharp curves, and light rails (some even with wooden rails capped by strips of iron, a hallmark of what railroad men around the world knew as the "American system" of railroad construction). American railroads, moreover, had just embarked on what would become a forty-year struggle to build a national railroad association of sufficient permanance to turn a fractured collection of railroads into a national system. To compound the paradox, Prussian railroad men had accomplished all this on their own, without the guiding hand of the state. Indeed, the Prussian central state had adopted a largely hands-off policy toward the railroads. The American state, in contrast, had taken a comparatively interventionist stance, actively promoting and regulating early railroads.

Understanding why early railroad development proceeded so differently in these two countries demands attention to a critical, but largely neglected, parameter of industrial change in our own time: the overall structure of political institutions. For the key to this paradox of the early nineteenth century, this book argues, lies neither in the realm of national culture nor in the actions of the state, but in the structuring presence of the two states themselves. Thus the story told here carries lessons for the world's political economies in the late twentieth century, as they cope with change and confront the need to rework institutions. "In the real world," as Ronald H. Coase observes, "to influence economic policy, we set up or abolish an agency, amend the law, change the personnel and so on: we work through institutions. The choice in economic policy is a choice of institutions."[4] In attending to institutions, however, we should not limit our horizons to isolated or mid-level institutions. To contemporary nations, early American and Prussian railroad development shows how the constitutional structure—the larger, overarching structure of national political institutions—plays a constitutive role in industrial change.

Herman Daems, eds., *Managerial Hierarchies: Comparative Perspectives on the Rise of the Modern Industrial Enterprise* (Cambridge: Harvard University Press, 1980); Alfred D. Chandler, *Scale and Scope: The Dynamics of Industrial Capitalism* (Cambridge: Harvard University Press, Belknap Press, 1990).

[4] Ronald H. Coase, "The New Institutional Economics," *Journal of Institutional and Theoretical Economics* 140 (1984): 230.

The New Institutionalisms

In the central place that it accords to national political structures, this book builds on the "new institutionalism" that has emerged both in business history and in the history of technology (I will argue) in recent years. But it expands the frame of reference within which historians of business and technology work by drawing on recent insights generated by "historical institutionalism" in the social sciences and showing how politics might be—and why it should be—more thoroughly integrated into their analyses. A brief review of institutionalism in these fields will indicate where the current shortcomings lie and how historical institutionalism enlarges the analytical frame of reference for understanding the relationship between politics and industrial change.[5]

In business (and economic) history, a "new institutionalism" with roots extending back to the 1930s has brought institutions—and therefore politics—front and center. The process began when historians shifted from neo-classical theory's traditional concern with production costs and relative factor prices to firm structure, corporate strategy, and transaction costs (that is, the costs of buying and selling, of organizing production, and so on). With this analytical turn, historians such as Alfred D. Chandler, Jr., and Douglass North came to regard institutions as central to economic performance.[6]

[5] The boundaries between business and technological history should not be sharply drawn, for they are highly artificial and, together with those demarcating labor history, have become quite porous in recent years. See especially William Lazonick, "Technological Change and the Control of Work: The Development of Capital-Labour Relations in US Mass Production Industries," in *Managerial Strategies and Industrial Relations: An Historical and Comparative Study*, ed. Craig R. Littler and Howard F. Gospel (London: Heineman, 1983), pp. 111–36; and Philip Scranton, *Proprietary Capitalism: The Textile Manufacture at Philadelphia, 1800–1885* (Cambridge: Cambridge University Press, 1983).

[6] See, most recently, Chandler, *Scale and Scope*; Douglass North, *Institutions, Institutional Change and Economic Performance* (Cambridge: Cambridge University Press, 1990); and, for historiographic insight, Thomas K. McCraw, "Introduction: The Intellectual Odyssey of Alfred D. Chandler, Jr.," in Alfred D. Chandler, *The Essential Alfred Chandler: Essays Toward a Historical Theory of Big Business*, ed. and intro. by Thomas K. McCraw (Boston: Harvard Business School, 1988), pp. 2, 13–15, 18–19. In economics, the classic works are Ronald H. Coase, "The Nature of the Firm," *Economica*, n.s., 4 (November 1937), which is reprinted in R. H. Coase, *The Firm, The Market, and the Law* (Chicago: University of Chicago Press, 1988), pp. 33–55; and Oliver Williamson, *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting* (New York: The Free Press, 1985). I would include in this literature "positive political economy," since it represents the fruits of this perspective applied to the

Although substantial differences distinguish various approaches within the new "economic institutionalism," they all, in effect, open up a way of putting politics back into history.[7] For institutions of any kind consist of rules, compliance procedures, and norms that order relations among individuals.[8] This means that institutions, by their very nature, spell out a distribution of power.[9] In this sense, politics is as inherent in the institutions that reduce economic uncertainty and facilitate economic exchange as it is in what we conventionally regard as political institutions. Institutionalist business history is thus well positioned to explore the relationship between politics and industrial change.

Historical analysis in this vein, moreover, has illuminated the workings of institutions at various levels of aggregation. Research at the level of the firm or industry still commands the field, but even in this domain comparative research has required historians to broaden their view. As Chandler's comparative study of the rise of managerial capitalism suggests, the behavior of individual firms cannot be fully understood without reference to political institutions, especially those that govern collusive behavior. This confirms what Douglass C. North and Barry R. Weingast argue: that economic development cannot be understood apart from its political context, that constitutions and states demand attention because they specify and enforce property rights. Taking a different tack, Steven Tolliday, Jonathan Zeitlin, and colleagues explore the institutional underpinnings of industrial relations, treating "firms and employers' associations, like trade unions and the state, . . . as complex institutions whose decisions are

political sphere. See James E. Alt and Kenneth A. Shepsle, eds., *Perspectives on Positive Political Economy* (Cambridge: Cambridge University Press, 1990).

[7] On efforts to put politics back into other fields, see William E. Leuchtenburg, "The Pertinence of Political History: Reflections on the Significance of the State in America," *Journal of American History* 73 (December 1986): 585–600; Robert W. Gordon, "Critical Legal Histories," in *Critical Legal Studies*, ed. Allan C. Hutchinson (Totowa, N.J.: Rowman & Littlefield, 1989), pp. 79–103; Eric Foner, ed., *The New American History* (Philadelphia: Temple University Press, 1990).

[8] For essentially similar definitions of institutions across disciplines, see Peter A. Hall, *Governing the Economy: The Politics of State Intervention in Britain and France* (New York: Oxford University Press, 1986), p. 19; Douglass C. North, *Structure and Change in Economic History* (New York: W. W. Norton, 1981), pp. 201–2; Rogers M. Smith, "Political Jurisprudence, The New Institutionalism, and the Future of Public-Law," *American Political Science Review* 82 (1988): 91; Williamson, *Economic Institutions*, p. 385.

[9] For theoretical insight, see Steven Lukes, *Power: A Radical View* (London and Basingstoke: The Macmillan Press, Ltd., 1974).

the product of the internal political processes as well as external pressures."[10] In shifting emphasis away from individual entrepreneurs or autonomous markets, institutionalists impart to business history a heightened sensitivity to political context—but only up to a point, as we will see.[11]

In the history of technology, an "institutionalist" school has not yet coalesced, but the materials are at hand. As historians of technology discovered, when they pushed back the boundaries of their field to make room for "contextual" and "externalist" perspectives, institutions pervade the history of technology.[12] This is evident both in the treatment of mass production, one of the field's mainstays, and in the newest work on the social construction of technology and on historical alternatives in technological development. As Merritt Roe Smith shows, the genesis of mass production technologies early in the nineteenth century was intimately bound up with a political institution (the military); the historical evolution of mass production, as recounted by David Hounshell, culminated in the creation of one of the premier institutions of the twentieth century, Fordism; and the military again played a central role, David F. Noble argues, in the development of numerically controlled machine tools in the twentieth century.[13] Thomas P. Hughes's influential work on "tech-

[10] Chandler, *Scale and Scope*; North, *Structure and Change*; Douglass C. North and Barry R. Weingast, "Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth-Century England," *Journal of Economic History* 49 (December 1989): 803–32; Steven Tolliday and Jonathan Zeitlin, "Introduction: Employers and Industrial Relations between Theory and History," in *The Power to Manage? Employers and Industrial Relations in Comparative-Historical Perspective*, ed. idem (London: Routledge, 1991), p. 2.

[11] For a renewed defense of entrepreneurial history, however, see Harold C. Livesay, "Entrepreneurial Dominance in Businesses Large and Small, Past and Present," *Business History Review* 63 (1989): 1–21.

[12] On internalist-externalist debates in the history of technology, see David A. Hounshell, "Commentary: On the Discipline of the History of American Technology," *Journal of American History* 67 (March 1981): 854–65; Darwin Stapleton and David A. Hounshell, "The Discipline of the History of Technology: An Exchange," *Journal of American History* 68 (March 1982): 897–902; David A. Hounshell, ed., *The History of American Technology: Exhilaration or Discontent?* (Greenville, Del.: Hagley Papers, 1984); Staudenmaier, *Technology's Storytellers*; Stephen H. Cutcliffe and Robert C. Post, eds., *In Context: History and the History of Technology* (Bethlehem: Lehigh University Press; London: Associated University Presses, 1989); and John M. Staudenmaier, "Recent Trends in the History of Technology," *American Historical Review* 95 (1990): 715–25.

[13] Merritt Roe Smith, *Harpers Ferry and the New Technology: The Challenge of Change* (Ithaca: Cornell University Press, 1977); David Hounshell, *From the American System to Mass Production, 1800–1932: The Development of Manufacturing Technology in the United States* (Baltimore: Johns Hopkins University Press, 1984); David F.

nological systems," moreover, suggests a marked affinity with institutionalism. The rise of technological systems since the late nineteenth century has turned on the creation, expansion, and maintenance of a complex of institutions—economic, professional, educational, political, and so on.[14] These changes in the realm of technology, Melvin Dubofsky and William Lazonick argue, had profound institutional implications for industrial relations as well.[15]

In the new literature on the social construction of technology and on historical alternatives in technological development, institutions have also proven pivotal. In a pioneering work in this vein, Ruth Schwartz Cowan points to the constitutive role of social and economic institutions in determining the viability of alternative household technologies.[16] Institutions are deeply embedded in a paradigm-breaking essay by Charles Sabel and Jonathan Zeitlin, which examines alternative ways in which relations among producers have been organized historically and thus highlights the institutions that underpinned mass production as well.[17] The social constructivist perspective advanced by Wiebe E. Bijker and Trevor J. Pinch explicitly includes institutions among the "relevant social groups" that, by definition, attach a particular meaning to a given technology.[18] Meanwhile, Langdon Winner has revitalized the field's

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Noble, *Forces of Production: A Social History of Industrial Automation* (New York: Alfred A. Knopf, 1984). See also Merritt Roe Smith, ed., *Military Enterprise and Technological Change: Perspectives on the American Experience* (Cambridge: M.I.T. Press, 1985).

[14] Hughes, "The Order of the Technological World"; idem, *Networks of Power: Electrification in Western Society, 1880–1930* (Baltimore: Johns Hopkins University Press, 1983); idem, "Evolution of Large Technological Systems"; idem, *American Genesis: A Century of Invention and Technological Enthusiasm* (New York: Penguin, 1989). See also David F. Noble, *America By Design: Science, Technology, and the Rise of Corporate Capitalism* (Oxford: Oxford University Press, 1977); Walter A. McDougall, *. . . the Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, 1985).

[15] Melvin Dubofsky, "Technological Change and American Worker Movements, 1870–1970," in *Technology, The Economy, and Society: The American Experience*, ed. Joel Colton and Stuart Bruchey (New York: Columbia University Press, 1987), pp. 162–85; Lazonick, "Technological Change and the Control of Work."

[16] Ruth Schwartz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic Books, 1983).

[17] Charles Sabel and Jonathan Zeitlin, "Historical Alternatives to Mass Production: Politics, Markets and Technology in Nineteenth-Century Industrialization," *Past and Present*, no. 108 (August 1985): 133–76. See also Scranton, *Proprietary Capitalism*; idem, "Diversity in Diversity: Flexible Production and American Industrialization, 1880–1930," *Business History Review* 65 (1991): 27–90.

[18] Trevor J. Pinch and Wiebe E. Bijker, "The Social Construction of Facts and Arti-

traditional concern with the social impact of technology by exploring from a philosophical standpoint the impact of alternative technologies on the institutional configuration of society and polity.[19] Examples could easily be multiplied, for the institutional thread runs throughout the literature.

