The Entrepreneurial Culture and Bureaucracy in Twentieth-Century America

LOUIS GALAMBOS

America's entrepreneurial culture is important because it promotes the search for new opportunities for innovation. Here, the author traces that culture through two industrial revolutions and focuses on the growing tension between entrepreneurship and bureaucracy inside and outside of the nation's twentieth-century firms. Business histories are explored using categories adapted from behavioral economics. Particular attention is devoted to some of the important exceptions that throw light upon the stereotypes of the static government agency and the slow-moving industrial firm. Still, the author concludes, following World War II the economy had to be pulled out of its bureaucratic doldrums by new science- and social science-based industries that invigorated the nation's entrepreneurial culture and promoted a wave of significant biological and digital innovations. The article concludes with a glance at the future of the bureaucratic and entrepreneurial cultures.

Keywords: entrepreneurship; bureaucracy; biological; digital

Stereotypes

Asked for a description of a typical bureaucrat, most Americans would probably dig up negative words like "slow," "inefficient," "rule-bound," and maybe, if they had suffered through a recent encounter with the taxman, "dictatorial." Asked to go through the same exercise with the word "entrepreneur," they would certainly be more positive. Words like

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"creative," "smart," and "unusual" would probably pop up, along with "intense." These two stereotypes frame this article. The task here is to get a more nuanced understanding of the relationships between the bureaucratic structure of authority and America's entrepreneurial culture in the twentieth century. My central hypothesis is that the bureaucratic and entrepreneurial cultures were fundamentally at odds, as the stereotypes indicate, but that their relationships evolved in intricate and important ways in the twentieth century. Neither camp would, it seems, achieve a total victory by 2000. The essence of this study is thus a brief history of how the balance shifted back and forth between these two cultures and what that meant for the U.S. style of capitalism. We begin with a federal effort to understand the forces and institutions that were changing the American economy at the beginning of the century.

The U.S. Industrial Commission Reports

Following a severe depression (1893–1897), fierce struggles between labor and capital, widespread agrarian unrest, and the rise of a series of giant business organizations whose wealth and power seemed threatening to many Americans, Congress organized the U.S. Industrial Commission to study the economy and report on potential federal responses.[1] The large enterprises were particularly threatening because they had faces and personalities. The enormous wealth and power of the "trusts" was associated with their founders, men like Andrew Carnegie and John D. Rockefeller.[2] The commission heard the testimony of many of the nation's business leaders, as well as their opponents, and studied the U.S. economy at length before issuing its final report in 1902. The date was important because it was near the tail end of a combination movement that decisively restructured many of America's leading industries.[3]

The commission was ambivalent, as was the American public, about the rise of big business. Although condemning monopoly, the commissioners found much to like and little to criticize in large-scale transportation, production, and distribution—sectors that combined, the commissioners said, to provide Americans with better and cheaper goods and services. The commission's report is a useful benchmark because it said very little about innovation, nothing about the country's entrepreneurial culture,[4] next to nothing about public or private

1. U.S. Industrial Commission, *Report*, *1*.

2. Thorelli, *The Federal Antitrust Policy*. Galambos, *The Public Image of Big Business*, 47–114, 181–183.

3. Lamoreaux, *The Great Merger Movement*. Nelson, *Merger Movements*.

4. This is the third article in a series exploring America's entrepreneurial culture. For my definitions of entrepreneurship and culture, see Galambos,

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bureaucracies, and nothing about a bureaucratic culture.[5] Between 1902 and the end of the twentieth century, however, these issues all became unescapable and important in the United States. The public's perception and governmental involvement with large enterprise shifted dramatically and repeatedly, as would public, media, scholarly, and business interest in innovation and in public and private bureaucracies. In these years, America's entrepreneurial culture would experience a series of decisive changes—developments that had significant effects on the nation's capitalist system and its performance.

The central concern here is the manner in which entrepreneurs and the culture of innovation interacted with bureaucracy and its culture, both inside and outside of the nation's business organizations. The large bureaucratic firms of the Second Industrial Revolution sought and frequently achieved economies of scale; they also sought and frequently achieved relatively secure positions in stable oligopolies. They found it difficult, however, to sustain innovation, in part because their bureaucratic structures were antithetical to the risks of entrepreneurship.[6] Meanwhile, their political setting was changing as more and more Americans sought economic security and equity through new government programs that were implemented by bureaucratic agencies and were frequently created to control private enterprises. Many Americans—and probably most of those in business—condemned the public bureaucratic organizations for their inflexibility, inefficiency, secrecy, and anti-entrepreneurial exercises of power.[7]

From time to time, however, various public bureaucracies would provide opportunities for innovation, and others would align themselves with the entrepreneurial impulse even though their dominant

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"The Entrepreneurial Culture and the Mysteries of Economic Development," 290–291, and "The Entrepreneurial Culture: Mythologies, Realities, and Networks in Nineteenth-Century America." *Academy of Management Perspectives*, Feb 7, 2020. https://doi.org/10.5465/amp.2019l.0132. For different approachs to the entrepreneur, see Casson, *Entrepreneurship*; Venkataraman, "The Distinctive Domain of Entrepreneurial Research," 119–138; and Shane, *A General Theory of Entrepreneurship*. See also Baumol and Strom, "'Useful Knowledge' of Entrepreneurship." Sewell Jr., *Logics of History*, discusses the various historical approaches, including mine, to culture.

5. On bureaucracy, see Weber, *The Theory of Social and Economic Organization*, 324–340; and Bendix, *Max Weber*, 385–457. On the bureaucratic culture, see Merton, "Bureaucratic Structure and Personality," 195–206; Taylor, "Bureaucratic Structure and Personality," 151–171; and Williams, Sjoberg, and Sjoberg, "The Bureaucratic Personality," 173–189.

