The London School of Economics and Political Science

Heuristics of Capital: A Historical Sociology of US Venture Capitalism, 1946-1968

Dmitrii M. Zhikharevich

A thesis submitted to the Department of Accounting of the London School of Economics for the degree of Doctor of Philosophy

London, September 2019

Declaration

I certify that the thesis I have presented for examination for the MPhil/PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

I warrant that this authorisation does not, to the best of my belief, infringe the rights of any third party.

I declare that my thesis consists of 93,863 words.

ABSTRACT

This thesis examines the emergence and early history of venture capitalism in the US as a project of capitalization. As theorized in recent literatures on valuation studies and the "new" history of capitalism, capitalization is a collective activity, simultaneously cognitive and socio-technical, of "turning things into assets." As such, it requires the capitalizing subject to "think as an investor." The history of capitalism can be reconstructed as a history of successive "regimes of investment," differing in terms of which assets get capitalized and under what terms. Before stabilizing as a "regime," however, capitalization begins as a *project* that is logically and historically anterior to the institutions and technologies that will later hold it together. Rather, projects of capitalization emerge as ways of imagining certain objects as investments, or capital assets. In the early history of venture capital in the US, this imagination was targeted at young, small, technology-based firms. Prospective investors — who eventually became early venture capitalists — deployed a set of informal heuristics adopting some of the categories from the classifications used by the applied financial and managerial disciplines. This thesis follows the sequence of episodes through which these heuristics increasingly became centered on "people," eventually helping create a novel action under a description and, to put it in Ian Hacking's terms, a corresponding human kind — technical entrepreneurs. Accordingly, the analytical approach is nominalist: no claim is made as to whether the heuristics deployed by the actors featuring on the pages to follow could serve as a substitute for probabilistic calculation or any other formal calculative device. Yet however "effective" these heuristics might have been, they did have certain dynamic effects, applying and creating new classifications of investment opportunities, companies, and, eventually, people. As a result, in the early 1970s, venture capitalists defined themselves as being engaged in the "people business." Rather than effectively "turning engineers into entrepreneurs" through coercive or performative effects, they created the category of "technical entrepreneurs" as a human kind, that is, as an open possibility for being a certain kind of person, without necessarily becoming one.

Acknowledgments

I am grateful to my supervisors, Peter Miller and Martin Giraudeau, for their trust, encouragement and tolerance to my perennially failed timing. Andrea Mennicken has been tremendously helpful throughout all stages of my studies, and especially in the very last moments before the submission. Mike Power made many incisive and useful comments during my presentations and the progress meeting, suggesting, inter alia, that the argument could be framed as a "Hackingesque story." It took me too long to absorb this, but I did my best.

The Department of Accounting at LSE has been a comfortable home, both intellectually and socially. I am grateful to the Department, and specifically to Wim Van der Stede, for endorsing my application for a period of study abroad in the final year, which enabled me to become part of another "epistemic community" at Harvard Kennedy School's STS Program. Sheila Jasanoff was generous to accept me and offer valuable guidance, in addition to the opportunity to be part of an ongoing and highly stimulating conversation with the other Fellows, as well as distinguished speakers at Harvard STS Circle. Archivists and librarians at Harvard Business School helped me navigate the relevant archives, Artem Gureev and Daria Savchenko saved me from homelessness during the first few weeks, and Barry Cohen suggested a few good ideas that I am hoping to explore in the near future. Nancy Hogan has been a great host for me and my wife Dasha.

Back in London, Vassily Pigounides has been a helpful friend and an involved listener all the way through. Participants of the AC500 seminars generously listened to my chaotic presentations and offered many valuable comments. At LSE, I have also enormously benefited from the courses by Mary Morgan and David Graeber taken in my first year.

Vincent Lepinay and Mario Biagioli supported my PhD application back in 2014. I hope they were not wrong. Colleagues and friends from across Russia helped in innumerable ways. I am grateful to Andrey V. Rezaev for teaching me how to "work hard, really hard," colleagues and friends from the TANDEM Lab at St. Petersburg State University and the European University in St. Petersburg for valuable lessons and long conversations. Last but not least, the works of Georgi Derluguian remain a distant but constant source of inspiration.

And the list could go on. I am most grateful to my family — for helping me survive as much as for surviving my doubts, remorse and chaotic lifestyle. Whatever good comes out of this, they deserve it much more than I do.

As a good heir of the great Russian romantic tradition, I won't trust my love to the printed word, but, Dasha, you get the point.