Yet, in the treatment of politics, a curious lopsidedness prevails in both business and technological history. Not only have historians in both fields directed attention to political institutions more haphazardly than to economic institutions, but even those who give the most sustained attention to politics work within limited horizons. To be sure, they conceive of political institutions as much more than mere actors, recognizing instead the manifold ways in which political institutions structure social action. Yet, almost without exception, historians overlook the way that the larger configuration of national political institutions structures social life in the business world and technological realm alike.

To clarify the nature of the problem, it helps to draw a broad distinction between the individual *elements* of a national economy or polity, on the one side, and the overall *structure* of the two spheres, on the other.[20] Studies of the multitude of discrete elements that compose economies or polities appear in abundance: they focus on capitalists or politicians; engineers or state officials; workers or voters; firms, technological systems, or political parties; markets or elections; unions, trade associations, or bureaucracies; and so on. Studies attentive to overall structure, in contrast, are concerned not with discrete elements but with the relationships among them and with the structures thus created. Applied to the economic sphere, this perspective yields studies sensitive to national industrial structure, labor-market structure, economic structure, and so on. Indeed, these are familiar terms because industrialization itself is normally construed as a process of structural change. But the perspective is rarely extended to the structure of the national polity itself.[21] By and large,

facts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," in *Social Construction*, ed. Bijker, Hughes, and Pinch, p. 30.

[19] Langdon Winner, *The Whale and the Reactor: A Search for Limits in an Age of High Technology* (Chicago: University of Chicago Press, 1986).

[20] Reference to polity and economy as "two spheres," while useful for analytical purposes, should not be taken to imply autonomous realities.

[21] Harry N. Scheiber, "Federalism and the American Economic Order, 1789–1910," *Law & Society Review* 10 (Fall 1975): 57–118 constitutes a noteworthy exception,

the new institutionalism in business and technological history has neglected the role of national political structures in the process of industrial change.

What is missing can be seen by analogy in the new "historical institutionalism" that has coalesced in political science and sociology in recent years. Like its counterpart in economic thinking, this line of inquiry sees institutions and individuals as intimately intertwined: individuals pursue their goals, formulate policy, even create or alter institutions, all in the familiar, volitional sense; but, as they do so, their own strategic choices are shaped by the institutional context in which they operate.[22] In applying this insight to the political realm, however, historical institutionalists have taken it a step further, using it to explore the consequences not only of particular institutions but also of the structure of political institutions on a national scale. As Theda Skocpol writes:

> In this perspective, states matter not simply because of the goal-oriented activities of state officials. They matter because their organizational configurations, along with their overall patterns of activity, affect political culture, encourage some kinds of group formation and collective political actions (but not others), and make possible the raising of certain political issues (but not others).[23]

Political structures matter, in other words, because their presence defines the ambient political environment.

Although this perspective derives largely from the study of politics in the conventional sense, a handful of studies suggests that it is equally well suited to analysis in the economic sphere. In a study of

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although Hughes, *Networks of Power*, and Chandler, *Scale and Scope*, may be read to imply the centrality of national political institutions.

[22] For reviews of the literature, see Smith, "Political Jurisprudence"; James G. March and Johan P. Olsen, *Rediscovering Institutions: The Organizational Basis of Politics* (New York: Free Press, 1989), pp. 1–19; Timothy Mitchell, "The Limits of the State: Beyond Statist Approaches and Their Critics," *American Political Science Review* 85 (March 1991): 77–96; Sven Steinmo and Kathleen Thelen, "Historical Institutionalism in Comparative Politics," in *Structuring Politics: Historical Institutionalism in Comparative Analysis*, ed. Sven Steinmo, Kathleen Thelen, and Frank Longstreth (New York: Cambridge University Press, 1992), pp. 1–32, from which I have borrowed the term.

[23] Theda Skocpol, "Bringing the State Back In: Strategies of Analysis in Current Research," in *Bringing the State Back In*, ed. Peter B. Evans, Dietrich Rueschemeyer, and Theda Skocpol (Cambridge: Cambridge University Press, 1985), p. 21.

working-class formation in the late nineteenth-century United States, for example, Victoria Hattam explores the complex interaction between labor ideology and the distinctive American political structure—the "state of courts and parties," as Stephen Skowronek dubbed it—in explaining why American labor never developed its own political party. Peter Hall's work on post–World War II economic policy in Britain and France demonstrates the impressive power of an analysis that is sensitive to the institutional organization of capital, labor, and the state; in effect, he views both economy and polity in structural terms.[24] In its attention to the silent presence of national political structures, in short, historical institutionalism pushes back the analytical horizon, offering historians of business and technology a new vantage point for understanding industrial change.

In that spirit, this book offers a comparative study that mines the experience of an earlier age for insight into the relationship between political structures and industrial change. The basic questions are deceptively simple: In what ways did the structure of political institutions shape patterns of industrial change? To what extent did the process of industrial change, in turn, alter domestic configurations of power? Comparing early railroad development in the United States and Prussia, the bulk of the study addresses the first question. It begins with the content and process of early railroad policy-making in the two countries, then compares the process of organizing railroad interests, and concludes by delving into the murky world of technological choice in the 1830s and 1840s. Political structure serves as the analytical fulcrum, in other words, while the analysis moves from the political to the economic sphere, focusing successively on state policies, economic institutions, and technological choice.[25] The final

[24] Victoria Hattam, "Economic Visions and Political Strategies: American Labor and the State, 1865–1896," *Studies in American Political Development* 4 (1990): 82–129; idem, *Labor Visions and State Power: The Origins of Business Unionism in the United States* (Princeton: Princeton University Press, 1992); Stephen Skowronek, *Building a New American State: The Expansion of National Administrative Capacities, 1877–1920* (Cambridge: Cambridge University Press, 1982); Peter A. Hall, "Patterns of Economic Policy: An Organizational Approach," in *The State in Capitalist Europe*, ed. S. Born, D. Held, and J. Krieger (London: Allen and Unwin, 1983), pp. 21–53; Hall, *Governing the Economy*. See also Amy Bridges, "Becoming American: The Working Classes in the United States before the Civil War," in *Working Class Formation: Nineteenth-Century Patterns in Western Europe and the United States*, ed. Ira Katznelson and Aristide R. Zolberg (Princeton: Princeton University Press, 1986), pp. 157–96.

[25] In the language more familiar to political scientists, political structure serves as

chapter then briefly addresses the second question, carrying the story forward to the 1850s and beyond, when the industrial changes set in motion by railroad development itself initiated a process of institutional change that ultimately transformed the American and Prussian political structures.

The Comparative Rationale

All historical knowledge, Marc Bloch once observed, necessarily relies on "the mark, perceptible to the senses, which some phenomenon, in itself inaccessible, has left behind."[26] But tracing the impact of something so intangible as political structures poses special problems of evidence, and it is partly for this reason that the study proceeds comparatively. Even if one could work with a manageable body of evidence, as is not the case with railroad history, tackling the subject in a single national context would magnify the difficulties of interpretation. As David Hackett Fischer observes, explicit comparison at least reduces the risk of committing the "fallacy of appositive proof," which occurs when one attempts "to establish a quality in A by contrast with a quality in B—and B is misrepresented or misunderstood."[27] This has been a long-standing problem in American and German historiography, for the concepts of American exceptionalism and the German *Sonderweg* both imply some standard from which they deviate. But that standard remains, at best, ill-defined and underspecified. This is what several British students of German history contended, sparking the first round in the *Historikerstreit* of the 1980s. Geoff Eley, David Blackbourn, and others charged that the central tenets of the German *Sonderweg*—the weakness of the German bourgeoisie, the failure of the revolution of 1848, and Germany's general misdevelopment—are grounded implicitly in comparisons with models of French, American, and, above all, British development that are either unsubstantiated or outdated.[28] During the same

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the independent variable, while the components of industrial change—state economic policy, economic institutions, and technological choice—serve successively as dependent variables.

[26] Marc Bloch, *The Historian's Craft*, trans. Peter Putnam (New York: Vintage Books, 1953), p. 55.

[27] David Hackett Fischer, *Historians' Fallacies: Toward a Logic of Historical Thought* (New York: Harper & Row, 1970), p. 56.

[28] The path-breaking work was David Blackbourn and Geoff Eley, *Mythen deutscher*

years, moreover, the concept of exceptionalism lost its vigor in economic history, as comparative research undermined the notion of a unitary process of industrialization modeled on the British experience.[29] Without a "model" pattern of political or economic development, all patterns become "exceptional." Although the notion of German exceptionalism seems to have survived the challenge, American historians would do well to take note, given the paucity of comparative research on the American *Sonderweg*.

Another reason for casting this as a comparative study is difficult to convey to those who have not had hands-on experience with comparative research. This is its almost magical ability to expose the otherwise invisible paradigms that become second-nature in the historiography of every nation. In the most general terms, the reigning paradigm in American history reflexively privileges society over state; in German history, the opposite occurs. Only when one tries out a given paradigm in another context, and discovers that it alters the historical landscape, does it become apparent how profoundly these invisible paradigms structure understanding of our past, accentuating some facets while shielding others from view. The great value of comparative research, as Carl Degler observes, resides in the way that it "emphasize[s] aspects of our past that may have gone unnoticed before, just as it . . . call[s] for explanations where none was thought necessary before."[30] Comparing processes of industrial change in the United States and Prussia enriches and deepens our historical understanding of both countries in provocative and unforeseen ways.

Finally, this study takes a comparative form because, as Erich An-

Geschichtsschreibung: Die gescheiterte bürgerliche Revolution von 1848, trans. Ulla Haselstein (Frankfurt/Main: Verlag Ullstein, 1980). An English-language edition, which includes a survey of the response to the German edition, was published as *The Peculiarities of German History: Bourgeois Society and Politics in Nineteenth-Century Germany* (Oxford: Oxford University Press, 1984). Since then, this *Historikerstreit* has been overtaken by another that centers more directly on the Nazi period. For a thoughtful review of the former and an introduction to the latter, see Charles Maier, *The Unmasterable Past: History, Holocaust, and German National Identity* (Cambridge: Harvard University Press, 1988). For a recent contribution to the original debate, see Bernd Weisbrod, "Der englische 'Sonderweg' in der neueren Geschichte," *Geschichte und Gesellschaft* 16 (1990): 233–52.

[29] Rondo Cameron, "A New View of European Industrialization," *Economic History Review*, 2d ser., 38 (February 1985): 1–23; P. K. O'Brien, "Do We Have a Typology for the Study of European Industrialization in the XIXth Century?" *Journal of European Economic History* 15 (Fall 1986): 291–333.

[30] Carl N. Degler, "In Pursuit of an American History," *American Historical Review* 92 (February 1987): 7.

germann rightly observes, "it is fun!" In reality, some compulsion also enters in, for it becomes practically impossible to stop thinking comparatively, once one has learned the habit. But the sheer pleasure of confronting "the challenges of ambiguity," to borrow Angermann's phrase, makes it worth the risk, as he puts it, "of being torn to pieces by all kinds of specialists."[31]

Fortunately, comparative historians are neither as scarce nor as beleaguered as they once were.[32] For this, they have some distinguished colleagues to thank: Jürgen Kocka, one of the first to draw the United States and Germany into comparative perspective; Thomas P. Hughes, whose study of electrical power systems in the United States, Britain, and Germany introduced historians of technology to comparative history; Peter Kolchin, whose prize-winning study of American slavery and Russian serfdom did so much to validate the method; and Alfred D. Chandler, Jr., who juxtaposes the American experience with managerial capitalism to that of Britain and Germany.[33] These provide just a hint of the unprecedented vitality that comparative studies, especially of the United States and Prusso-Germany, enjoyed in the 1980s. Nearly a dozen such studies appeared during the decade, their topics ranging from landed elites, populism, and labor history to urban transportation and technical regulation to adolescence and kindergarten movements.[34]

[31] Erich Angermann, *Challenges of Ambiguity: Doing Comparative History*, German Historical Institute Annual Lecture Series No. 4 (New York: Berg, 1991), p. 6.

[32] Among more recent calls for a comparative approach to American history, see George M. Frederickson, "Giving a Comparative Dimension to American History: Problems and Opportunities," *Journal of Interdisciplinary History* 16 (Summer 1985): 107–10; Raymond Grew, "The Comparative Weakness of American History," ibid., pp. 87–101; Degler, "In Pursuit of an American History"; David A. Hounshell, "Rethinking the History of 'American Technology,'" in *In Context*, ed. Cutcliffe and Post, pp. 216–29.