6. Shane, *A General Theory of Entrepreneurship*, 228. Shane concludes (with Luigi Orsenigo) that the capitalist economy is in a "continual state of disequilibrium," 250.

7. Alvarez and Brehm, "Information and American Attitudes toward Bureaucracy." Rourke, "Secrecy in American Bureaucracy," 540–564, and *Bureaucracies, Politics, and Public Policy*. "Public Trust in Government," Pew Research Center.

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cultures were antithetical. Meanwhile, some of the large private enterprises, organized along bureaucratic lines, would learn how to sustain innovation and give to the economy a powerful dynamic that was in part endogenous to these firms. Within the successful organizations, of course, the tension between entrepreneurship and bureaucracy would continue to exist and in many cases to shape business performance. The resulting syntheses, as well as various modulations in the entrepreneurial culture, would accelerate, then retard, and finally accelerate again the transformation and expansion of the American brand of capitalism. The entrepreneurial culture would persist through the last quarter of the twentieth century and would focus the search for opportunities on new technologies and on global as well as national markets.

The Long Growth Cycle of Private Bureaucracy during America's Second Industrial Revolution, 1900–1980

By the time the Industrial Commission concluded its study, America's industrial sector was dominated by very large corporations that were organized along bureaucratic lines. Banks, insurers, railroads, and wired communications led the way.[8] Horizontal and vertical combinations in industry followed, leaving the American economy transformed —no longer primarily consisting of small and medium-sized businesses oriented to local or regional markets.[9] The large industrial companies were focused on national and frequently international markets; they competed in new ways, as the commission pointed out. They used their economies of scale to defend and expand their markets. They were structured as centralized bureaucracies that were, in their time, organizational innovations, and their cultures favored efficiency over innovation, system over science, accountability over adventurous explorations, and diligence in routines over disruptive competition.[10]

Western Union, the telegraph giant, was in many regards typical of these organizations. Established in 1856 to take advantage of a major innovation in communications and to reduce competition in a new industry, Western Union succeeded in building a national network that, for a time, served the nation's businesses well and trained a

8. Hammond, *Banks and Politics*. Sylla, "Experimental Federalism," 483–541. Chandler, *The Visible Hand*, 79–144. John, *Network Nation*, 5–113.

9. Chandler, *The Visible Hand*, 207–376, and *Strategy and Structure*, 19–51. Lamoreaux, Raff, and Temin, "Beyond Markets and Hierarchies," 404–433.

10. These themes were apparent in the testimony of the business leaders who spoke to the U.S. Industrial Commission, *Report, 1*. See also Hidy and Hidy, *Pioneering in Big Business*. For similar conclusions about late twentieth-century Danish businesses, see Søensen, "Bureaucracy and Entrepreneurship," 387–412.

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generation of its employees in the basics of electromechanical operations.[11] The entrepreneurial multiplier was at work here, fostering new businesses across the country.[12] As the firm evolved, however, it became increasingly conservative. President William Orton (1867–1878) leaned toward the bureaucratic culture. He was "diligent and capable," sure-handed in cutting costs, and successful in maintaining his firm's near-monopoly. In the winter of 1876–1877, however, Orton turned down an opportunity to buy for $100,000 the Bell telephone patents owned by the business that would soon become Western Union's disruptive competitor. The outcome of that bad decision came in 1908/1909, when the Bell System's holding company, AT&T, absorbed Western Union.[13] The failure rates for this type of large enterprise were certainly lower than they were for startups, but acquisitions by competitors or bankruptcies for firms large and small were widespread during each downturn of the business cycle.

Most of the newer firms of the Second Industrial Revolution went through similar cycles, although many of them were able to remain independent. Like Western Union, the Ford Motor Company was initially a remarkably innovative firm. Its assembly line was a marvel of efficiency, and by 1920, Ford was clearly the dominant and most entrepreneurial firm in the fast-growing automobile industry.[14] By the twenties, Ford and its major competitor, General Motors (GM), had driven out of the industry a host of smaller firms. By the late 1920s, however, the founder's influence had waned, and Ford's bureaucrats had become less inclined to embrace the risks of innovation; the business steadily lost market share to a more entrepreneurial GM.[15] Several decades later, GM suffered from the same form of bureaucratic hardening of its managerial arteries. Following World War II, GM and the rest of the U.S. car and tire industries were out-innovated by Japanese, German, and French firms that brought a new wave of technological change to the automobile and tire markets.[16]

Were the giant firms of the postwar era helped or hurt by the growing financialization of the American economy? America's financial sector

11. John, *Network Nation*, 5–199.

12. Galambos and Amatori, "The Entrepreneurial Multiplier Effect," 763–808.

13. John, *Network Nation*, 133–155; although Orton turned down the Bell deal, he spent several million on the "ostentatious, massive, and expensive" Western Union building in New York. See also Garnet, *The Telephone Enterprise*, 152; and Brooks, *Telephone*, 61–64, 131–134.

14. Hounshell, *From the American System to Mass Production*, 217–302. Rubenstein, *Making and Selling Cars*, 3–29, 56–70.

15. Chandler, *Strategy and Structure.* Rubenstein, *Making and Selling Cars*, 188–216.

16. Odagiri and Goto, "The Japanese System of Innovation," 76–114. Clarke, *Trust and Power*, 260–262. Sull, Tedlow, and Rosenbloom, "Managerial Commitments," 461–500.