Finally, a mandatory bit of self-irony: to rephrase a Russian proverb, the one who harnesses slowly *has to* ride fast. Readers will understand.

CONTENTS

Introduction

This thesis examines the emergence and early history of venture capitalism in the US as a *project of capitalization*.

Venture capital (VC) today is a generic term covering long-term, equity or equity-like investments, institutional or otherwise, in early-stage emerging growth companies, often but not always engaged in advanced technology fields.[1] Assuming the role of an active, "hands-on" investor, venture capitalists (VCs) "raise capital to support the growth of technology-based companies" and "realize liquidity for their founding investors," including VCs themselves, "by managing public offerings of their shares and by merging them into much larger companies."[2] In the imagination of the policy-makers and the public alike, its most visible success was the VC-backed growth of information and communication (ICT) and biotechnology industries between the 1970s and the 2000s, in the San Francisco Bay Area, since then also known as Silicon Valley. By 2000, the toponym turned into a metaphor, coming to exemplify "a Holy Grail of economic development,"[3] with venture capital, along with flexible labor markets, the inflow of highly skilled migrants, close industry-university ties, and network forms of organization, constituting an exportable model of regional economic development and innovation-based growth more generally.[4]

The literature on venture capital and its history spans several scholarly disciplines. However, by way of a broad summary, two major interpretations are discernible. On the one hand, venture capital can be thought of as a form of

---

[1] See, for a sample of comparable definitions, Patrick R. Liles, *Sustaining the Venture Capital Firm* (Cambridge, MA: Management Analysis Center, Inc, 1977); Richard Florida and Martin Kenney, "Venture Capital and High Technology Entrepreneurship," *Journal of Business Venturing* 3, no. 4 (1988): 301–19; Richard Coopey, "The First Venture Capitalist: Financing Development in Britain after 1945: The Case of ICFC/3i," *Business and Economic History* 23, no. 1, Fall (1994): 262–71; Martin Kenney and Richard Florida, "Venture Capital in Silicon Valley: Fueling New Firm Formation," in *Understanding Silicon Valley: The Anatomy of an Entrepreneurial Region*, ed. Martin Kenney (Stanford, Calif.: Stanford University Press, 2000), 98–123; Paul A. Gompers and Joshua Lerner, *The Venture Capital Cycle* (Cambridge, MA: MIT Press, 2004).

[2] William H. Janeway, "Doing Capitalism: Notes on the Practice of Venture Capitalism," *Journal of Economic Issues* 20, no. 2 (1986): 431.

[3] Timothy J. Sturgeon, "How Silicon Valley Came to Be," in *Understanding Silicon Valley: Anatomy of an Entrepreneurial Region*, ed. Martin Kenney (Stanford, Calif.: Stanford University Press, 2000), 15.

[4] On Silicon Valley economy, historical and contemporary roles of VCs, and its "modular" character, see AnnaLee Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (Cambridge, Mass.: Harvard University Press, 1996); Martin Kenney, ed., *Understanding Silicon Valley: Anatomy of an Entrepreneurial Region* (Stanford, Calif.: Stanford University Press, 2000); Lee et al., *The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship* (Stanford, Calif.: Stanford University Press, 2000); Bruce Kogut, *The Global Internet Economy* (Cambridge, Mass.: MIT Press, 2003); Ronald J. Gilson, "Engineering a Venture Capital Market: Lessons from the American Experience," *Stanford Law Review* 55, no. 4 (2003): 1067–1103; Lécuyer, *Making Silicon Valley: Innovation and the Growth of High Tech, 1930–1970* (Cambridge, Mass.: MIT Press); Josh Lerner, *Boulevard of Broken Dreams: Why Public Efforts to Boost Entrepreneurship and Venture Capital Have Failed–and What to Do About It* (Princeton: Princeton University Press, 2009); Michel Ferrary and Mark Granovetter, "The Role of Venture Capital Firms in Silicon Valley's Complex Innovation Network," *Economy and Society* 38, no. 2 (2009): 326–59; Leslie Berlin, *Troublemakers: Silicon Valley's Coming of Age* (New York: Simon and Shuster, 2017); Robyn Klingler-Vidra, *The Venture Capital State: The Silicon Valley Model in East Asia (Cornell Studies in Political Economy)* (Ithaca: Cornell University Press, 2018). On the origins of the term, see Turo Uskali and David Nordfors, "The Role of Journalism in Creating the Metaphor of Silicon Valley," *IJ-4 The Fourth Conference on Innovation Journalism* 23 (2007): 3–20.