[33] Jürgen Kocka, *White Collar Workers in America, 1890–1940: A Social-Political History in International Perspective*, trans. Maura Kealey, SAGE Studies in 20th Century History, vol. 10 (London and Beverly Hills: SAGE Publications, 1980); Hughes, *Networks of Power*; Peter Kolchin, *Unfree Labor: American Slavery and Russian Serfdom* (Cambridge: Harvard University Press, Belknap Press, 1987); Chandler, *Scale and Scope*.

[34] In order of appearance: Shearer Davis Bowman, "Antebellum Planters and *Vormärz* Junkers in Comparative Perspective," *American Historical Review* 85 (1980): 779–808; Glenn Yago, *The Decline of Transit: Urban Transportation in German and U.S. Cities, 1900–1970* (Cambridge: Cambridge University Press, 1984); Shearer Davis Bowman, "Planters and Junkers: A Comparative Study of Two Nineteenth-Century Elites and Their Regional Societies," (Ph.D. diss., University of California, Berkeley, 1986); Peter Lundgreen, "Measures for Objectivity in the Public Interest: The Role of Scientific Expertise in the Politics of Technical Regulation: Germany and the U.S.,

The present study contributes to this new and growing literature in a way that must be seen as suggestive rather than conclusive. Adopting a comparative methodology reduces the interpretive difficulties, as noted earlier; and organizing the exposition in a largely comparative fashion throughout the book reduces the "dirty work" of comparison that the reader has to do. But the two together magnify the historian's task (in ways for which the tenure track makes no allowance). Because of the many ramifications of railroad development itself, moreover, research on the subject in any country means dealing with an overwhelming wealth of sources. In an effort to keep it to manageable proportions, I oriented my research around the major railroad lines in both countries, but differences in the history of railroads in the two countries have produced discrepancies in the available sources. Both sides of the story rely on secondary sources where they are helpful, but the German side draws more on government archival materials, while the American is based to a larger degree on printed primary materials. In any event, this foray into comparative industrial history will have served its purpose if it convinces historians of both countries to think anew about the relationship between politics and industrialization. The remainder of this chapter explains

1865–1916," in idem, *Standardization, Testing, and Regulation: Studies in the History of the Science-based Regulatory State (Germany and the U.S.A., 19th and 20th Centuries)*, Forschungsschwerpunkt Wissenschaftsforschung (Bielefeld: B. Kleine, 1986); Irmgard Steinisch, *Arbeitszeitverkürzung und sozialer Wandel. Der Kampf um die Achtstundenschicht in der deutschen und amerikanischen Eisen-und Stahlindustrie 1880–1929* (Berlin and New York: Walter de Gruyter, 1986); Tom Taylor, "The Transition to Adulthood in Comparative Perspective: Professional Males in Germany and the United States at the Turn of the Century," *Journal of Social History* 21 (1987–88): 635–58; Ann Taylor Allen, "'Let Us Live with Our Children': Kindergarten Movements in Germany and the United States, 1840–1914," *History of Education Quarterly* 28 (1988): 23–48; David Peal, "The Politics of Populism: Germany and the American South in the 1890s," *Comparative Studies in Society and History* 31 (April 1989): 340–62; Gary Marks, *Unions in Politics: Britain, Germany, and the United States in the Nineteenth and Early Twentieth Centuries* (Princeton: Princeton University Press, 1989); Shearer Davis Bowman, "Honor and Martialism in the U.S. South and Prussian East Elbia during the Mid-Nineteenth Century," in *What Made the South Different?* ed. Kees Gispen (Jackson: University Press of Mississippi, 1990), pp. 19–48; Thomas Welskopp, "Arbeit und Macht im Hüttenwerk. Arbeits- und industrielle Beziehungen in der deutschen und amerikanischen Eisen- und Stahlindustrie von den 1860er bis zu den 1930er Jahren," Ph.D. diss., Freie Universität Berlin, 1991. See also Erich Angermann and Marie-Luise Frings, eds., *Oceans Apart? Comparing Germany and the United States; Studies in Commemoration of the 150th Anniversary of the Birth of Carl Schurz* (Stuttgart: Klett-Cotta, 1981); Chandler and Daems, eds., *Managerial Hierarchies*; and Hans-Jürgen Puhle, "Comparative Approaches from Germany: The 'New Nation' in Advanced Industrial Capitalism, 1860–1940—Integration, Stabilization and Reform," *Reviews in American History* 14 (December 1986): 614–28.

why these two countries and this industry are appropriate choices for comparison and how the argument proceeds.

Parallel Patterns of Industrialization

Why compare the antebellum United States and *Vormärz* Prussia? Because the timing, pace, and nature of industrialization over the nineteenth century make the two countries ideal cases for comparison—or as close as one is likely to come in historical research. The earmarks of early industrialism had become visible in both countries by the 1830s, and structural change proceeded apace in subsequent decades. During the last half of the century, consequently, "the distribution of the labor force among the economic sectors was remarkably similar," according to Kocka, although the American labor force grew faster than the German. In both, moreover, the process of industrial change took a largely capitalist form, even though both had a fairly well developed public sector of the economy as the railroad era opened. In Prussia, the state, particularly through the Overseas Trading Corporation (*Seehandlung*) and the Mining Office (*Oberbergsamt*), owned a number of manufacturing and mining enterprises. In the United States, state enterprise came primarily in the form of state government participation in banking and transportation. Yet, in neither country did the public sector carry so much weight that the economy could not be called capitalist. By the end of the century, the United States and the German empire with its Prussian core had emerged as the leading challengers to British industrial power, and by then striking parallels were also evident in the organizational nature of American and German industrialism: where the United States saw the emergence of giant trusts, Germany, of course, had its giant cartels. To a greater degree than in any other country, moreover, American and German businesses built managerial hierarchies staffed by professional managers. "Competitive capitalism" in the United States and "cooperative capitalism" in Germany (as Chandler terms them) differed in degree, not in kind.[35] Both coun-

[35] Kocka, *White Collar Workers*, pp. 16–23; idem, "The Rise of the Modern Industrial Enterprise in Germany," in *Managerial Hierarchies*, ed. Chandler and Daems, pp. 99–105; Chandler, *Scale and Scope*, pp. 12, 393–95; Jürgen Kocka, "Germany: Cooperation and Competition," in "*Scale and Scope*: A Review Colloquium," *Business History Review* 64 (1990): 711–16. On state enterprise, see W. O. Henderson, *The State and the Industrial Revolution in Prussia, 1740–1870* (Liverpool: Liverpool Uni-

tries, in short, might usefully be viewed as moderately "backward" industrializers.[36]

This characterization is apt for another reason as well. *Vormärz* Prussia and the antebellum United States were once thought to map out opposite ends of a "strong-state, weak-state" spectrum, but several decades of research have rendered these images increasingly untenable (although the invisible paradigms make them difficult to dislodge). On the American side, revisions began in the 1940s when a group of scholars set out to reevaluate the state governments' role in antebellum American industrialization.[37] These studies—the first

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versity Press, 1958), pp. 59–75, 119–47; Ulrich Peter Ritter, *Die Rolle des Staates in den Frühstadien der Industrialisierung: Die preußische Industrieförderung in der ersten Hälfte des 19. Jahrhunderts* (Berlin: Duncker and Humblot, 1961), pp. 76–92; Guy S. Callender, "The Early Transportation and Banking Enterprises of the States in Relation to the Growth of Corporations," *Quarterly Journal of Economics* 17 (November 1902): 111–62; George Rogers Taylor, *The Transportation Revolution, 1815–1860* (New York: Holt, Rinehart and Winston, 1951; reprint ed., New York: Harper & Row, Harper Torchbooks, 1968), pp. 352–83; Carter B. Goodrich, *Government Promotion of American Canals and Railroads, 1800–1890* (New York: Columbia University Press, 1960), pp. 51–165; and the sources cited in notes 37–42 below. The extent to which agriculture in the Prussian East and American South took a capitalist form is a matter of considerable controversy; for an introduction, see Helmut Bleiber, "Staat und bürgerliche Umwälzung in Deutschland: Zum Charakter besonders des preußischen Staates in der ersten Hälfte des 19. Jahrhunderts," in *Preußen in der deutschen Geschichte nach 1789*, ed. Gustav Seeber and Karl-Heinz Noack (Berlin: Akademie-Verlag, 1983), esp. pp. 102–6; Hartmut Harnisch, "Zum Stand der Diskussion um die Probleme des 'preußischen Weges' kapitalistischer Agrarentwicklung in der deutschen Geschichte," in ibid., pp. 116–44; Bowman, "Planters and Junkers," pp. 36–67; and for a broader take on the question, Steven Hahn, "Class and State in Postemancipation Societies: Southern Planters in Comparative Perspective," *American Historical Review* 95 (1990): 75–98.

[36] The classic statement is Alexander Gerschenkron, *Economic Backwardness in Historical Perspective: A Book of Essays* (Cambridge: Harvard University Press, Belknap Press, 1966).

[37] The pioneering studies were Oscar Handlin and Mary Flug Handlin, *Commonwealth: A Study of the Role of Government in the American Economy: Massachusetts, 1774–1861*, rev. ed. (Cambridge: Harvard University Press, Belknap Press, 1969; orig. pub. 1947); Louis Hartz, *Economic Policy and Democratic Thought: Pennsylvania, 1776–1860* (Cambridge: Harvard University Press, 1948; reprint ed., Chicago: Quadrangle Books, Quadrangle Paperbacks, 1968); Milton Sydney Heath, *Constructive Liberalism: The Role of the State in Economic Development in Georgia to 1860* (Cambridge: Harvard University Press, 1954); James Neal Primm, *Economic Policy in the Development of a Western State: Missouri, 1820–1860* (Cambridge: Harvard University Press, 1954). These grew out of a cooperative project of the Committee on Research in Economic History (under the sponsorship of the Social Science Research Council) and had their origins in the New Deal era. For details on the project, see Handlin and Handlin, *Commonwealth*, pp. viii–x and Appendix G. Related works include Harry H. Pierce, *Railroads of New York: A Study of Government Aid, 1826–1875* (Cambridge: Harvard University Press, 1953); Goodrich, *Government Promotion*; Harry N. Scheiber, *Ohio Canal Era: A Case Study of Government and the Econ-*

to take federalism seriously, one might say—effectively laid to rest the myth of laissez-faire during the antebellum period (or should have). Yet, the wealth of follow-up research that they should have generated never quite materialized. Since then, scholars of the antebellum political economy have examined the American state from another angle, shifting attention to the role of the state and federal courts in economic growth.[38] Others, meanwhile, began to look anew at the federal government's role before the Civil War and discerned interventionist tendencies in the federal legislature and executive as well.[39] The core of the old myth, to be sure, remains unchallenged:

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omy, 1820–1861 (Athens: Ohio University Press, 1969). On the progress of the literature, see Robert A. Lively, "The American System: A Review Article," *Business History Review* 29 (March 1955): 81–96; Harry N. Scheiber, "Government and the Economy: Studies of the 'Commonwealth' Policy in Nineteenth-Century America," *Journal of Interdisciplinary History* 3 (Summer 1972): 135–51; Donald J. Pisani, "Promotion and Regulation: Constitutionalism and the American Economy," *Journal of American History* 74 (December 1987): 740–68. For a recent study that brings new questions to this line of inquiry, see L. Ray Gunn, *The Decline of Authority: Public Economic Policy and Political Development in New York State, 1800–1860* (Ithaca: Cornell University Press, 1988). We still know far too little about the details of antebellum public administration at the state level.

[38] Here scholars have followed the lead of James Willard Hurst, *Law and the Conditions of Freedom in the 19th-Century United States* (Madison: University of Wisconsin Press, 1956). Among subsequent works, see especially Lawrence M. Friedman, *A History of American Law* (New York: Simon & Schuster, Touchstone Books, 1973); and Morton J. Horwitz, *The Transformation of American Law, 1780–1860* (Cambridge: Harvard University Press, 1977). For a case study that reflects both traditions, see Stanley I. Kutler, *Privilege and Creative Destruction: The Charles River Bridge Case* (Philadelphia: J. B. Lippincott, 1971; New York: W. W. Norton, 1978). For an innovative structural perspective on the courts, see Hattam, "Economic Visions"; and idem, *Labor Visions*. For overviews of the literature, see Harry N. Scheiber, "Regulation, Property Rights, and Definition of 'The Market': Law and the American Economy," *Journal of Economic History* 41 (March 1981): 103–9; idem, "Public Economic Policy and the American Legal System: Historical Perspectives," *Wisconsin Law Review* (1980): 1159–89; Pisani, "Promotion and Regulation," pp. 740–68.