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had been steadily expanding its role in the economy since the late nineteenth century, and financial innovations played an important role in the boom and bust of the 1920s and 1930s. Congress created the Security and Exchange Commission (SEC) in 1933 in a largely successful effort to ensure that future financial innovations would not endanger the economy or confuse investors about what they were buying. There was hope, as well, that the combined efforts of the Federal Reserve System, the SEC, and a more engaged and proactive federal government would enable the nation to avoid severe panics and depressions. Between 1945 and the end of the century, that new combination of institutions, policies, and the nation's political leaders warded off another great depression but combined forces to send the nation into an inflationary spiral that magnified the problems with global competition. More helpful was the development of a new venture capital industry, but it was oriented to startups, that is, to businesses looking to disrupt Second Industrial Revolution businesses.[17] Other financial innovations —such as the many new forms of derivatives—profited financial institutions and served the purposes of America's large industrial and service firms without, however, arming them to deal with their primary crises. Meanwhile, pressures from the financial sector had promoted a short-term outlook on corporate strategy and an emphasis on accounting measures that provided little useful information for guiding those vital strategic choices.[18] The financial sector continued to grow and innovate, but on balance, financialization probably slowed innovation in the rest of a business system facing severe global competition.[19]

The big, bureaucratic businesses most successful in sustaining innovation were those that took full advantage of the rise of the professions in science, social science, and technology. Each profession created a social system dedicated in part to protecting the political and economic positions of its members and in part to ensuring that the profession would remain innovative. The professions became promoters, producers, and frequently the judges of the entrepreneurial culture in twentieth-century America.[20] They became, as well, a great source of income and wealth for those businesses that could learn how to make effective use of their practitioners and knowledge. This, as it turned out,

17. Nicholas, *VC: An American History*.

18. Johnson and Kaplan, *Relevance Lost*, 125–225. Johnson, *Relevance Regained*, 3–56. Johnson, "Managing by Remote Control," 41–66.

19. Olegario, *The Engine of Enterprise*, 172–216. O'Sullivan, *Contests for Corporate Control*, 105–231.

20. Abbott, *The System of Professions*, stresses political economy. For the intellectual aspects, see Parsons, *The Social System,* 335–348, and *Essays in Sociological Theory*, 34–49, 370–385.

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was not an easy problem for a bureaucratic business to solve. Here too, failure was ever present.

The large firms that were successful in this regard had two characteristics: They were able to create and protect from the bureaucracy a division, subdivision, or department that had a strong entrepreneurial culture and had managers who were intensely devoted to innovation.[21] The firm's top executives also had to understand and exploit the ideas and support the managers of the innovative subdivision or department. The leadership had to provide funds for innovation, had to keep the program going even though all the efforts were not successful, and had to bring into the process other divisions and departments (marketing and sales, for instance) when an innovation appeared to be successful.[22]

CEO Thomas Watson Jr. provided this kind of leadership at IBM, when it was developing its breakthrough technology in the 360 computer. Watson Jr. made a number of crucial decisions: one was to move the program out of the firm's headquarters in Armonk, New York, so that the more conservative engineers and scientists would not strangle his business baby in its crib; another was to appoint Fred Brooks and Gene Amdahl to lead the project and to report directly to him. The result of this effort was the IBM 360, a remarkable success for the company, the industry, and the American economy in the post–World War II years. Unfortunately for the postwar United States, IBM was the exception in an industrial economy withering under fierce competition from abroad.[23]

Why did so many of the U.S. Second Industrial Revolution firms fail to meet the new competition? Why were entire industries like machine tools wiped out? Each industry and each firm was different, but certain patterns of response to competition cut across the entire sector. Most important were a generation of leaders who were inward looking—too attentive to their firms' bureaucratic structures and cultures and their existing markets than to this new threat. America had emerged from World War II with its basic industries intact and had, for a time, produced and sold almost half of the world's goods and services. As one prominent business leader later observed, "The world was our oyster and we ate it!" Chrysler's Lee Iacocca said, "All you had to do to sell a car was smile."[24] These smiling executives emerged from that extended

21. The innovative division or department became, in effect, an entrepreneurial firm within the large corporation. It balanced the advantage of large resources against the disadvantage of existing in a bureaucratic setting that almost always threatened to resist major changes.

22. Graham and Pruitt, *R&D for Industry*, 183–223. Hounshell and Smith Jr., *Science and Corporate Strategy*, 125–248.

23. Cortada, *IBM*. Usselman, "Unbundling IBM," 249–279.

24. Interview conducted with Antonie T. Knoppers in 1990 at Merck & Co., Inc. Iacocca, with Novak, *Iacocca*.

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era of dominance with a bad case of hubris, and true to the biblical injunction, overweening pride came before a fall. By 1980, the Second Industrial Revolution was slumping to an end. As interest rates approached 20 percent and productivity increases dropped toward zero, the bureaucratic corporation and its culture were, in effect, pushing the entrepreneurial culture into the background in a country that was already limping from a resounding military defeat in Asia and an awesome series of economic defeats in global competition.[25]

Reform Capitalism and the Expansion of the Bureaucratic State

Given the seemingly overwhelming combination of national problems, it was not surprising that various American politicians, pundits, business leaders, and academic experts prescribed cures for America's economic ailments. It is also not surprising that they disagreed about what should be done. Looking at the problem from the vantage point of the economics department in the University of Chicago, Professor Milton Friedman forcefully and brilliantly called for a return to a market economy unshackled from a slow-moving, intrusive, bureaucratic context. He opposed even the licensing of doctors and other controls that limited entry and thus the competition that was at the heart of his analysis. Friedman received a Nobel Prize in 1976, and by the early 1980s his advocacy was an important part of the intellectual base of a neoconservative movement opposed to the bureaucratic state.[26]

Many other Americans looked, instead, to the public sector for solutions to America's problems.[27] This was not a new phenomenon. Indeed, efforts to solve economic and urban problems through public action were a well-established practice.[28] Progressive reform in the early 1900s had begun to build an institutional base for a more active form of political economy in the nation's local, state, and federal governments. As this movement gained momentum, the United States began to shift resources at the local, state, and federal level from the private to the public sector.[29] Public planning gradually took over some of the economic space that had been controlled by markets. In some

25. Atack and Bateman, "Manufacturing," 573–704. Lindert, "U.S. Foreign Trade and Trade Policy," 407–462. On bureaucratic problems, see Gouldner, *Patterns of Industrial Bureaucracy*. See also Wright, *Corporation Nation*, 208–214.