entrepreneurial finance or "risk-capital" in general. In this sense, proto-forms of venture investing have existed throughout much of the history of commerce, beginning with the "risk communities" of medieval merchants engaged in long-distance trading and colonial ventures of early modern European empires, if not earlier.[5] On the other hand, VC can be treated as a form of financing technological innovation or research and development activities (R&D) more broadly conceived.[6] Accordingly, the earliest precedents of proto-venture capital can be found in the period of English industrialization and, more prominently, during the Second Industrial Revolution.[7] In this perspective, capitalist development is punctuated with the periodic emergence of clusters of entrepreneurial talent and pools of financial capital willing to take risks with new technologies, deployed through informal networks of affluent individuals, insider lending, universal banking, as well as public securities markets.[8] For the US case, possible candidates would include the burgeoning New England textile industry in the 1820s, Cleveland and Pittsburgh electric light, chemical, oil, and steel industries between the 1870s and the 1910s,

[5] On merchant "risk communities," see Max Weber, *General Economic* History, trans. Frank H. Knight (1927; Glencoe, Illinois: The Free Press, 1950); Fernand Braudel, *Civilization and Capitalism 15th-18th Century–Volume II: The Wheels of Commerce* (1979; New York: Harper & Row, 1983); Jonathan Levy, *Freaks of Fortune: The Emerging World of Capitalism and Risk in America* (Cambridge, MA; London, U.K.: Harvard University Press, 2012). For a set of more distant historical examples, see David S. Landes, Joel Mokyr, and William J. Baumol, *The Invention of Enterprise: Entrepreneurship from Ancient Mesopotamia to Modern Times* (Princeton, NJ: Princeton University Press, 2012); Ronald C. Michie, "Options, Concessions, Syndicates, and the Provision of Venture Capital, 1880–1913," *Business History* 23, no. 2 (1981): 147–64; Ronald C. Michie, "The Finance of Innovation in Late Victorian and Edwardian Britain: Possibilities and Constraints," *Journal of European Economic History* 17, no. 3 (1988): 491–530.

[6] Cristiano Antonelli and Morris Teubal, "Knowledge-Intensive Property Rights and the Evolution of Venture Capitalism," *Journal of Institutional Economics* 4, no. 2 (2008): 163–82; David C. Mowery, "Plus ca Change: Industrial R&D in the 'Third Industrial Revolution,'" *Industrial and Corporate Change* 18, no. 1 (2009): 1–50; Gerben Bakker, "Money for Nothing: How Firms Have Financed R&D-Projects since the Industrial Revolution," *Research Policy* 42, no. 10 (2013): 1793–1814.

[7] Joel Mokyr, *The Gifts of Athena: Historical Origins of the Knowledge Economy* (Princeton, [NJ]: Princeton University Press, 2002); Carlota Perez, "Finance and Technical Change: A Long-Term View," in *Elgar Companion to Neo-Schumpeterian Economics*, ed. Horst Hanusch and Andreas Pyka (Cheltenham, UK; Northampton, MA: Edward Elgar, 2007), 775–99; Robert C. Allen, *The British Industrial Revolution in Global Perspective* (Cambridge; New York: Cambridge University Press, 2009).

[8] See Naomi R. Lamoreaux, *Insider Lending: Banks, Personal Connections, and Economic Development in Industrial New England* (Cambridge: Cambridge University Press, 1994); Liam Brunt, "Rediscovering Risk: Country Banks as Venture Capital Firms in the First Industrial Revolution," *Journal of Economic History* 66, no. 1 (2006): 74–102. The idea of banks as venture capitalists goes back to Joseph Schumpeter, who theorized "wildcat banking" as the provision of loans regardless of the borrower's ability to repay, treating it as the primary means of entrepreneurial finance. He was likely generalizing from the experience of the German and Austro-Hungarian universal banking, although the term emerged in the context of "free" banking in the U.S. between the 1830s and the 1860s. See Joseph A. Schumpeter, *Business Cycles: A Theoretical, Historical and Statistical Analysis of the Capitalist Process* (New York and London: McGraw-Hill Book Company, Inc, 1939); Gerald P. Dwyer, "Wildcat Banking, Banking Panics, and Free Banking in the United States," *Economic Review (Federal Reserve Bank of Atlanta)* December, no. 3–6 (1996): 1–20; Richard Tilly, "Universal Banking in Historical Perspective," *Journal of Institutional and Theoretical Economics - JITE* 154, no. 1 (1998): 1–7; Caroline Fohlin, *Mobilizing Money: How the World's Richest Nations Financed Industrial Growth* (Cambridge: Cambridge University Press, 2012); Michael Peneder and Andreas Resch, "Schumpeter and Venture Finance: Radical Theorist, Broke Investor, and Enigmatic Teacher," *Industrial and Corporate Change* 24, no. 6 (2015): 1315–52.