[39] John G. Burke, "Bursting Boilers and the Federal Power," *Technology and Culture* 7 (Winter 1966): 1–23; Smith, *Harpers Ferry*; Merritt Roe Smith, "Army Ordnance and the 'American System' of Manufacturing, 1815–1861," in *Military Enterprise*, ed. idem, pp. 39–86; Charles F. O'Connell, Jr., "The Corps of Engineers and the Rise of Modern Management, 1827–1856," in ibid., pp. 87–116; Keith W. Hoskin and Richard H. Macve, "The Genesis of Accountability: The West Point Connections," *Accounting, Organizations and Society* 13 (1988): 37–73; Frank Bourgin, *The Great Challenge: The Myth of Laissez-Faire in the Early Republic* (New York: George Braziller, 1989); Todd Shallat, "Building Waterways, 1802–1861: Science and the United States Army in Early Public Works," *Technology and Culture* 31 (January 1990): 18–50; Linda Ann Moore, "The Failure of Federal Social Programs in the Early 19th Century," paper presented to the Society for the History of the Early American Republic, Madison, Wis., July 26–28, 1991; Hugh R. Slotten, "Patronage, Politics, and Practice in Nineteenth-Century American Science: Alexander Dallas Bache and the U.S. Coast Survey," Ph.D. diss., University of Wisconsin-Madison, 1991. Although published re-

throughout the antebellum period, the federal executive remained comparatively weak, while the federal legislature inclined toward stalemate. Precisely because of its peculiar, fractured structure, moreover, the American state does not fit neatly with conventional understanding of an interventionist state. But the cumulative effect is clear: it has become impossible to speak of "laissez-faire" in the antebellum American context. Taking federalism into account, the antebellum American "state" was much more than "a mere shell."[40]

On the Prussian side, too, historians began to rethink the state's role in industrialization as mounting evidence undermined the conventional image. Initially, few historians questioned the extent of the state's involvement in economic activity during the first half of the nineteenth century; instead, they debated its consequences—beneficial or not, intended or not. On balance, the first round of revisions found *Vormärz* Prussian policies to have been rather contradictory in nature, some encouraging industrialization but others either hampering economic change or proving irrelevant.[41] Historian Clive Trebilcock has gone a step further, however, debunking what he labels "myths of the directed economy" in nineteenth-century Germany. By 1840, he argues, even the Prussian state had shifted away from the "regimented" forms of state involvement that had characterized the eighteenth century, turning instead to a collection of indirect policies that aimed to encourage industrialization mainly by offering advice and guidance. As he rightly notes, "these methods are not easily reconciled with traditional expectations as to the behaviour of 'authoritarian' German states."[42] In the 1980s other historians—Thomas Nipperdey, Wolfgang Hardtwig, W. R. Lee

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cently, Bourgin's book, like the SSRC studies, had its origins in the New Deal; for details see the foreword by Arthur Schlesinger, Jr.

[40] Richard Franklin Bensel, *Yankee Leviathan: The Origins of Central State Authority in America, 1859–1877* (Cambridge: Cambridge University Press, 1990), p. ix. Bensel is referring, of course, to the federal government.

[41] See Karl W. Hardach, "Some Remarks on German Economic Historiography and its Understanding of the Industrial Revolution in Germany," *Journal of European Economic History* 1 (Spring 1972): 73–77; Jonathan Sperber, "State and Civil Society in Prussia: Thoughts on a New Edition of Reinhart Koselleck's *Preußen zwischen Reform und Revolution*," *Journal of Modern History* 57 (June 1985): 280–84. Eric Dorn Brose explores the origins of this contradictory quality in *The Politics of Technological Change in Prussia: Out of the Shadow of Antiquity, 1809–1848* (Princeton: Princeton University Press, 1993).

[42] Clive Trebilcock, *The Industrialization of the Continental Powers, 1780–1914* (New York and London: Longman, 1981), pp. 74–78 (quotation from p. 78).

among them—have come to this view as well.[43] "Despite much evidence for specific kinds of economic promotion," Hans Jaeger notes, "the significance of the state for the industrialization of the nineteenth century in Germany—especially with regard to Prussia—is very much contested."[44] Revisions from both sides, in short, have blurred traditional images of the two states: the antebellum United States had more of a state than previously thought, while Prussia apparently had less. In this sense, too, "*moderately* backward" seems an appropriate characterization.

Contrasting Political Structures

Yet, despite parallel patterns of capitalist industrialization, the American and Prussian political structures differed substantially in the first half of the nineteenth century. In this respect, they confirm Skocpol's warning not to conflate capitalism and democracy: "capitalism in general has no politics," she observes, "only (extremely flexible) outer limits for the kinds of support for property ownership and controls on the labor force that it can tolerate."[45] Both structures exhibited a significant degree of decentralization, but the critical difference lay in the degree to which governmental powers were separated, both vertically among levels and horizontally among branches of government. These formal differences defined two distinct types of structure, one federal-legislative and the other unitary-bureaucratic.

In the United States, decentralization operated within a federal structure that gave the American state governments a strong voice. The crucial distinction, as Carl J. Friedrich explains, was that the American state governments enjoyed the basic right of "amending of

[43] Thomas Nipperdey, *Deutsche Geschichte, 1800–1866: Bürgerwelt und starker Staat* (Munich: Verlag C. H. Beck, 1983), pp. 182–85; Hardtwig, *Vormärz*, pp. 93–95; W. R. Lee, "Economic Development and the State in Nineteenth-Century Germany," *Economic History Review*, 2d ser., 41 (1988): 346–67; idem, "The Paradigm of German Industrialisation: Some Recent Issues and Debates in the Modern Historiography of German Industrial Development," in *German Industry and German Industrialisation: Essays in German Economic and Business History in the Nineteenth and Twentieth Centuries*, ed. idem (London: Routledge, 1991), pp. 8, 12. See also Richard H. Tilly, *Vom Zollverein zum Industriestaat: Die wirtschaftlich-soziale Entwicklung Deutschlands 1834 bis 1914* (Munich: Deutscher Taschenbuch Verlag, 1990).

[44] Hans Jaeger, *Geschichte der Wirtschaftsordnung in Deutschland* (Frankfurt/Main: Suhrkamp Verlag, 1988), p. 81.

[45] Theda Skocpol, "Political Response to Capitalist Crisis: Neo-Marxist Theories of the State and the Case of the New Deal," *Politics and Society* 10 (1980): 200.

the constitutional charter itself."[46] In the antebellum years, moreover, they constituted the primary policy-making arena. As Harry N. Scheiber writes, "the states enjoyed virtually exclusive control over elections, civil rights, education, family and social relations, and criminal law," as well as extensive powers over labor relations, corporations, commercial law, and the expropriation of private property under eminent-domain law.[47] The federal arrangement also gave the states the power to determine their own internal structure and to control the activities of lower levels of government. The structure of the state governments themselves depended on the arrangements spelled out in their constitutions, subject only to the stricture of the national constitution that they have "a Republican Form of Government."[48] Hence, most had bicameral legislatures and a single executive, although the specific arrangements and relative strength of the branches varied from state to state.[49] And, regardless of their specific structure, the state governments generally determined what powers could be exercised by county and city governments. Thus, under "decentralized federalism," as Scheiber terms it, power in most policy areas was concentrated at the middle level of the American political structure, rather than above or below that point.[50]

In Prussia, decentralization functioned within a unitary structure, the hallmark of which was enduring domestic conflict "between ministerial centralism and provincial regionalism."[51] This is worth emphasizing, for regionalism placed real limits on the power of the central state. Prussian regionalism reflected the country's persistently heterogeneous economic and social structure. Although per-

[46] Carl J. Friedrich, *Trends of Federalism in Theory and Practice* (New York: Frederick A. Praeger, 1968), pp. 5–6. Cf. Daniel J. Elazar, "Federalism," *International Encyclopedia of the Social Sciences*, vol. 5 (1968), pp. 355–57; idem, *Exploring Federalism* (Tuscaloosa: University of Alabama Press, 1987).

[47] Friedrich, *Trends of Federalism*, pp. 5–8, 17–18; Scheiber, "Federalism and the American Economic Order," pp. 83–84.

[48] U.S. *Constitution*, art. IV, sec. 4. The Constitution does not elaborate on the subject, and it has generally been accepted that the form of the state governments that existed when the Constitution was adopted implicitly defined "republican." *The Constitution of the United States of America (Annotated)*, Senate Doc. No. 232, 74th Congress, 2d sess., 1938, pp. 548–49.

[49] Richard B. Morris and Jeffrey B. Morris, eds., *Encyclopedia of American History*, 6th ed. (New York: Harper & Row, 1982), pp. 132–33 and 198.

[50] Scheiber, "Federalism and the American Economic Order," pp. 72–96.

[51] Rüdiger Schütz, "Preußen und seine Provinzen," in *Preußen-Ploetz: Eine historische Bilanz in Daten und Deutungen*, ed. Manfred Schlenke (Würzburg: Verlag Ploetz Freiburg, 1983), p. 29.

haps not quite as diverse as the United States, Prussia was still a nation marked, as Reinhart Koselleck writes, by "social, religious, linguistic, and legal pluralism,"[52] and by pockets of local autonomy. After the Congress of Vienna (1815), when Prussia acquired Westphalia and the areas that would be consolidated into the province of the Rhineland, the main lines of divergence ran along a gradient from the agrarian East to the industrial South-Central and West.[53] In their administrative, legal, and economic practices, the new western provinces reflected their geographical separation from the East, their proximity to France and Belgium, and years of occupation by Napoleon. In the face of provincial heterogeneity, the Prussian state adopted an integration policy characterized by a willingness to compromise when it would not interfere unduly with the power of the central state. As Thomas Nipperdey observes, "Prussia sought to solve the problem of integration and regionalism not through federalization but through decentralization."[54] The national legal code (*Allgemeines Preußisches Landrecht*) adopted in 1794, for example, did not extend to each and every individual in the nation. In some cases it did take precedence, but it generally remained subordinate to provincial law. In the Rhineland, moreover, French law superseded it altogether; in the premier example of "accommodation to provincial regionalism," as Rüdiger Schütz notes, the Rhineland retained its distinctive legal and judicial system, based on the *Code Napoléon*, when it became a Prussian province. Decentralization within the unitary Prussian structure developed, not unlike American federalism, as a pragmatic concession to the reality of persistent regionalism.[55]

[52] Reinhart Koselleck, "Staat und Gesellschaft in Preußen 1815–1848," in *Moderne deutsche Sozialgeschichte*, ed. Hans-Ulrich Wehler, 5th ed. (Cologne: Verlag Kiepenheuer & Witsch, 1976), p. 63. For a discussion of political structure and diversity in the American case, see C. D. Tarlton, "Symmetry and Asymmetry as Elements of Federalism: A Theoretical Speculation," *Journal of Politics* 27 (1965): 861–74.

[53] Knut Borchardt, *Perspectives on Modern German Economic History and Policy*, trans. Peter Lambert (Cambridge: Cambridge University Press, 1991), pp. 30–47; Lee, "Economic Development and the State." See also Frank B. Tipton, Jr., *Regional Variations in the Economic Development of Germany During the Nineteenth Century* (Middletown, Conn.: Wesleyan University Press, 1976); Rainer Fremdling and Richard H. Tilly, eds., *Industrialisierung und Raum: Studien zur regionalen Differenzierung im Deutschland des 19. Jahrhunderts*, Historisch-Sozialwissenschaftliche Forschungen, vol. 7 (Stuttgart: Klett-Cotta, 1979).

[54] Nipperdey, *Deutsche Geschichte*, p. 332.

[55] Koselleck, "Staat und Gesellschaft," pp. 58, 63; Schütz, "Preußen und seine Provinzen," pp. 28–31; Nipperdey, *Deutsche Geschichte*, pp. 331–37. For a detailed study of

Nonetheless, Prussia's unitary structure meant that the uppermost level of government wielded much more power than the federal government in the United States.[56] A series of reforms after the Napoleonic Wars produced a degree of administrative uniformity throughout the country. At the top of the structure before 1848 stood the king, his personal authority limited mainly by the power of the bureaucracies, sometimes referred to as Prussia's "Quasi-Parliament." Where legislative matters were concerned, two bodies served the king directly in an advisory capacity. The Council of State (*Staatsrat*) included the royal princes, current and former ministers, senior members of the military and the bureaucracies, the provincial governors, and representatives of the churches and universities. The Council of Ministers (*Staatsministerium*) functioned as a collegial organization, whose members presided over the various, functionally organized ministries. On an informal basis, finally, a ring of personal advisors around the king could be as powerful as the Council of State or Council of Ministers. These institutions, formal and informal, together constituted the Prussian central state.