26. Friedman and Friedman, *Free to Choose*. Burgin, *The Great Persuasion*. Mitch, "A Year of Transition," 1714–1734.

27. Graham, *Losing Time*.

28. Hall and Soskice, *Varieties of Capitalism*, 1–244.

29. Wallis, "Federal, State, and Local Government Finances," 10–12. Postell, *Bureaucracy in America*, 127–206.

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sectors and industries, the regulatory state and its experts began to squeeze the country's entrepreneurs and their culture into opportunities limited by complex democratic and interest-group processes. That was the case with the railroads after the Interstate Commerce Commission established its authority to control essential aspects of the industry.[30] Other similar reforms followed. In 1913, the new Federal Reserve System set out to seek control over the nation's financial sector; meanwhile, state regulatory bodies like the Texas Railroad Commission, which had started with narrowly defined interests, gradually expanded their purview; and local zoning boards began to define where certain forms of economic activity could take place in major cities.[31] These new, public bureaucracies and new brands of expert control were accompanied by a bureaucratic culture that slowly and steadily cut into the political economy of entrepreneurship.

American entry into World War I (1917) forced the federal government to attempt swiftly to extend the institutions controlling the economy. Although the government's grasp far exceeded its reach, many more citizens now had their first experiences with large-scale bureaucracies in the economy and in the military.[32] Crises stoked the bureaucratic culture during the war and the immediate postwar years. By the mid-1920s, progressive reform had waned, but public and private bureaucratization continued to recast life in urban America. In 1928, Americans elected Herbert Hoover as President. Hoover was an engineer who had long been an exemplar of an associational variation on the bureaucratic culture.[33]

Dealing effectively with these profound changes outside of the firm required a special kind of creativity on the part of business. Creativity of this sort seemed always to be in short supply—hence the failures. The telephone industry provides a good example, however, of what could be accomplished in this context by imaginative leaders. Telephony was an important entrepreneurial venture of the late nineteenth century. The Bell System initially used its patent rights to solidify its position as the dominant firm in what was largely a city-oriented business with limited technological potential for long-distance service. After Bell's patents expired in 1894–1895, a rapid process of entry ensued, leaving the industry with approximately half of its customers served by Bell companies and half by independents. The Bell System's holding company, AT&T, fought these changes and used its advantages in financial

30. Skowronek, *Building a New American State*, 121–162, 248–284.

31. Carpenter, *The Forging of Bureaucratic Autonomy.* Kerr*, American Railroad Politics.* Berkowitz and McQuaid, *Creating the Welfare State.* Jacoby, *Modern Manors.* Childs, *The Texas Railroad Commission*.

32. Cuff, *The War Industries Board*, and "American Mobilization for War," 73–86.

33. Hawley, "Herbert Hoover," 116–140. Balogh, *The Associational State*, 23–138.

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resources and an improved long-distance service to attempt to restore its near-monopoly.[34]

This strategy provoked the U.S. Department of Justice and the Interstate Commerce Commission to prepare for an antitrust suit against the firm, but AT&T was able to negotiate a settlement in 1913 that left the Bell System well regulated but in firm control of the industry. AT&T's position was strengthened by its manufacturing entity, Western Electric, and its research and development wing, Bell Labs. The Bell System of the 1920s, which was intricately organized inside and pervasively regulated from outside, was an appropriate model for a new bureaucratic synthesis of public and private power in twentieth-century America.[35]

Before that model could spread very far, however, the Great Depression and the New Deal in Washington and in state governments created a political setting considerably more hostile to the market economy and extremely hostile to big business. After an initial experiment with business-led cartelization under the National Recovery Administration,[36] President Roosevelt and Congress launched a series of programs that together constituted a quantum leap in public bureaucratization.[37] World War II and the ensuing Cold War with the USSR deepened and vastly broadened this New Deal state. By the late 1940s, the welfare state, the military state, and the promotional state had all experienced astonishing phases of expansion that fostered bureaucratic values and a new role for administrative planning in postwar America. The archetypal new organization was the Social Security Administration, which had a network of offices in every state and major city and provided millions of Americans with retirement income. Social Security and the other New Deal bureaucracies that survived judicial review and political opposition constituted a distinct watershed in American government.

The rise of the U.S. federal state nurtured the bureaucratic culture and prompted academic and intellectual concerns about the new role of bureaucratic organizations in America. As regulation began to shape and frequently limit opportunities for innovation in more and more sectors of the economy, political leaders in both major parties began to find fault with the performance of the society's regulatory institutions.

34. Reich, *The Making of American Industrial Research.* Brooks, *Telephone*, 127–137. Temin, with Galambos, *The Fall of the Bell System*, 9–11. Miranti, "Probability Theory, 114–131. Lipartito, *The Bell System and Regional Business.*

35. Temin, with Galambos, *The Fall of the Bell System*, 11–13. Brooks, *Telephone*, 156–186. Lipartito, "Rethinking the Innovation Factory," 132–159.

36. Taylor, *Deconstructing the Monolith*.

37. Durant, "A Heritage Made Our Own," 3–22. For international perspectives, see Crozier, *The Bureaucratic Phenomenon*, or Jacoby, *The Bureaucratization of the World*.