and Detroit automobile industry in the 1920s.[9] Silicon Valley would thus appear a thoroughly familiar example of a technological cluster, whose perhaps unusual potency can be explained by a long history of heavy infusions with public money and a host of other favorable contingencies.[10]

Nevertheless, as an "organized" and professionally managed business practice, venture capital emerged in the US after World War II, and it was Silicon Valley where its business model was "repeatedly verified."[11] The period of its emergence, and thus also the relevant "event window" this thesis is concerned with, covers the late 1940s, when the first specialized venture capital organizations have been established, and the late 1970s, when it evolved into a quantitatively visible industry — in terms of the number of firms, the size of funds under management, the scale of operation, and the public recognition. In 1957, the American Research and Development Corporation (ARD), the first venture capital company to mobilize institutional funds, established in Boston in 1946, invested $70,000 in Digital Equipment Corporation (DEC), a minicomputer startup, in exchange for a 70% equity stake. In August 1966, DEC went public on New York Stock Exchange (NYSE), making an offering of 375,000 common shares at $22 per share, which was quickly sold out and soon traded at a three-point premium.[12] The initial success was multiplied in the long-term, with the value of the ARD's initial investment increasing by a factor of 500 in nine years, offsetting the losses or mediocre performance of the rest of its portfolio companies.[13]

In the next decade, the pattern set by ARD became much more visible, if not assuredly reproducible. In 1971, the National Association of Securities Dealers launched the world's first automated quotations system, NASDAQ, which also became the first public market specialized in high-technology stock trading. In that same year, Intel Corporation, a quintessential VC-backed startup, founded by two prominent engineers, but with little more than two years of history, became the first company to undertake an initial public offering (IPO) on NASDAQ, raising $6.8 million at $23.50 per share — "providentially," as Martin Kenney puts it, as it marked the emergence of a symbiotic relationship between venture capital,

---

[9]-See Naomi R. Lamoreaux, Margaret Levenstein, and Kenneth L. Sokoloff, "Mobilizing Venture Capital during the Second Industrial Revolution: Cleveland, Ohio, 1870-1920," *Capitalism and Society* 1, no. 3 (2006); Tom Nicholas, *VC: An American History* (Cambridge, Mass.: Harvard University Press, 2019). For a longer-term perspective beyond the US, see Perez, "Finance and Technical Change: A Long-Term View"; Fohlin, *Mobilizing Money: How the World's Richest Nations Financed Industrial Growth*; William H. Janeway, *Doing Capitalism in the Innovation Economy: Markets, Speculation and the State* (Cambridge: Cambridge University Press, 2012).

[10]-Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*; Stuart Leslie, "The Biggest" Angel" of Them All: The Military and the Making," in *Understanding Silicon Valley: The Anatomy of an Entrepreneurial Region*, ed. Martin Kenney (Stanford, Calif.: Stanford University Press, 2000), 44–67; Lécuyer, *Making Silicon Valley: Innovation and the Growth of High Tech, 1930–1970*; Linda Weiss, *America Inc.? Innovation and Enterprise in the National Security State* (Ithaca: Cornell University Press, 2014). For an insider's view, see William R. Hambrecht, "Venture Capital & the Growth of Silicon Valley," *California Management Review* 26, no. 2 (1984): 74–82.

[11]-Nicholas, *VC: An American History*, 7; John W. Wilson, *The New Venturers: Inside the High-Stakes World of Venture Capital* (Boston, MA: Addison-Weseley, 1985).

[12]-"DIGITAL EQUIPMENT MARKETS ITS SHARES," *New York Times,* August 19, 1966, 42.