At the regional level, the political structure consisted of eight provinces (reduced from ten in 1824), divided into twenty-five districts (*Regierungsbezirke*) and further subdivided into several hundred counties (*Kreise*). At the head of the each province stood a senior president (*Oberpräsident*), who possessed only limited executive powers but nonetheless wielded considerable influence as mediator between the ministries and the provincial governments. Provincial assemblies (*Provinziallandtage*) were established in 1823/24 as a partial concession to demands for political liberalization, but these were headed by marshals, whom the king appointed personally. Here, the

Prussia's "integration policy" in the *Vormärz* period, see Rüdiger Schütz, *Preußen und die Rheinlande: Studien zur preußischen Integrationspolitik im Vormärz* (Wiesbaden: Franz Steiner Verlag, 1979).

[56] The description in this and the following paragraph draws on the diagram of the Prussian administrative structure after 1815 in Peter Ruf, "Ansätze zur Erneuerung: Die preußischen Reformen 1807–1815," in *Preußen-Ploetz*, ed. M. Schlenke, p. 175; Koselleck, "Staat und Gesellschaft," pp. 65–68; Schütz, *Preußen und die Rheinlande*, pp. 36–83, 242–45; Bleiber, "Staat und bürgerliche Umwälzung," pp. 99–100; Koselleck, "Altständische Rechte, außerständische Gesellschaft und Beamtenherrschaft im Vormärz," in *Preussen in der deutschen Geschichte*, ed. Dirk Blasius (Königstein/Ts.: Verlagsgruppe Athenäum-Hain-Scriptor-Hanstein, 1980), pp. 219–36; Nipperdey, *Deutsche Geschichte*, pp. 331–37. King Friedrich Wilhelm III reigned from 1797 until his death in 1840; he was succeeded by Friedrich Wilhelm IV, who died in 1861.

landed nobility retained the upper hand. Noble landowners held half of the votes, urban landowners a third, and peasant landowners a sixth, the nobility voting as individuals and the others holding votes as a group (with a somewhat different arrangement in the Rhine provinces). These assemblies had responsibility for certain provincial matters but otherwise their powers were largely advisory. Unlike the American states, moreover, they enjoyed no constitutional right to alter the structure of the state itself, not even after the revolution of 1848. At the next level down were the district governments, organized on a collegial basis but headed by strong district presidents (*Regierungspräsidenten*). The district governments, however, were directly under the authority of the ministries (with the exception of the Justice Ministry), rather than provincial officials, and they played an important role in the formulation of legislation in the ministries. At the next lower level of government was the county magistrate (*Landrat*), chosen by the central government from candidates nominated by the district assemblies. The latter were firmly under the control of the local nobility, who took care to see that the nominees for county magistrate came from their own ranks.[57] Completing the structure, finally, were the municipal governments, their powers exercised formally at the pleasure of the central state. In the administration of city affairs, the landed nobility had less influence, but in the countryside its power remained virtually unchecked.

Thus the Prussian structure exhibited a polarization of power between top and bottom, unlike the American structure with its mid-level concentration of power. The fingers of ministerial power reached down to the district level but not much further. The formal power of the landed nobility, conversely, was concentrated at the lower levels of the structure. It maintained its power at the national level primarily through informal channels—personal connections to the royal household or individuals appointed to the ministries. To the extent that the interests of the ministries and the landed nobility coincided, of course, the two together could form an interlocking power structure, although they did not always do so.

[57] In 1812 the county magistrate was replaced by a county director named directly by the central state rather than by the district assembly; due to opposition from the nobility, however, the county-magistrate system was soon reinstated. Not until 1872 was the magistrate made a civil servant. Ruf, "Ansätze zur Erneuerung," p. 176.

At each level of government, moreover, the two structures differed in another crucial respect: the degree to which power was separated among branches of government. In the United States, a relatively well developed horizontal separation of powers served to limit executive power both at the national and at the state level. This naturally gave greater prominence to legislative bodies and carried with it a fairly high degree of formal popular representation at both the state-government and the national level.[58] In practice, therefore, Congress and the state legislatures tended to dominate the policy-making process at their respective levels of government, their power tempered mainly by the courts and in a few cases by strong executives at the state level.[59] In *Vormärz* Prussia, governmental powers were less distinctly separated. The executive (*Verwaltung*) and judiciary had been partially disengaged as part of the Stein-Hardenburg reforms early in the century, but the executive and legislative functions in Prussia remained formally combined. Since representative bodies played only an advisory role, the bureaucracies at the national and district level dominated the policy-making process.[60]

Viewed both vertically and horizontally, then, the American and Prussian political structures that early railroad promoters confronted looked quite different, despite a common tendency toward decentralization. The distinguishing mark of the Prussian unitary-bureaucratic state before 1848 was its twofold concentration of policy-making power at the national level in the executive branch. In the United States, federalism and (horizontal) separation of powers combined to produce a highly fragmented political structure, one marked by a

[58] By 1830 only five state governments still retained property qualifications on suffrage while another eight required voters to be taxpayers. In addition, most had moved to popular election of governors and presidential electors. A glaring exception to the shift toward manhood (not to mention universal) suffrage remained in place, of course, as long as slaves and (in some states) free blacks had no voting rights. Morris and Morris, eds., *Encyclopedia*, p. 198; Kirk H. Porter, *A History of Suffrage* (Chicago: University of Chicago, 1918), pp. 110, 148.

[59] See note 49. By the 1830s New York state under the Albany Regency had developed one of the strongest executives, its powers particularly noticeable in the areas of banking, education, and internal improvements. "For some time there has appeared in the administration of the State of New York," Michel Chevalier noted with approbation in 1835, "a character of grandeur, unity, and centralisation, that has procured it the title of the *Empire-State*." Michael Chevalier, *Society, Manners and Politics in the United States* (New York: Burt Franklin, 1969; orig. pub. Boston, 1839), pp. 370–77 (quotation from p. 371; original italics).

[60] See note 56.

twofold dispersion of power that gave the state legislatures a prominent place in policy-making.

The structure of the antebellum American state poses special problems, as historians well know, for federalism produced a policy "mosaic" (in Scheiber's words) to which each state contributed "its own coloration and design."[61] This makes generalization difficult, though nonetheless necessary. The large differences among the states notwithstanding, it is essential to adopt a more comprehensive vision—to view events from the perspective of "the American state" writ large—in order to perceive the full dimensions of the antebellum American state. As Oscar and Mary Handlin observed nearly fifty years ago:

> In America, the peculiar complexity of federalism has often, in the last half-century, misled those who have touched upon the subjects of government and business enterprise. . . . Too often the absence of activity by the federal government has been taken for the absence of all activity, the denial of its right to act, the denial of the right of any government to act.

In a decentralized federal system, this is the predictable result, when the states are not taken into account. Understanding the antebellum American state demands close attention to the activities of the states, because, as the Handlins explain, "the affairs of the states were not only of greater public concern than those of the nation but they also had a more pervasive and more significant influence."[62] But policy variations among the states, while worth exploring in their own right, are not of intrinsic interest for this study. They matter no more or less than differences in the Prussian central state's treatment of its provinces, for assessments of state intervention do not depend on the geographical uniformity of policy.

If these various methods of curbing autocratic or oligarchic power—horizontal and vertical separation of powers, greater formal representation—may be taken as essential characteristics of a "liberal" political structure in the classical sense, then it seems reasonable to characterize the American structure as more liberal and the Prussian as less. Notwithstanding the limitations on formal representation in the United States and the existence of informal channels

[61] Scheiber, "Federalism and the American Economic Order," p. 97.
[62] Handlin and Handlin, *Commonwealth*, p. xvi.

of representation in Prussia, political liberalism prevailed to a greater extent in the antebellum United States than it did in Prussia.[63]

Because of these differences in structure, railroad policy in this period emanated from different levels and branches of government in the two countries. In the antebellum United States, the state legislatures decided, for example, whether to incorporate companies or to grant rights of eminent domain. In *Vormärz* Prussia, the central bureaucracies did so. Although most of the ministries (not to mention state financial institutions, the Post Office, and the provincial and local governments) had a strong interest in railroad policy, the Finance Ministry in Berlin had immediate responsibility for the issuing of charters, and early railroad men dealt most often with its officials. Comparing events and tendencies in these two countries thus should provide valuable clues to the impact of different political structures on the process of industrial change.[64]

Early Railroad Development

Early railroad development offers a remarkably rich basis for comparison. In the United States and Prusso-Germany alike, it served as an opening wedge in the process of industrial change that transformed the two nations into leading economic powers by the end of the century. Even though the magnitude of railroad construction in the United States quickly dwarfed that in any other country, as Jürgen Kocka observes, a fundamental similarity marked the timing, pace, and nature of railroad development in the two countries.[65] In both

[63] Cf. David G. Smith, "Liberalism," *International Encyclopedia of the Social Sciences*, vol. 9 (1968), p. 278. Friedrich treats the question whether a federal or a unitary structure is "more appropriate" in a given situation as a matter of "practical politics" (*Trends of Federalism*, p. 6), but, as Daniel J. Elazar notes, federalism "as a political device" is usually valued as "a means of safeguarding individual and local liberties" through the dispersion of power ("Federalism," p. 354).

[64] Marc Bloch, "Toward a Comparative History of European Societies," in *Enterprise and Secular Change: Readings in Economic History*, ed. Frederick C. Lane and Jelle C. Riermersma (Homewood, Ill.: Richard D. Irwin, Inc., 1953), pp. 494–521; William H. Sewell, "Marc Bloch and the Logic of Comparative History," *History and Theory* 6 (1967): 208–18; Theda Skocpol and Margaret Somers, "The Uses of Comparative History in Macrosocial Inquiry," *Comparative Studies in Society and History* 22 (April 1980): 174–97.

[65] Jürgen Kocka, "Eisenbahnverwaltung in der industriellen Revolution: Deutsch-Amerikanische Vergleiche," in *Historia Socialis et Oeconomica: Festschrift für Wolfgang Zorn zum 65. Geburtstag*, ed. Hermann Kellenbenz and Hans Pohl (Stuttgart: Franz Steiner Verlag Wiesbaden GmbH, 1987), pp. 261–62.

countries, plans for the first railroads surfaced in the 1820s. In the United States, the first railroads, powered by horses, were the Granite Railroad in Quincy, Massachusetts, and the Mauch Chunk Railroad, a mining railroad in Pennsylvania, completed in 1826 and 1827, respectively. The first Prussian railroads, also horse-powered mining railroads, were built in 1828 and 1829.[66] Then in the 1830s railroad construction began in earnest, especially in the United States. As will become apparent in the following chapters, the rapidity of construction in the United States reflected the dynamics of legislative policymaking, coupled with the political exigencies of federalism, both of which made it much easier for American railroad promoters to obtain charters. By 1840 (table 1-1) construction had been completed on some 4,500 kilometers of track in the United States; in Prussia, only 185 kilometers had been completed. (The German states together claimed about 500 kilometers of track at that time.)[67]

The pace of construction in Prussia picked up in the 1840s, however, and in both countries national rail networks took shape in the late 1840s and 1850s. By the mid-1840s, several regional concentrations of railroads had emerged in Prussia. The most important of these centered on Berlin, from which railroads radiated in every direction (except to the northwest). Cologne formed a second nexus in the western provinces, while regional centers had also grown up in other German states.[68] Construction proceeded unevenly, depending on

[66] For an overview of Prussian railroad development, see Wolfgang Klee, *Preußische Eisenbahngeschichte* (Stuttgart: Verlag W. Kohlhammer, 1982); and Rainer Fremdling, *Eisenbahnen und deutsches Wirtschaftswachstum, 1840–1879: Ein Beitrag zur Entwicklungstheorie und zur Theorie der Infrastruktur*, 2d ed. enl., Untersuchungen zur Wirtschafts-, Sozial- und Technikgeschichte, vol. 2. (Dortmund: Gesellschaft für Westfälische Wirtschaftsgeschichte e.V., 1985). On antebellum American railroad development, see Robert William Fogel, *Railroads and American Economic Growth: Essays in Econometric History* (Baltimore: Johns Hopkins University Press, 1964); Albert Fishlow, *American Railroads and the Transformation of the Ante-Bellum Economy* (Cambridge: Harvard University Press, 1965); *History of Transportation in the United States before 1860*, prepared under the direction of Balthasar H. Meyer by Caroline E. MacGill and a staff of collaborators (Washington, D.C.: Carnegie Institution, 1917), hereafter cited as Meyer, *History of Transportation*; and Taylor, *Transportation Revolution*, pp. 74–103.