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One of those was the Civil Aeronautics Board, which controlled America's airlines from 1938 until 1978, when Congress and President Carter agreed that the experiment had failed and that competition should be restored. The Airline Deregulation Act of that year launched a general, bipartisan move against the regulatory state and some of its major agencies.[38]

The business and intellectual opponents to the newly powerful administrative state were highly selective in their attacks on public bureaucracies. They criticized regulations and welfare, but business spokesmen were frequently supportive of the promotional and military states. If they had looked deeper into the society, they might have discovered other prominent aspects of public bureaucracy to approve. These would have included the improvements that took place in local and state educational systems, including the rapid advance of the high school movement and the development of an enormous state-level system of higher education. These changes provided a base for the professional schools that were increasingly supplying business with the executives, managers, scientists, engineers, and other employees who were essential to the maturing enterprises of the Second Industrial Revolution.

The educational bureaucracy also provided a foundation for the diversification of entrepreneurship in the postwar economy. The normal paths out of the kitchen for women and out of the ghetto for African Americans were through education: the high schools, the colleges and universities, and then the professional schools. This entire educational infrastructure itself evolved relentlessly toward bureaucratic organization and culture as it expanded and gradually began, under pressure, to promote elements of diversity in postwar America.[39]

The educational system also began to produce professional entrepreneurs, some of whom found new markets in the nation's public and private bureaucracies. The high degrees of specialization in these organizations, their great size, the need for evidence of due diligence by their leaders, and the pressure to lower costs while improving performance created entirely new opportunities for innovation. In response, social scientists in several disciplines developed new consulting organizations that provided specialized services to bureaucracies that would rather buy services than to provide them in house. In exploiting those opportunities, professionals—academic and otherwise—all had

38. Vietor, *Contrived Competition.* On the anti-bureaucratic intellectual movement, see Merton, "Bureaucratic Structure and Personality," 560–568, and *Social Structure,* 194–224. See also Postell, *Bureaucracy in America*; and Taylor, "Bureaucratic Structure and Personality," 151–172. White, *The Organization Man.* Rourke, *Bureaucracies, Politics, and Public Policy.* Schuck, *Why Government Fails So Often.*

39. Galambos, *The Creative Society.*

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built-in networks provided by their professions and in many cases by the nonprofit foundations that had an interest in professional bodies of knowledge. These networks facilitated communication and frequently provided resources to enterprising professionals.[40]

Two of these academic entrepreneurs were psychologist Dr. Robert Hogan and his wife, Dr. Joyce Hogan, who began to explore the opportunities created as business and government leaders discovered that they needed help in hiring and promoting workers, managers, and fellow executives. They needed objective measures of potential and a record confirming their due diligence in making personnel decisions. They needed assessment programs grounded in empirical social science.[41]

Having made an initial decision (System 1) to explore the market for assessment, the Hogans studied the activities of existing organizations and individuals in that market.[42] They grounded their effort in the academic work and experiences they had accumulated in the psychology of personality and kinesiology. Government contracting was important in the Baltimore/Washington area, and the Hogans first got a contract through Johns Hopkins University with the United States Navy. Having broken into the market, they went on to do state and local studies (some with the police), also through the university. The passage of the Civil Rights Act of 1964 and the establishment of the EEOC opened up an even broader market for new assessment studies that would not discriminate, as IQ tests did, against applicants on the basis of gender or race. Having mastered several System 2 capabilities and completed an exploration of the market, they were better prepared than most startups to survive. During these years, a popular alternative way to acquire System 2 skills was to join a franchise operation that provided training and monitoring of performance with startups. There were, however, no such franchise businesses in the type of assessments the Hogans were doing.

Operating for a time with joint appointments at the University of Tulsa, the Hogans started a new firm, working first through the

40. Abrahamson, *Beyond Charity*. In addition to writing this volume, Abrahamson edited the other five books in the series.

41. This account of the assessments startup is based primarily on a long series of interviews with Robert Hogan and the firm's CEO, Tomas Chamorro-Premuzic, in 2017 and 2018. I have known both Robert Hogan and the late Joyce Hogan since the time that all three of us were on the faculty at Johns Hopkins University.

42. The System 1 and System 2 concepts are from Kahneman, *Thinking Fast and Slow*. System 1 is fast, almost automatic, and in this present study involves the initial decision to engage in entrepreneurship. System 2 involves the careful thought and development of the capabilities that can make an entrepreneurial venture successful. Many such efforts appear to fail because of a lack of working capital, unanticipated developments in the context of the firm, or a lack of leadership skills on the part of the entrepreneur(s).

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university and then as a separate, private business, Hogan Assessment Systems (organized as an S corporation in 1989). With contracts in hand, they did not have to borrow capital or sell equity and could avoid the shortage of working capital that plagues many startups. They also had in hand their major assessment tool, the Hogan Personality Inventory (HPI), which was designed to predict occupational success. Instead of testing IQ or measuring traits, the HPI was designed to predict outcomes.[43] As results using their inventory came in, Robert Hogan kept upgrading the HPI to improve its ability to predict performance in domestic organizations and those around the world where the company gradually developed a number of branch offices.

By 2000, Hogan Assessment Systems was a successful business. Its success was a product of factors that were both exogenous and endogenous to the firm. The personality testing that Hogan developed had intellectual roots that reached back through several leading American universities to German post–World War I experiments with social science testing.[44] The markets for the firm's services were largely in Second Industrial Revolution businesses and public bureaucracies in the United States and other nations. The endogenous elements were flexible, professional leadership, a carefully focused service, and the positive outcomes that have enabled them to keep improving the testing methodology and building the brand.[45] This was not the only firm to explore with success the opportunities to sell testing programs and other services to large, twentieth-century bureaucracies.[46] Washington, DC, and its suburbs were full of consultants' offices, as were most other large cities.[47] These ventures changed American entrepreneurship and its culture by introducing substantially higher levels of expertise and education in their leadership, employees, and operations.