[13]-Spencer E. Ante, *Creative Capital: Georges Doriot and the Birth of Venture Capital* (Boston, Mass.: Harvard Business Press, 2008), 195–96; David H. Hsu and Martin Kenney, "Organizing Venture Capital: The Rise and Demise of American Research & Development Corporation, 1946-1973," *Industrial and Corporate Change* 14, no. 4 (2005): 579–616; Henry Etzkowitz, *MIT and the Rise of Entrepreneurial Science* (London and New York: Routledge, 2002).

technology-based companies, and specialized public markets, the financial engine behind the "new economy business model."[14] In 1973, the industry organized nationally, founding the National Venture Capital Association (NVCA), and successfully lobbied for tax and investment regulation reforms later in that decade. The reduction of capital gains tax from 49.5% to 28% by the 1978 Revenue Act and the 1979 clarification of the "prudent man" rule, codified in the Employee Retirement Income Security Act (ERISA) of 1974, allowed pension funds and other institutions to invest in venture capital, effectively legitimizing it as an asset class.[15] With NASDAQ as a dedicated "exit" channel for VC investments and the supply side "boost" of institutional money, the industry began to grow explosively, setting on the path towards increasing competition and specialization. In January 1984, Arthur Rock, one of Intel's founding investors who helped Robert Noyce and Gordon Moore raise the initial $2.5 million of capital, appeared on the cover of Time Magazine, featuring as a "venture capitalist."[16] Two years later, venture capital was included in the list of asset classes representing the "broad spectrum of primary wealth-generating investments available to the institutional investor."[17]

In that same year, a reflective theorist-practitioner wondered whether venture capital represented a "novel extension of capitalism,"[18] articulating a concern that resurfaced again in the aftermath of the dot-com bubble, in recognition of the impact of the VC-fueled "exit-capitalism" on the American "variety of capitalism," and beyond.[19] Neither the literature concerned with venture capital as a form of entrepreneurial finance nor the one treating it as a form of R & D finance fully addresses this question. The former focuses on the VC industry as a specialized segment of the capital market, providing finance to the businesses that would

---

[14] Martin Kenney, "How Venture Capital Became a Component of the US National System of Innovation," *Industrial and Corporate Change* 20, no. 6 (2011): 1706. On the complementarity of venture capital and NASDAQ, see Nicholas, *VC: An American History*, 313–15; Bakker, "Money for Nothing: How Firms Have Financed R&D-Projects since the Industrial Revolution," 1807–8; Antonelli and Teubal, "Knowledge-Intensive Property Rights and the Evolution of Venture Capitalism." On the "new economy business model," see William Lazonick, "Varieties of Capitalism and Innovative Enterprise," *Comparative Social Research* 24 (2007): 21–69; William Lazonick, "Innovative Business Models and Varieties of Capitalism: Financialization of the U.S. Corporation," *Business History Review* 84, no. 4 (2010): 675–702; on Silicon Valley VC finance, see Martin Kenney and Urs Von Burg, "Institutions and Economies: Creating Silicon Valley," in *Understanding Silicon Valley: The Anatomy of an Entrepreneurial Region*, ed. Martin Kenney (Stanford, Calif.: Stanford University Press, 2000), 218–40; Stephen S. Cohen and Gary Fields, "Social Capital and Capital Gains in Silicon Valley," in Understanding Silicon Valley: The Anatomy of an Entrepreneurial Region, ed. Martin Kenney (Stanford, Calif.: Stanford University Press, 2000), 190–217.

[15] Paul Gompers and Josh Lerner, "The Venture Capital Revolution," *Journal of Economic Perspectives* 15, no. 2 (2001): 145–68; Gompers and Lerner, *The Venture Capital Cycle*. The "prudent man" or "prudent person" rule requires fiduciaries to invest their trusts' assets the way a "prudent person" would, undertaking careful due diligence and avoiding speculative or excessively risky outlets by judging each investment on its own merits. It dates back to the Massachusetts court precedent *Harvard College v Amory* (1830) 26 Mass (9 Pick) 446. See Bevis Longstreth, *Modern Investment Management and the Prudent Man Rule* (New York and Oxford: Oxford University Press, 1988).

[16] Michael Moritz, "Arthur Rock: The Best Long-Ball Hitter Around," *Time* 123, no. 4 (1984): 55.

[17] Gary P. Brinson, Jeffrey J. Diermeier, and Gary G. Schlarbaum, "A Composite Portfolio Benchmark for Pension Plans," *Financial Analysts Journal* 42, no. 2 (1986): 15–24.

[18] Janeway, "Doing Capitalism: Notes on the Practice of Venture Capitalism."