[67] For summary details on 178 American railroads completed or in planning by 1840, see Franz Anton Ritter von Gerstner, *Die innern Communicationen der Vereinigten Staaten von Nordamerika*, 2 vols. (Vienna: L. Förster, 1842–43), 2:334–37, who counts 4,600 kilometers. Early railroad mileage statistics, especially for the United States, must be viewed as rough estimates. For discussion, see Fogel, *Railroads*, pp. 257–60.

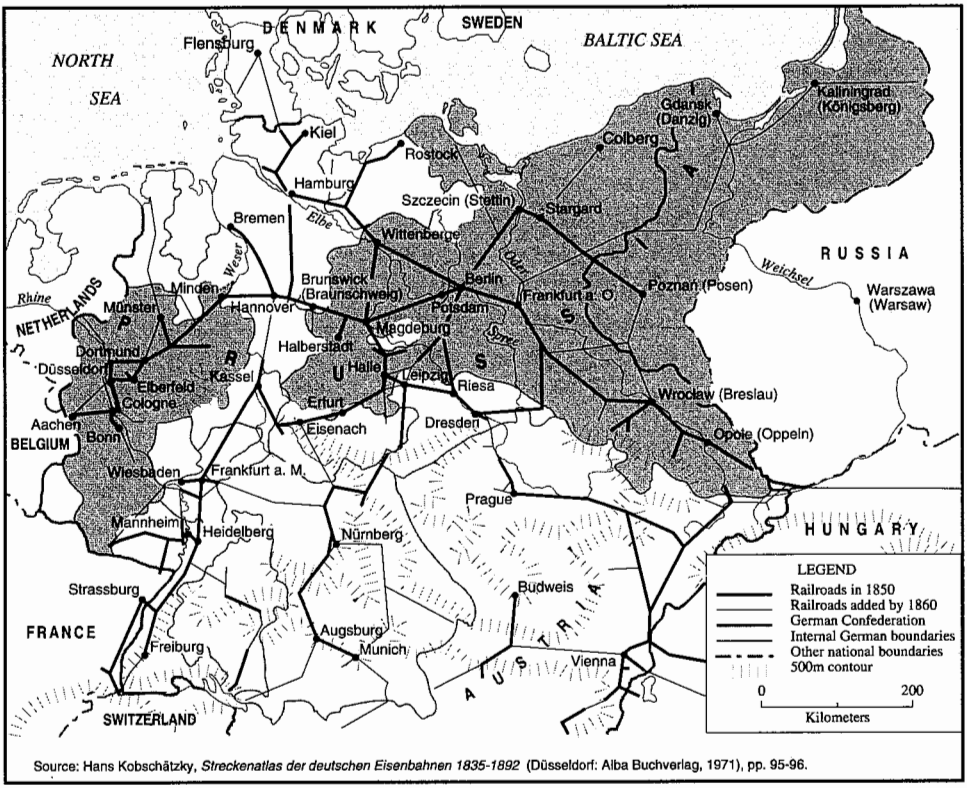
[68] *Festschrift über die Thätigkeit des Vereins Deutscher Eisenbahn-Verwaltungen in den ersten 50 Jahren seines Bestehens, 1846–1896* (Berlin: Nauck'schen Buch-

TABLE 1-1
Comparative Railroad Development
United States and Prussia, 1839/40–1860

	United States	*Prussia*
Population (millions)		
1820	9.6	11.3
1830	12.9	13.0
1839	16.7	
1840	17.1	14.9
1850	23.2	16.6
1860	31.5	18.3
Total Railroad Mileage (km)		
1840	4,500	185
1850	14,400	2,970
1860	49,000	5,760
Mileage per 10,000 Inhabitants (km)		
1840	2.6	0.1
1850	6.2	1.8
1860	15.6	3.1
Total Railroad Investment ($ million)		
1839/40[a]	$96	$5
1850	$301	$107
1860	$1,151	$268
Investment per Capita		
1839/40[a]	$5.75	$0.34
1850	$12.97	$6.45
1860	$36.54	$14.64

SOURCES: For Prussian population, Wolfgang Köllman, ed., *Quellen zur Bevölkerungs-, Sozial- und Wirtschaftsstatistik Deutschlands 1815–1875*, vol. 1: *Quellen zur Bevölkerungsstatistik Deutschlands 1815–1875*, prepared by Antje Kraus (Boppard am Rhein: Harald Boldt Verlag, 1980), p. 226. For American population and rail mileage, U.S. Bureau of the Census, *Historical Statistics of the United States, 1789–1945* (Washington, D.C.: Government Printing Office, 1949), Series A2, K1. For American investment, Fishlow, *American Railroads*, p. 358. For Prussian mileage and investment (*Kapitalstock zu Anschaffungspreisen [verwendetes Anlagekapital]*), Fremdling, *Eisenbahnen*, pp. 28, 48.

[a]U.S. in 1839; Prussia in 1840.



Source: Hans Kobschätzky, *Streckenatlas der deutschen Eisenbahnen 1835-1892* (Düsseldorf: Alba Buchverlag, 1971), pp. 95-96.

Fig. 1. Railroads in Prussia

general economic and political conditions, but by the end of the decade (see fig. 1), two great east-west thoroughfares had been constructed, one running from Berlin through Hannover to Düsseldorf on the Rhine and another connecting Berlin (by a rather circuitous route) through Halle with Frankfurt/Main. Other long-distance lines radiated from Berlin northwest to Hamburg and southeast to Breslau and beyond. Additional construction during the 1850s had fleshed out the network considerably by 1860.

druckerei, 1896), p. 410. Hereafter, this source is cited as *Festschrift*. See also Hans Kobschätzky, *Streckenatlas der deutschen Eisenbahnen, 1835–1892* (Düsseldorf: Alba Buchverlag, 1971), pp. 94–95.

During the same years, the American system also began to fill in (fig. 2). After the economic hard times of the late 1830s and the early 1840s, the pace of railroad construction picked up, first, in New England, where the density of track was already the greatest, and by the late 1840s in the rest of the country. Subsequently, the capstone of the antebellum American system was put in place when the four great east-west trunk-line railroads (the New York and Erie, New York Central, Baltimore and Ohio, and Pennsylvania railroads) were completed in rapid succession between 1851 and 1854. Meanwhile, construction of new railroads in the Old Northwest extended the trunk-lines' reach further westward and set the United States off on a railroad-building boom without parallel.[69]

By mid-century, then, the United States boasted roughly 14,000 kilometers of track (table 1-1), while the Prussian system had grown to nearly 3,000. (The German states, which led the Continental countries in railroad construction, claimed close to 6,000 kilometers.)[70] In per capita terms, this represented more than three times as much mileage in the United States as in Prussia. Then came a great spurt of construction in the United States in the 1850s, which widened the gap between the two countries. By 1860, the American network had grown to more than eight times the size of the Prussian system. In per capita terms, this represented five times more railroad mileage in the United States than in Prussia.

The bulk of this study focuses on the 1830s and 1840s, mainly because these were the years in which the contours of the industry took shape in both countries. Thus they were the years in which the two contrasting political structures exercised a formative influence on railroad development. In subsequent decades, moreover, the history of railroads in these two countries diverged in ways that would vitiate the comparative rationale that undergirds this study, if it were extended to those years. When American railroad construction penetrated the West in the 1850s and especially from the late 1860s on, not only the scale but also the nature of railroad development changed. As lines were constructed through sparsely populated areas in which

[69] On the post-1850 railroad business, see Chandler, *Visible Hand*, pp. 83–121.

[70] By 1850 France had built slightly less track than Prussia, Belgium had constructed less than 1,000 kilometers, and Britain claimed 10,000 kilometers. Fremdling, *Eisenbahnen*, p. 48; B. R. Mitchell, *European Historical Statistics, 1750–1970*, abridged ed. (New York: Columbia University Press, Macmillan Press, 1978), pp. 315–16.

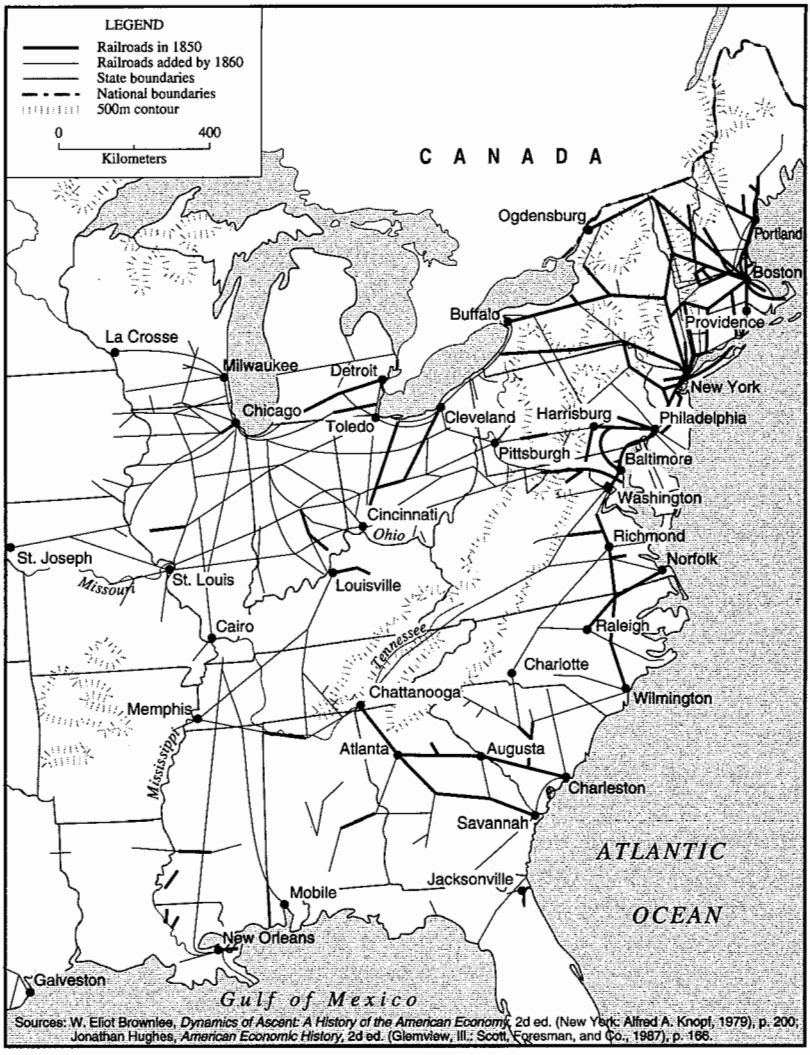


Fig. 2. Railroads in the United States

the federal government still owned much of the land, American railroad development became increasingly "developmental" in nature. That is, railroads no longer generated profits directly from the thriving local economies through which they passed; instead they themselves shaped the lines of subsequent settlement and stimulated eco-

nomic development. Railroad construction in the more sparsely settled regions of eastern Prussia in the 1860s and 1870s did not have comparable ramifications. The American federal and local governments, moreover, began to pick up the burden of promotion from financially strapped states, some of whose constitutions now prevented them from providing further aid. During the 1880s, finally, as a modicum of federal regulation was instituted in the United States, Prussia (by then a part of the German empire) nationalized its major lines.[71] As the industry matured in both countries, in short, the divergence between the two widened along several dimensions.

In the earlier period, however, railroad development had a more comparable significance in the two countries, despite discrepancies in the scale of construction. Indeed, it meant more to their industrial development than it did for any of their contemporaries. "In both countries," Kocka observes, "the initial construction phase (1840s to 1870s) coincided approximately with the breakthrough phase of industrialization, which was, accordingly, marked strongly by railroad construction."[72] The railroads contributed to that transformation by introducing the twin phenomena that would define a new industrial order: large geographic scale and capital intensity. The railroads brought a vast extension of the geographic scale of enterprise, for they were the first businesses whose transactions and property holdings alike extended over large distances. In tandem with capital intensity, moreover, large geographic scale prompted the railroad men to pioneer management techniques new to the private sector.[73] But the second phenomenon, capital intensity, had much wider ramifications, for it also prompted new methods of mobilizing capital, acted as a stimulus to industrial activity in other sectors, and radically changed competitive behavior.