43. Hogan and Shelton, "A Socioanalytic Perspective on Job Performance," 129–144.

44. Banks, "The Office of Strategic Services Psychological Selection Program," 32–41. The ideas moved to America and then to California along those personal, international networks that characterize most phases of professional innovation in the sciences, social sciences, and humanities in the modern era. Murray, *Explorations in Personality*; and MacKinnon, "How Assessment Centers Were Started in the United States." R. Hogan did his graduate work with Donald MacKinnon at the University of California, Berkeley. J. Hogan received her PhD in kinesiology from the University of Maryland.

45. Hogan, "How to Build Hogan Assessment Systems."

46. "2018 Top Assessment and Evaluation Companies."

47. The historians of U.S. consultancies agree that the business was experiencing a phase of very rapid expansion in the 1990s. McKenna, *The World's Newest Profession*, 216–251. Reihlen, Smets and Veit, "Management Consultancies as Institutional Agents." Kipping and Clark, "Researching Management Consulting."

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These entrepreneurial networks of consultancies prompt us to ask what, then, is the bottom line on public bureaucracies? Did they strengthen or weaken the entrepreneurial culture in America? Obviously they did both, and the exceptions are important because they help us see what the rule was—to see, that is, the general economic and cultural impact public bureaucracies had upon the society. What seems apparent is that on balance, the bureaucratic state in the twentieth century fostered activities and a culture that emphasized economic security and equity, not innovation.[48] Consultants notwithstanding, bureaucratization in the government and inside of the firm thus combined to make it extremely difficult for America to respond successfully to the global and domestic economic challenges of the 1960s, 1970s, and 1980s.

Intense and growing global competition helps explain why *In Search of Excellence: Lessons from America's Best-Run Companies* by Thomas J. Peters and Robert H. Waterman Jr. became a #1 National Bestseller in 1982, and also why several of the successful companies they described ran into deep trouble in the years that followed. Failure seemed by this time in American history always to be right around the corner for many of the leading firms of the Second Industrial Revolution.[49]

Those "deep troubles" built further support for the radical, shareholder ideology that Milton Friedman and others were promoting. The calls for neoconservative policies drowned out the proposals for an active "industrial policy" based on the Japanese model. If America was going to pull out of the slough, it was apparently not going to be as a result of a more intensive and extensive form of national planning by a new and powerful bureaucracy.

The Bio-Digital Revolution and Entrepreneurial Opportunities in America.

Paradoxically, an entrepreneurial path out of the slough was provided by two of the nation's most formidable bureaucracies. One was in the public sector; the other was the Bell System, which was controlled by AT&T, the world's largest private corporation. In 1947, three of the Bell System's scientists—William Shockley, John Bardeen, and Walter Brattain—developed a new switching device that would be one of the most basic innovations of the digital economy. The transistor opened the way to the integrated circuit, which in turn opened the way to

48. Moynihan, "Promises and Paradoxes of Performance-Based Bureaucracy," 278–302. Albrow, *Bureaucracy.*

49. Hannah, "Marshall's 'Trees' and the Global 'Forest.'" 253–293.

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revolutionary changes in the ability to control and manipulate information and to make broad use in the economy of the computer's analytical capabilities.[50]

The government had provided substantial support to the firms developing computer technology, and the military market for the transistor and the integrated circuit accelerated research, development, and production of digital devices in the postwar years. The Eisenhower Administration created the Advanced Research Projects Agency (ARPA) to promote work in this new field, and in this case, ARPA actually became the lead entrepreneur in the development of the Internet.[51]

Another government agency, the National Institutes of Health, provided a home during the 1950s and 1960s for a cadre of U.S. biochemists and molecular geneticists who were making major contributions to the transformation of the medical sciences. Enzyme inhibition opened new frontiers for medical innovation, as did new knowledge about the human genome.[52]

The task of translating this new knowledge into the drugs that would prevent or cure a disease was, however, left primarily in the hands of private enterprises. Some of these were large pharmaceutical companies and others were small biotech startups. The large companies had to transform their labs to take advantage of the new science, and not all were equally successful at making this transition. Bureaucracy triumphed over entrepreneurship in most cases, as big pharma was slow to change. One firm that was successful was Merck & Co., Inc., where the CEO brought into the firm Dr. Roy Vagelos, one of the country's leading scientists in enzyme inhibition and cholesterol research.[53] What Vagelos had to do was transform two R&D departments that had long been extremely successful. Indeed, the first major innovation that Merck introduced after Vagelos took over as head of basic research came out of the West Point labs that were using the customary tools of medicinal chemistry. At this point, CEO Henry Gadsden stuck with Vagelos, despite the internal, bureaucratic opposition to the transition.[54]

Led by Vagelos, a bench-research team (Al Alberts and Julia Chen) set off to find a molecule that would inhibit the body's production of

50. Choi, "Manufacturing Knowledge in Transit." Langlois and Steinmueller, "The Evolution of Competitive Advantage in the Worldwide Semiconductor Industry, 1947–1996," 19–78.

51. Abbate, *Inventing the Internet.*

52. Landau, Achilladelis and Scriabine, *Pharmaceutical Innovation.* Vagelos and Galambos, *Medicine, Science, and Merck*, 37–57.

53. Hogan, Chamorro-Premuzic, and Galambos, "Historical and Theoretical Explorations."

54. Gambardella, *Science and Innovation.* Roy Vagelos, *Values & Visions: A Merck Century*, 25–36. Vagelos and Galambos, *Medicine, Science, and Merck*, 106–138.