[19] Stefan Kühl, "Konturen Des Exit-Kapitalismus," *Leviathan* 30, no. 2 (2002): 195–219; Lazonick, "Varieties of Capitalism and Innovative Enterprise."

otherwise be denied it due to their small size, newness, or both, and emphasizes formal and informal mechanisms of risk-management deployed by the VCs.[20] The latter treats VC firms as a part of the infrastructure for "knowledge capitalization" or "national system of innovation" and emphasizes their ability to overcome the limited tradability of "knowledge-intensive" goods through expertise and experience that help achieve economies of scope in transaction costs, or through "embedding" the founders into local business networks, thereby helping them socialize and get access to specialized business services and legitimacy.[21] Both perspectives ultimately depend on a functionalist, market-failure type of argument: VCs are said to overcome either the failure of the incipient market for technological knowledge or the failure of the small business finance market.[22] However, since functional claims do not necessarily amount to historical explanation, it is worth recalling, following Fernand Braudel's famous distinction, that markets are not

[20] Joseph E. Stiglitz and Andrew Weiss, "Credit Rationing in Markets with Imperfect Information," *The American Economic Review* 71, no. 3 (1981): 393–410; David Kirsch, Brent Goldfarb, and Azi Gera, "Form or Substance: The Role of Business Plans in Venture Capital Decision Making," *Strategic Management Journal* 30, no. 5 (2009): 487–515.

[21] On knowledge capitalization and national systems of innovation, see Riccardo Viale and Henry Etzkowitz, *The Capitalization of Knowledge: A Triple Helix of University-Industry-Government*, *The Capitalization of Knowledge: A Triple Helix of University-Industry-Government* (Cheltenham, UK; Northampton, MA: Edward Elgar, 2010); Kenney, "How Venture Capital Became a Component of the US National System of Innovation." On the economies of scope in transaction costs, see Antonelli and Teubal, "Knowledge-Intensive Property Rights and the Evolution of Venture Capitalism"; Cristiano Antonelli and Morris Teubal, "Venture Capitalism as a Mechanism for Knowledge Governance," in *The Capitalization of Knowledge: A Triple Helix of University-Industry-Government*, ed. Henry Etzkowitz and Riccardo Viale (Cheltenham, UK; Northampton, MA: Edward Elgar, 2010), 98–120; Cathryn Carson, "Knowledge Economies: Toward a New Technological Age," in *The Cambridge History of the Second World War: Volume 3: Total War: Economy, Society and Culture*, ed. Michael Geyer and Adam Tooze (Cambridge: Cambridge University Press, 2015), 196–219. On "embedding," see Ferrary and Granovetter, "The Role of Venture Capital Firms in Silicon Valley's Complex Innovation Network"; Emilio J. Castilla et al., "Social Networks in Silicon Valley," in *The Silicon Valley Edge*, ed. William F. Miller, Marguerite Gong Hancock, and Henry S. Rowen (Stanford: Stanford University Press, 2000), 218–47.

[22] See George A. Akerlof, "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism," *The Quarterly Journal of Economics* 84, no. 3 (1970): 488–500; Kenneth J. Arrow, "Economic Welfare and the Allocation of Resources for Invention," in *The Rate and Direction of Inventive Activity*, ed. Richard R. Nelson (Princeton: Princeton University Press for NBER, 1962), 609–26. The first perspective is most comprehensively developed by Antonelli and Teubal, who invoke venture capital industry to explain a negative outcome, the non-occurrence of the market failure in "knowledge-intensive" goods after the emergence of a "knowledge-based economy" in the post-war U.S. Similarly, Bakker focuses on "market imperfections" from the point of view of the firm, offering a long-term perspective on the challenges of R&D financing. See Antonelli and Teubal, "Knowledge-Intensive Property Rights and the Evolution of Venture Capitalism"; Bakker, "Money for Nothing: How Firms Have Financed R&D-Projects since the Industrial Revolution." The second perspective is prevalent in the literature on VC; in historically-oriented accounts, it is driven, at least implicitly, by the same argument, i.e., the emergence of specialized venture capital organizations helps to overcome the "funding gap" developed after the Great Depression and the two world wars. For a pioneering exposition, see Liles, *Sustaining the Venture Capital Firm*; Martha Louise Reiner, "The Transformation of Venture Capital: A History of Venture Capital Organizations in the United States" (UC Berkeley, 1989).

identical to capitalism.[23] In fact, for much of modern history, just the opposite is true.[24]