[71] Goodrich, *Government Promotion*, pp. 169–204, 265–97; and idem, "Internal Improvements Reconsidered," *Journal of Economic History* 30 (June 1970): 289–311, esp. pp. 305–6. The developmental aspects in the United States may be seen most clearly in construction of the transcontinental railroads. See Robert William Fogel, *The Union Pacific Railroad: A Case in Premature Enterprise* (Baltimore: Johns Hopkins University Press, 1960). For an overview of Prussian (and German) railroads from the 1860s through nationalization, see Klee, *Preußische Eisenbahngeschichte*, pp. 132–78. Amy Elaine Sanders has a dissertation in progress at Columbia University on the nationalization of Prussian railroads.

[72] Kocka, "Eisenbahnverwaltung," p. 262. See also Richard Tilly, "The 'Take-Off' in Germany," in *Oceans Apart?*, ed. Angermann and Frings, p. 48.

[73] Chandler, *Visible Hand*, pp. 94–120; O'Connell, "Corps of Engineers"; Kocka, "Eisenbahnverwaltung," pp. 263–64.

Capital intensity manifested itself in several ways. First, and most obvious to contemporary observers, it meant that single enterprises and the industry as a whole commanded unprecedented amounts of capital. As Rainer Fremdling comments, "between 1840 and 1880 no other modern sector in Germany accumulated capital on [the] scale [of the railroads]."[74] In the United States, where railroad development proceeded so much more rapidly from the outset, railroads absorbed an even larger proportion of domestic capital. By 1850 (see table 1-1) something on the order of $300 million had been invested in American railroads and more than $100 million in Prussian lines; in per capita terms, Americans had invested roughly twice as much as Prussians had. In the United States, total railroad investment in 1850 reached a level equal to nearly 7 percent of the nation's domestic capital stock (table 1-2); in Prussia, it constituted about 3 percent. Ten years later, investment reached more than $1 billion and $268 million, respectively. In per capita terms, this meant two and a half times as much investment in the United States as in Prussia; total railroad investment now equalled nearly 13 percent of domestic capital stock in the United States and more than 5 percent in Prussia.

Because most railroads in both countries were privately owned and operated and because they demanded such large sums of capital, they made important contributions to the development of modern business methods. Even though American lines tended to rely more heavily on state aid (as chapter 2 argues), railroads in both countries were the first enterprises to make widespread use of the joint-stock form of corporate organization, and they were also the first to introduce broad segments of the public to the stock market. Through the 1840s, railroad investment in both countries came largely from private, domestic sources of capital. Foreign capital took on some importance in the United States during the 1830s, but only after 1850, as Carter B. Goodrich observes, were American railroads "able to raise substantial sums in the European market," and the bulk of foreign investment came after the Civil War. To raise large sums of capital, which reached millions of dollars per enterprise, railroad promoters in both countries turned mainly to private bankers (in Prussia) or merchant-capitalists (in the United States), who were often to be

[74]Rainer Fremdling, "Railroads and German Economic Growth: A Leading Sector Analysis with a Comparison to the United States and Great Britain," *Journal of Economic History* 37 (September 1977): 586.

TABLE 1-2
Total Railroad Investment as a Percentage of Domestic Capital Stock (Current Market Prices)

Year	*U.S.*	*Prussia*
1850	6.8%	3.0%
1860	12.7%	5.4%

SOURCES: Table 1-1; Robert E. Gallman, "The United States Capital Stock in the Nineteenth Century," in *Long-Term Factors in American Economic Growth*, ed. Stanley L. Engerman and Robert E. Gallman (Chicago: University of Chicago Press, 1986), p. 204, variant B; Walther G. Hoffman, *Das Wachstum der deutschen Wirtschaft seit der Mitte des 19. Jahrhunderts* (Berlin: Springer-Verlag, 1965), p. 255. German capital stock (*Kapital-stock zu laufenden Preisen*) adjusted to the Prussian population on the basis of Köllmann, ed. *Quellen*, pp. 226, 338. Most of the components of Gallman's data are in market prices or in net reproduction costs.

found among the ranks of their own stockholders. The companies relied on these private capitalists to help them in placing railroad stocks and bonds, which in both countries were the first industrial securities to be offered publicly in large volume. Indeed, they were virtually the only ones until the last decades of the nineteenth century: in Germany, other industrial securities did not appear on stock exchanges in any number until the 1870s; in the United States, it was only in the 1890s that manufacturers turned to the stock exchange for outside funds.[75] This is one reason why Chandler terms the railroads

[75] Kurt Bösselmann, *Die Entwicklung des deutschen Aktienwesens im 19. Jahrhundert: Ein Beitrag zur Frage der Finanzierung gemeinwirtschaftlicher Unternehmungen und zu den Reformen des Aktienrechts* (Berlin: Walter de Gruyter, 1939), pp. 30, 48–49, 102; Karl Obermann, "Zur Beschaffung des Eisenbahn-Kapitals in Deutschland in den Jahren 1835–1855," *Revue Internationale d'Histoire de la Banque* 5 (1972): 315–52; Richard H. Tilly, "Zur Entwicklung des Kapitalmarktes und Industrialisierung im 19. Jahrhundert unter besonderer Berücksichtigung Deutschlands," *Vierteljahrschrift für Sozial-und Wirtschaftsgeschichte* 60 (1973): 154–58; Leland H. Jenks, "Railroads as an Economic Force in American Development," *Journal of Economic History* 4 (1944): 7–10; Chandler, *Visible Hand*, pp. 90–93. For insight into the railroad activities of private bankers in Prussia, see the Bankhaus Mendelssohn & Co. collection, MA Nachl. 5. For background on Mendelssohn and this collection, see Wilhelm Treue, "Das Bankhaus Mendelssohn als Beispiel einer Privatbank im 19. und 20. Jahrhundert," *Mendelssohn Studien* 1 (1972): 29–80; and Hans-Günter Klein, "Das 'Bankarchiv' der Mendelssohns," Staatsbibliothek Preussischer Kulturbesitz, *Mitteilungen* 16 (1984): 94–105.

the "first big business" in the United States, a designation that applies equally well in Prusso-Germany.[76]

In both countries, the railroads also generated considerable demand for industrial products and thereby stimulated activity elsewhere in the economy. To see their importance in this respect, we need not wade into controversies about the railroads' "social savings."[77] The point here is merely to convey a sense of the railroads' economic weight in these two countries during the middle decades of the nineteenth century. Relying on the data of Robert W. Fogel and Albert Fishlow for the American side, Rainer Fremdling has compared the railroads' demand for iron products in the United States and Germany. Throughout the period 1840–1860, railroad-derived demand accounted for a substantial percentage of total domestic production and consumption of pig iron in both countries, although a larger percentage in the German states than in the United States. By the end of the period, American railroad demand approached 20 percent of domestic consumption and production—not insignificant, in itself. In Germany, however, railroad demand remained above 20 percent of both consumption and production after 1845, and by the late 1850s railroad demand approached 30 percent of production. In this regard, Fremdling concludes, railroad construction meant more for German iron producers and processors than it did for their American counterparts.[78]

Important differences also obtained in the timing of the process of import substitution in the two countries. Railroads in both initially relied almost entirely on Britain for locomotives and rails, and in both they moved quickly to substitute domestically produced locomotives for imports. But the German states moved more quickly through two subsequent stages in the process of import substitution: first, using imported coke pig iron to roll their own rails in the 1840s, and then substituting domestically produced coke pig iron for imports in the 1850s. The United States, in contrast, developed some

[76] Alfred D. Chandler, Jr., comp. and ed., *The Railroads: The Nation's First Big Business, Sources and Readings* (New York: Harcourt, Brace & World, Inc., 1965).

[77] To survey the American debate, see Fogel, *Railroads*; Fishlow, *American Railroads*; Patrick O'Brien, *The New Economic History of Railways* (London: Croom Helm, 1977); Robert W. Fogel, "Notes on the Social Saving Controversy," *Journal of Economic History* 39 (March 1979): 1–54. For Germany, see Fremdling, *Eisenbahnen*. For a wider European perspective, see Patrick O'Brien, ed., *Railways and the Economic Development of Western Europe, 1830–1914* (New York: St. Martin's Press, 1983).

[78] Fremdling, "Railroads and German Economic Growth," p. 593.

domestic rolling capacity in the late 1840s, but domestically produced rails did not provide serious competition to British imports until the late 1850s.[79] These divergent patterns, Fremdling argues, reflected differences in political context, for the tariff structure of the German *Zollverein* allowed duty-free imports of pig iron but placed heavy duties on finished iron until 1844. With a change of policy that year, the tariff structure protected both domestic coke (but not charcoal) pig iron producers and bar iron producers. This quickened the process of import substitution in two stages, as noted above. In the United States, in contrast, the tariff structure favored imports of finished rails over pig iron, except for a brief interlude from 1843 to 1846. This meant, in effect, that the United States exported the industry's backward linkages in the production of rails to a greater extent. As Fremdling observes:

> This tariff structure not only retarded the development of a modern iron processing industry based on imported pig iron, but also helped maintain the old-fashioned and costly charcoal furnaces. On this hypothesis the relatively small impact that American railroad construction had on pig iron production until the mid-1850s may be understood.

In the end, as Fremdling emphasizes, "*both* countries exported significant income and employment effects, chiefly to Great Britain," although the United States did so longer.[80]

In a third way, finally, capital intensity set railroad development apart from anything that had gone before. In this instance, capital intensity expressed itself in the ratio of fixed (or constant) to variable (or operating) costs. Fixed costs did not change significantly with an increase or decrease in the volume of traffic or the distance traveled; these included such items as administrative expenses, depreciation on buildings and equipment, insurance, taxes, interest (as opposed to dividends), and routine maintenance. Variable costs, as the term suggests, consisted of costs that varied with the volume of production—

[79] Ibid., pp. 587–92; Fishlow, *American Railroads*, pp. 132–40.

[80] Fremdling, "Railroads and German Economic Growth," pp. 595, 598–601 (original emphasis). Taking account of exports to countries such as the United States and Germany, moreover, alters the weight of railroad construction in the development of the British iron industry as well. Fremdling estimates roughly that worldwide railroad demand accounted for 26 percent of British pig iron production in 1844–51 and 18 percent in 1852–59.

on the railroads, the volume of traffic. These included wages and the other expenses of loading, unloading, and running trains, as well as certain maintenance expenses that varied with the intensity of train operation. In the railroad business, fixed costs accounted for a higher proportion of total unit costs than in any industry at the time.[81] In a fascinating analysis of railroad problems in the late nineteenth century, Gerald Berk rightly emphasizes that overcapitalization and the resulting high levels of fixed costs must be understood as a political construction, the result of "capital-market organization, investor entitlements, and national policy."[82] But, as he also acknowledges, relatively high fixed costs were a reality in the business from the outset.

By the late 1830s, railroad men in both countries understood the practical significance of high fixed costs. "This elementary fact of economic life," George H. Miller notes in his excellent study of American railroad regulation, "was responsible for most of the early assumptions behind rate-making policies."[83] As the Prussian railroad promoter David Hansemann observed in 1837, it was essential to differentiate "between those costs that originate directly from the transport [of goods and passengers] and those costs that, quite apart from the volume of transportation, are entirely unavoidable." Because some costs were more or less fixed—he cited interest charges and a portion of maintenance costs—unit costs fall "with an increase in traffic," he noted.[84] A committee of directors of the Boston and Worcester Railroad reasoned along similar lines in 1840, in estimating what would have happened to costs in 1838, had the volume of freight doubled.[85] The company's directors also reported that they

[81] Chandler, comp. and ed., *Railroads*, pp. 159–60; idem, *Visible Hand*, pp. 116–19. For a general discussion, see Porter, *Rise of Big Business*, pp. 10–11.

[82] Gerald Berk, "Constituting Corporations and Markets: Railroads in Gilded Age Politics," *Studies in American Political Development* 4 (1990): 137.

[83] George H. Miller, *Railroads and the Granger Laws* (Madison: University of Wisconsin Press, 1971), p. 17.

[84] David Hansemann, *Die Eisenbahnen und deren Aktionäre in ihrem Verhältniß zum Staat* (Leipzig: Renger'sche Verlagsbuchhandlung, 1837), pp. 14, 18. Hansemann distinguished four types of expenses—transportation costs, road maintenance costs, general administrative costs, and interest—and acknowledged the difficulty of apportioning them between the two categories. Ibid., p. 6.