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cholesterol. This style of targeted research was new to the industry, and Alberts and Chen had to develop an entirely new soil screen as they searched for the active substance that would serve as an inhibitor. Luckily, they soon found what they needed: lovastatin, the molecule that became Mevacor, the first American statin. A Japanese firm, Sankyo, was racing toward the same goal and developed its drug almost simultaneously. Despite the resulting competition, Mevacor, and Merck's follow-up drug Zocor, gave the firm a strong position in the global market for effective cardiovascular treatments. This was a case of disruptive innovation, although the new products were neither cheaper nor lower in quality. They were more expensive but considerably more effective in preventing heart disease.[55]

When he arrived at Merck, Vagelos, an instinctive System 1 science innovator, already had all the System 2 capabilities he needed to be a successful, organizational entrepreneur. With support from his CEO, he acquired the resources he needed, organized an effective and growing team of experts, and brought two important innovations through R&D, production, regulatory approval, marketing, and sales. By overcoming the inevitable internal bureaucratic resistance to the new sciences, he pushed Merck into a leading position in the global pharmaceutical industry.

Merck also began to develop new links to the small American biotechs that were using molecular genetics and rDNA technology to open another unique frontier in drug discovery. At first, big pharma stayed on the sidelines while biotech startups were getting underway and establishing their relations with the governments of the developed nations. There was considerable doubt inside and outside of the governments whether gene manipulation should be allowed, and if so, how it should be regulated. As these concerns dissipated in America, Merck and several other large pharmaceutical firms bought into biotech and began to bring the new genetic capabilities in-house.[56] In the 1980s and 1990s, the pharmaceutical firms and biotechs developed symbiotic relationships that helped to sustain innovation in the industry.

The Explosion of Digital Opportunities

An even broader frontier of opportunities for science- and engineering-savvy entrepreneurs opened up in digital businesses during the years

55. Ibid., 152–175. On disruptive innovation, see Christensen, *The Innovator's Dilemma*. Collins, et al., "Interpretaton of the Evidence . . . Statin Therapy," 2532–2561. Endo, "Historical Perspective on the Discovery of Statins," 484–493.

56. Orsenigo, *The Emergence of Biotechnology*. Sturchio and Galambos, "Pharmaceutical Firms and the Transition to Biotechnology," 250–278.

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following the development of the integrated circuit and the Internet. The combination of the computer and the new digital capabilities created an intense phase of competition between the West Coast start-ups and the more established electronics companies on the East Coast. Building upon its long background in radio enterprises; its networks of amateurs and professionals in science and engineering; its aggressive, engaged universities; a military establishment eager to buy high-tech products; and an ample supply of investors looking for capital gains, Silicon Valley won the first round of this competition and spread before Americans the powerful image of the startup firm that leapt from a garage to a leading position in the U.S. economy.[57] Entrepreneurial heroes abounded: David Packard, William Hewlett, Robert Noyce, Gordon Moore, and most dramatic of all, Steve Jobs and his buddy, Steve Wozniak. Up the coast as well, there was Bill Gates and Microsoft with the MS-DOS operating system that became dominant in the personal computer business.[58]

The Internet jolted the emerging digital economy by creating a new surge of entrepreneurial opportunities.[59] The new technology—like biochemistry and molecular genetics—was grounded in a science that was exogenous to the industry, to the best of the Silicon Valley firms, and in part to America. By the early 1990s, however, the Internet and browser technology had evolved in the United States in a form that made the World Wide Web a potential marketing tool. This, in effect, invited entrepreneurs to exploit the new network and attack the dominant but slow-moving bureaucratic firms of the Second Industrial Revolution. Innovators did not need to be in Silicon Valley to use the web, but the northern California environment was supportive of and continued for a time to be especially conducive to the "new new thing" in digital commerce.[60]

The result was an entrepreneurial surge of System 1 excitement and new dot-com firms. Webvan (California) was eager to be your online grocery store. Kozmo.com (New York) wanted to ease your life by delivering other items to your home, and Pets.com (California) would help you avoid a time-consuming trip to buy cat food. Your children

57. Lécuyer, *Making Silicon Valley.* Saxenian, *Regional Advantage*, 134–141.

58. Isaacson, *Steve Jobs*, and *The Innovators.* Less dramatic and less concentrated on the West Coast were the entrepreneurs who created an important computer services industry. Yost, *Making It Work.* Other states started to catch up with California in the early twenty-first century. Atkinson and Andes, *The 2010 State New Economy Index.*

59. The entrepreneurial firms included those directly linked to Internet development, like Performance Systems International (1989). Abbate*, Inventing the Internet*, 197–199. Galambos and Amatori, "The Entrepreneurial Multiplier Effect," 792–797.

60. Lewis, *The New New Thing.* Saxenian, *Regional Advantage.*

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would also benefit when you shopped with eToys (also California), which took on established brick and mortar retailers like Toys "R" Us. Exciting news like this drove up the value of dot.com stocks, as investors from coast to coast bought into this new and exciting entrepreneurial narrative.[61] The rate of new firm formation in high-tech, which had been increasing since 1980, reached a peak in the late 1990s.[62]

The reckoning came in 2000, when the dot.com bubble burst and left a string of bankruptcies and sad investors in its wake. They might have avoided some of the pain if they had looked at the long history of entrepreneurial failures in U.S. industries. They would have seen all the startups whose System 1 enthusiasm ran far ahead of their System 2 capabilities in the nineteenth century, as well as the high-tech, twentieth-century powerhouses that IBM drove out of the computer industry. They would have noted the business failure of the brilliant William Shockley, who left Bell Labs, tried to start his own firm, and promptly drove off the team he needed to make Shockley Semiconductor a success.[63] They would, if they were diligent, be able to see the many who did not master System 2 skills as well as the few who did. Even in an unusually strong entrepreneurial wave like the digital breakthrough, bankruptcy was more common than the stunning successes that kept the entrepreneurial culture thriving. The culture was particularly important after the bubble collapsed, as it sustained innovation despite the multitude of negative, dot.com outcomes.[64]