Indeed, in the *longue durée* of capitalism, VCs would appear as the latest instantiation of Braudel's pristine capitalist-arbitrageur who, acting as a "middleman," earns exceptionally high, if irregular, profits, by bringing into contact supply and demand that would otherwise be "in complete ignorance of each other," separated by a long geographical distance.[25] Likewise, venture capitalists hope to extract abnormal gains from connecting markets that are distant, although not spatially, but temporally: actual capital markets and the "markets-on-paper" for the future products of the proposed venture, as of yet residing in "existential twilight."[26] In other words, VCs are engaged in an activity that can be more aptly described not as intermediation but as capitalization, that is, "making capital as capital."[27] Two recent literatures, drawing in different ways on the Pragmatist tradition, have pointed to capitalization as a fruitful site for studying finance and capitalism.[28] As different from economics and much of economic sociology, a focus on capitalization allows to disentangle markets from capitalism, thus remaining faithful to Braudel's historical insight. Markets imply arm's-length transactions involving standardized commodities exchanged at their spot values, and as such, are historically and conceptually distinct from the "upper-case economy" of capital assets that appreciate over time, thus being involved in a different mode of temporalization.[29]

---

[23] On functional causality, see Hans Joas and Wolfgang Knöbl, *Social Theory: Twenty Introductory Lectures*, *Social Theory: Twenty Introductory Lectures* (Cambridge; New York: Cambridge University Press, 2009), 56–57; Arthur L. Stinchcombe, *Constructing Social Theories* (New York: Harcourt, Brace and World, 1968). On the difference between markets and capitalism, see Fernand Braudel, *Civilization and Capitalism 15th-18th Century–Volume II: The Wheels of Commerce*, 230.

[24] Fernand Braudel, *Afterthoughts on Material Civilization and Capitalism* (Baltimore and London: The Johns Hopkins University Press, 1979); Immanuel Wallerstein, "Braudel on Capitalism, or Everything Upside Down," *The Journal of Modern History* 63, no. 2 (1991): 354–61; Giovanni Arrighi, "Braudel, Capitalism, and the New Economic Sociology," *Review* 24, no. 1 (2001): 107–23.

[25] Braudel, *Civilization and Capitalism 15th-18th Century–Volume II: The Wheels of Commerce*, 405; Janeway, "Doing Capitalism: Notes on the Practice of Venture Capitalism."

[26] Martin Giraudeau, "Remembering the Future: Entrepreneurship Guidebooks in the US, from Meditation to Method (1945-1975)," *Foucault Studies*, no. 13 (2012): 40–66.

[27] Martin Giraudeau, "The Business of Continuity," in *Reset Modernity!*, ed. Bruno Latour and Christophe Leclercq (Cambridge, MA: MIT Press, 2016), 278–85.

[28] These literatures can be broadly designated as "valuation studies" and "new" histories of American capitalism. See, in particular, David Stark et al., *The Sense of Dissonance: Accounts of Worth in Economic Life* (Princeton, NJ: Princeton University Press, 2009); Jens Beckert and Patrik Aspers, eds., *The Worth of Goods: Valuation and Pricing in the Economy,* (Oxford: Oxford University Press, 2011); Michèle Lamont, "Toward a Comparative Sociology of Valuation and Evaluation," *Annual Review of Sociology* 38 (2012): 201–21; David Antal, Ariane Berthoin, Michael Hutter and David Stark, eds., *Moments of Valuation: Exploring Sites of Dissonance* (Oxford: Oxford University Press, 2015); Martin Kornberger, Lise Justesen, Jan Mouritsen, Anders Koed Madsen, *Making Things Valuable* (Oxford: Oxford University Press, 2015); Sven Beckert and Christine Desan, eds., *American Capitalism: New Histories* (New York: Columbia University Press, 2018). On Pragmatism, see Fabian Muniesa, "Setting the Habit of Capitalization: The Pedagogy of Earning Power at the Harvard Business School, 1920-1940," *Historical Social Research* 41, no. 2 (2016): 196–217; Fabian Muniesa et al., *Capitalization: A Cultural Guide* (Paris: Presses des Mines, 2017); Jonathan Levy, "Capital as Process and the History of Capitalism," *Business History Review* 91, no. 3 (2017): 483–510.