[85] *Report of a Committee of Directors of the Boston and Worcester Rail-road Corporation. On the proposition of the Directors of the Western Rail-road, to reduce the rates of fare and freight on the two Rail-roads* (Boston: Samuel N. Dickinson, 1840), pp.

were charging higher rates per mile for shorter trips, in part because the interior segments did not face water competition but also "on the ground, that freight when once loaded in the cars, . . . might be carried to the termination of the line at as little cost at least, as it can be delivered at any of the intervening stations."[86]

Because the railroads labored under relatively high fixed costs, their cost efficiency depended critically on the volume of traffic—what Chandler terms "throughput"—and the distance that it traveled, and this, in turn, generated multiple incentives for rate discrimination. As Miller summarizes:

> Since the total cost of operation did not increase in proportion to the amount of traffic, a large volume of business was thought to be desirable, permitting overhead expenses to be distributed over a maximum number of units. This in turn seemed to justify low inducement rates. It was also evident that costs did not increase in proportion to the distance traveled because switching and terminal expenses were the same for short as for long hauls. It seemed practical therefore to seek long-haul traffic at lower rates per mile than were asked for short hauls.

Assymetries in track grades and in the flow of traffic back and forth provided additional grounds for discrimination. "Almost from the

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23n, 31. They divided expenses into the following categories: general (including road repairs), locomotive, freight, and passenger, each of the latter three including wages, repairs, and depreciation. Ibid., p. 30. Since 1837, they reported, they had been charging "depreciation," that is, "an equivalent for the estimated amount of wear and decay beyond what was made good by the repairs," to current expenses. *Report of the Directors of the Boston & Worcester Rail Road, to the Stockholders, at Their Ninth Annual Meeting, June 1, 1840* (Boston: Samuel N. Dickinson, 1840), p. 19.

[86] *Report of the Directors of the Boston & Worcester Rail Road . . . at Their Ninth Annual Meeting*, pp. 7–8. Fourteen years later, however, the company was having trouble maintaining higher rates on local traffic: "It has been found that high rates for short distances cannot be maintained against wagons, as much of the cost of handling and truckage at each end of the transit is saved to the latter." *Twenty-Fifth Annual Report of the Directors of the Boston and Worcester Railroad Corporation, for the Year Ending November 30, 1854* (Boston: David Clapp, 1855), p. 15. The following year they complained that, because of the novelty of the business, the industry had from the outset underestimated the cost of running a railroad: "an undue appreciation was made of the wear and depreciation of all its parts. . . . it must not be forgotten that railways are, at best, expensive establishments." *Twenty-Sixth Annual Report of the Directors of the Boston and Worcester Railroad Corporation, for the Year Ending November 30, 1854* (Boston: David Clapp, 1856), pp. 17–18.

outset," Miller observes, such cost considerations "produced wide departures from a rate structure based simply on distance."[87]

More broadly, the railroads' experience with high fixed costs introduced the distinctively modern business practices and regulatory problems associated with industrial capitalism. The new conditions of operation transformed the incentives acting on businessmen (and the occasional businesswoman), radically altering competitive behavior. In hard times, businesses that did not labor under high fixed costs could curtail production in the time-honored fashion, thereby reducing the bulk of their expenses proportionately. But capital-intensive businesses no longer had this option, for reducing production levels, while fixed costs remained nearly constant, merely increased their unit costs. Under the new incentives, therefore, they maintained or even increased production levels when demand slackened, so that they could at least spread their fixed costs over a larger volume of output. This reduced their unit costs and thus enabled them to cut prices.[88]

This peculiar new competitive behavior had a widening circle of consequences, many of which first appeared in the railroad industry and then emerged in full force in the mass-production industries of the late nineteenth century. It made cooperation among firms to control output or prices both more important (because competition was more "virulent," as Naomi Lamoreaux puts it) and more difficult from an economic standpoint (because decreasing production entailed greater costs for the capital-intensive producer). Other things being equal, the new conditions of competition compounded the obstacles to collective action among firms. They also altered the balance of power between labor and management, Dubofsky argues, making capital-intensive companies *more* vulnerable to labor unrest

[87] Miller, *Railroads and the Granger Laws*, p. 17. Competition with parallel lines or alternative modes of transportation and value-based pricing also encouraged rate discrimination. On rate-making, see also Chandler, comp. and ed., *Railroads*, pp. 159–60; Rainer Fremdling and Günter Knieps, "Competition, Regulation and Nationalization: The Prussian Railroad System in the 19th Century," Institute of Economic Research, Faculty of Economics, University of Groningen, Research Memorandum No. 397, November 1990. On the concept of throughput, see Chandler, *Visible Hand*, p. 241, and idem, *Scale and Scope*, p. 24.

[88] Naomi Lamoreaux, *The Great Merger Movement in American Business, 1895–1904* (Cambridge: Cambridge University Press, 1985), pp. 14–86. "The industries most likely to erupt in price wars," she argues (p. 86), "were those in which fi[x]ed costs were high and in which expansion had been rapid and recent." See also Porter, *Rise of Big Business*, pp. 10–12.

and work stoppages. The combined effect, as William Lazonick emphasizes, was to put a premium on the ability to secure the raw materials, labor, and markets that were essential to maintaining a high volume of production and low unit costs. In the absence of perfect markets, this, in turn, encouraged backward and forward integration as well as the new techniques associated with modern labor relations, scientific management, welfare capitalism, and mass consumerism (all of which further increased fixed costs).[89] In the railroad business, moreover, the rate discrimination that high fixed costs encouraged profoundly undermined traditional American methods of government regulation that were geared to maximum prices.[90]

In short, the railroads introduced many, if not all, of the distinctive phenomena that marked industrial capitalism, as Chandler suggested some thirty years ago when he dubbed them "the first big business." They served as a bridge between the first and second phases of the industrial revolution in these two countries, constituting a vital element of the first but also ushering in the second, with all the novelty that attended large-scale, capital-intensive enterprise. Studying early railroad history, therefore, takes us into the first stages of a process of industrial change without parallel until our own time.[91] As the following chapters argue, however, this early encounter with industrial capitalism proceeded differently in the two countries, because of their contrasting political structures.

The Argument

This book offers neither a comprehensive history of American and Prussian railroads nor a general political history of the two nations. Instead, it explores certain ways in which political history and early railroad history intermeshed during the antebellum and *Vormärz*

[89] Dubofsky, "Technological Change"; Lamoreaux, *Great Merger Movement*, p. 45; Lazonick, "Technological Change." For an overview, see Porter, *Rise of Big Business*, pp. 1–28, and on the railroads, ibid., pp. 32–41. On railroad labor, see also Chandler, comp. and ed., *Railroads*, pt. 4; Walter Licht, *Working for the Railroad: The Organization of Work in the Nineteenth Century* (Princeton: Princeton University Press, 1983); Shelton Stromquist, *A Generation of Boomers: The Pattern of Railroad Labor Conflict in Nineteenth-Century America* (Urbana: University of Illinois Press, 1987).

[90] See Miller, *Railroads and the Granger Laws*; and chap. 6 of this book.

[91] Michael J. Piore and Charles F. Sabel, *The Second Industrial Divide: Possibilities for Prosperity* (New York: Basic Books, 1984).

years, thus affirming that industrial change is a complex process, at once political and economic in nature. It takes as its starting point the two political structures as they stood on the eve of the railroad era. The bulk of the study (chapters 2–5) explores their impact on various aspects of early railroad development during the formative decades of the 1830s and 1840s. In these chapters, political structure serves mainly as the independent variable, although the causal connections become increasingly complicated as the chapters progress from state policy through railroad associations to technological styles.

This exploration should not be read as an attempt to derive a rigorous "law" of political structure. That would surely be a fruitless exercise, for history may be structured but it is not so tightly constrained. Rather, it should be understood as an effort to understand the incentives and tendencies that different political structures created and how they shaped social action.

Briefly, chapters 2 and 3 describe and then suggest how to interpret the tenor of early American and Prussian railroad policies. Chapter 2 outlines systematic policy differences and concludes that the American state (that is, the state governments and to a lesser extent the federal government) intervened more extensively and more effectively during the 1830s and 1840s than the *Vormärz* Prussian state did. When functional equivalents—the Prussian central state and the American state governments—are set side by side, in other words, the "American state" receives higher marks on the interventionist scale during the 1830s and 1840s. Chapter 3 considers alternative ways of interpreting these divergent patterns and argues that they reflected neither prevailing interests nor ideas, but the distinctive patterns of policy-making that the two political structures engendered in a capitalist context. The American political structure encouraged more interventionist policies by allowing more effective expression of interests both supporting and opposing railroad construction. In Prussia, state officials at the apex of the unitary structure favored railroad development by the late 1830s, but they could not marshal the capital for state railroads without also ceding to demands for political liberalization. When push came to shove, they chose to rely on private capital to build the railroads, a decision that forced them to moderate regulatory demands so that the private companies would attract sufficient capital.

Chapter 4 suggests that the two political structures shaped relations among the railroads in equally distinctive ways. The Prussian lines succeeded in forming a permanent national (indeed, inter-German) association in the late 1840s, because they faced a unitary state that had begun to take a more interventionist stance. American lines tried valiantly to form similar associations. But the fragmented American political structure compounded the obstacles to collective action, and they uniformly failed to do so during the antebellum period. The location of the policy-making process within each state structure thus exercised a decisive impact on efforts to organize railroad interests.

Chapter 5 shows how attention to institutions also yields a new perspective on the question of technological style. Prussian railroads cost (per kilometer) roughly half again as much as American railroads, a difference that is best understood as the product of the complex interaction of state and capital. Railroad builders in both countries, as avid participants in a vibrant international colloquy on the new technology, worked with a common pool of knowledge, and they shared a common frame of reference, defined by the British paradigm of railroad construction (sturdy construction, low grades, minimal curves) and its polar opposite, the "American system." Out of these commonalities the contrasting Prussian and American political structures shaped distinctive national styles of technology in two ways: indirectly, through their impact on state railroad policy, which exacerbated a relative scarcity of capital in the United States but not in Prussia; and, more immediately, by structuring the engineering community itself, producing a more homogeneous engineering viewpoint in Prussia but encouraging a durable diversity of views in the United States. As Prussian engineers moved toward a consensus in the early 1840s that railroads should be constructed in a sturdier fashion than the "American system" called for, but not as luxuriously as the British paradigm dictated, American engineers remained divided. This heterogeneity of views, combined with the relative scarcity of capital, produced a greater diversity of styles and therefore lowered *average* construction costs in the United States.

Thus, from state policies through interest associations to the technology itself, these two contrasting political structures pushed early railroad development in divergent directions. In all three domains,

the fragmented American structure impeded, and the centralized Prussian structure facilitated, the emergence of this large-scale technological system.

But these two political structures, taken as givens in chapters 2 through 5, were by no means impervious to change. Bringing the causal arrow full circle, the Epilogue surveys the complex transformation of both political structures that this peculiar new technology precipitated in the late 1840s and 1850s. In Prussia, the unprecedented amounts of capital that railroad construction demanded—*pace* Gerschenkron—ultimately forced a modicum of political liberalization. In the United States, the combination of high fixed costs and geographic sprawl undermined the states' traditional regulatory authority. These institutional changes, in turn, altered the interventionist thrust of railroad policy in the two countries. In newly liberalized Prussia, railroad policy took an "American turn" as state officials gained the political legitimacy to promote *and* regulate the railroads with greater energy. In the United States, the growth of interstate railroads laid bare the structural constraints on the American state legislatures' power, and the parameters that guided railroad policy-making were suddenly thrown open to redefinition. As railroad men used the weapons inherent in the American political structure to wage running battles with the state legislatures, the interventionist thrust of American railroad policy became increasingly attenuated. Only when their defensive maneuvers catapulted the issue to the national level was the American state's regulatory power partially reconstituted in the 1880s. And only then, when regulatory authority was clearly lodged at the national level, did the obstacles to collective action inherent in federalism abruptly recede. American railroads quickly responded to the new constellation of incentives and, like their Prussian counterparts forty years earlier, organized a permanent national association.

Shifting analytical gears in this way underscores the corollary importance of attending to industrial context in understanding political change, thus reinforcing the larger point: that a keener sensitivity to the intangible, yet very real presence of political structures enriches understanding of the complex interplay between industrial and political change.