The entrepreneurial failures provide the essential background to the accomplishments of innovators like Jeff Bezos, who had his System 1 moment in 1994, when the dot.com bubble was just starting to inflate. He had already mastered the System 2 capabilities he would need, starting with his undergraduate work in computer science and electrical engineering (BS, Princeton University, 1986). He spent several years learning the financial and managerial skills essential to successful entrepreneurship before launching Amazon out of his garage. Bezos had his eye on several retail businesses that seemed to him to provide targets vulnerable to low-cost online competition. First in line was the book trade.[65]

61. Goldfarb and Kirsch, *Bubbles and Crashes.*

62. Hathaway, "Tech Starts," 7. As Hathaway notes, new-firm formation in the high-tech sector then began to spread across the country. See also Mandel, *How the Startup Economy is Spreading Across the Country.*

63. Shurkin, *Broken Genius*, 163–189.

64. Fairlie, Sameeksha, and Herrmann, *National Report on Early Stage Entrepreneurship.*

65. Stone, *The Everything Store.*

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By 1997, Amazon was already cutting into the markets of traditional booksellers like Barnes & Noble and Borders.[66] It was time to expand, but Bezos needed additional capital to fund his larger goals. He had started his firm with family financial backing, and now he turned to family, friends, and eventually to Wall Street for the capital he needed to fund additional expansion. With the bubble still growing and investors wildly enthusiastic about the promise of dot.com innovations, Amazon was able to raise millions from equity and bond sales. Then Bezos put his sights on additional online targets (in music and video) and began to grow and diversify through aggressive acquisitions. Unlike many of the dot.com firms, Amazon sailed through the first year after the bubble burst (November 2000) in what seemed to be good financial shape. By 2002, however, the company was flirting with bankruptcy before Bezos cut costs sharply and stabilized its finances.

Bezos, a master of System 2 skills, guided Amazon to its first profitable quarter in 2002 and then began to look for additional markets vulnerable to efficient, effective online competition.[67] As the firm evolved into a massive, digital conglomerate, its success prompted fear from potential competitors, concern from advocates of antitrust, and acclaim from its millions of customers. Amazon's success deepened and broadened America's entrepreneurial culture, while its online attacks on the giant retail firms that had long dominated the world's urban markets left its political foes searching for a rationale and for policies that would enable them to bring this colossus (and others) under control. That controversy, however, takes us too far beyond 2000, the announced, if not always respected, terminus of this article.

A Two-Handed Conclusion

As usual, there is a yin and a yang, a positive conclusion and a negative warning in the history of America's twentieth-century experience with the intricate relations between the bureaucratic and entrepreneurial cultures. There are, as well, some guidelines to the compromises, the kind of complementary, mutual developments that will perhaps protect the culture of innovation in a society increasingly characterized by bureaucratic structures of authority in its private as well as public sectors.

The good news is that as of the end of the twentieth century, entrepreneurship and its sustaining culture were still thriving in America. Even some of the nation's largest, most bureaucratic firms had learned how to innovate over the long term. Their efforts were providing

66. Raff, "What Became of Borders?" and "The Book-of-the-Month Club."
67. Stone, *The Everything Store*, 38–135.

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Americans with new goods (statins for better health), new services (many of them online), and as a bonus the type of disruptive competition that is needed to keep the nation's economy thriving. A host of entrepreneurs were launching startups, most of which employed digital technology, to offer better ways to perform traditional services (in online ordering and assessments) and to develop better products (using, for instance, 3D printing). The modern bureaucratic state at the local, state, and national levels had made its important contribution (through education and the Internet) to these positive developments.

This new entrepreneurial frontier favored those who had mastered STEM knowledge and could combine it with the Stage 2 capabilities needed to make an entrepreneurial venture successful over the middle and maybe even the long term. Education, private and public, thus became ever more important to the society. These encouraging changes could not vanquish the nation's Cassandras, but they left them much to ponder and to somehow discount at the end of a century of dynamic changes.

What, then, does this history provide as a warning? First, it was obvious that America's Second Industrial Revolution had a long cycle: an initial, heavily entrepreneurial phase charted in Alfred D. Chandler's histories and those of his students and colleagues, followed by a decline as bureaucratic firms, relatively weak business leadership, and an increasingly intrusive government bureaucracy hampered innovation. Recently, Robert Gordon has examined those developments from a different angle and arrived at similar positive conclusions about America's triumphant march to industrial leadership in the late nineteenth and early twentieth centuries. Gordon sees these positive developments followed by a long phase of national decline beginning late in the twentieth century, when the economy failed to produce significant increases in total factor productivity.[68]

My own warning is different than Gordon's because I believe the first phase of the Bio-Digital Revolution needs to be evaluated primarily on the basis of its innovations rather than productivity increases. The total positive effect—economically, politically, and socially—of bio-digital innovation was and continues to be truly dramatic. It boosted the United States back into a leadership position in global technology and medical innovation, opened broad new frontiers for the nation's entrepreneurs, and gave a powerful boost to their distinctive culture. The advances in health and life expectancy alone constituted a major breakthrough for Americans and for populations around the world.[69]

68. Gordon, *The Rise and Fall of American Growth*.

69. Deaton, *The Great Escape*, 126–164. As Deaton makes clear, the advances were, and continue to be, unequal between and within countries.

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My perspective on the history suggests, however, that the firms of this Third Industrial Revolution, like those of the Second, will inevitably drift toward less innovative forms of bureaucratic authority. Founders retire; second and third generation leaders are only occasionally as innovative as the men and women they replace. In the absence of pressure, the bureaucrats shape the firm's development. That and the further extension of the administrative state seem likely to stifle innovation as they did in post–World War II America. Meanwhile, bureaucratic values will appeal to America's aging population. Although American capitalism may once again be rescued from bureaucratic stasis by the scientific, technological, and organizational breakthroughs of another industrial revolution, who can with authority predict that will happen? Or when it might happen? Even if it does, a long war of attrition favors the bureaucracy and its values over the entrepreneurial culture that did so much to shape and then reshape American capitalism in the twentieth century.

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