[29] Nasser Abourahme and Omar Jabary-Salamanca, "Thinking against the Sovereignty of the Concept: A Conversation with Timothy Mitchell," *City* 20, no. 5 (2016): 737–54; Eli Cook, *The Pricing of Progress: Economic Indicators and the Capitalization of American Life* (Cambridge, MA: Harvard

Encompassing its narrower technical meanings, most generally, capitalization can be defined as a process, collective or individual, of "turning things into assets" by "recognizing in the objects of valuation (whatever these may be) the qualities of an "asset," that is, its potentials to produce earnings."[30] On the one hand, to capitalize, one must be "thinking like an investor"[31]; hence capitalization involves cognition and knowledge, even if imperfect, of the prospective objects of valuation, as well as the instruments that help constitute them as such.[32] More generally, capitalization takes place within a historical "investment regime" that determines "which assets get capitalized and under what terms."[33] On the other hand, capitalization always occurs under conditions of uncertainty about the future: it is a "particular way of rendering the future available in the present."[34] From a sociological point of view, this means that capitalization depends on the actors' capabilities of "scoping out" the future through collective imagination, but also through socio-technical devices that facilitate it and make it accessible to others.[35] Accounting technologies play an especially important role in this process.[36] As scholars of accounting have long argued, accounting inscriptions can be constitutive of the very sphere of the "economic."[37] In the context of capitalization, it is primarily accounting that allows to continuously reconstitute capital qua capital, as opposed to wealth, thus making possible what Max Weber called "permanent capitalistic enterprise," irreducible to a collection of "purely occasional ventures" and "individual transactions."[38]

University Press, 2017); Martin Giraudeau, "The Predestination of Capital: Projecting E. I. Du Pont de Nemours and Company into the Newworld," *Critical Historical Studies* 6, no. 1 (2019): 33–62.

[30] Muniesa, "Setting the Habit of Capitalization: The Pedagogy of Earning Power at the Harvard Business School, 1920-1940," 214.

[31] Muniesa et al., *Capitalization: A Cultural Guide.*

[32] Fabian Muniesa and Liliana Doganova, "Capitalization Devices. Business Models and the Renewal of Markets," in *Making Things Valuable*, ed. Martin Kornberger, Lise Justesen, Jan Mouritsen, Anders Koed Madsen (Oxford: Oxford University Press, 2015), 109–25; Andrea Mennicken and Michael Power, "Accounting and the Plasticity of Valuation," in *Moments of Valuation: Exploring Sites of Dissonance*, ed. David Antal, Ariane Berthoin, Michael Hutter and David Stark (Oxford, UK: Oxford University Press, 2015), 208–28.

[33] Levy, "Capital as Process and the History of Capitalism," 25–26.

[34] Abourahme and Jabary-Salamanca, "Thinking against the Sovereignty of the Concept: A Conversation with Timothy Mitchell," 740; Levy, "Capital as Process and the History of Capitalism."

[35] Jens Beckert, *Imagined Futures: Fictional Expectations and Capitalist Dynamics* (Cambridge, Mass.: Harvard University Press, 2016); Sheila Jasanoff and Sang-Hyun Kim, *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power* (Chicago: University of Chicago Press, 2015).

[36] Peter Miller, "Accounting Innovation beyond the Enterprise: Problematizing Investment Decisions and Programming Economic Growth in the U.K. in the 1960s," *Accounting, Organizations and Society* 16, no. 8 (1991): 733–62; Peter Miller and Ted O'Leary, "Mediating Instruments and Making Markets: Capital Budgeting, Science and the Economy," *Accounting, Organizations and Society* 32, no. 7–8 (2007): 701–34; Arjun Appadurai, "The Spirit of Calculation," *The Cambridge Journal of Anthropology* 30, no. 1 (2012): 3–17; Jonathan Levy, "Accounting for Profit and the History of Capital," *Critical Historical Studies* 1, no. 2 (2014): 171–214.

[37] Anthony G. Hopwood, "Accounting Calculation and the Shifting Sphere of the Economic," *European Accounting Review* 1, no. 1 (1992): 125–43; Peter Miller and Michael Power, "Accounting, Organizing, and Economizing: Connecting Accounting Research and Organization Theory," *Academy of Management Annals* 7, no. 1 (2013): 557–605.

[38] Weber, *General Economic History*, 229; Levy, "Accounting for Profit and the History of Capital."

Finally, capitalization is prospective, but not teleological, beginning as a forward-looking, contingent project of imagining certain things as assets — that is, valuing them in view of their capacity to produce income in the future — and eventually settling down as a habit. Thus, it is possible to analyze specific historical projects of capitalization, "tracing the necessary prospective conditions, and the slow, sometimes stunted, emergence of the capital process, in many incipient capitalisms," rather than "pinning down the moment of exact transition."[39] Ultimately, this thesis attempts to offer such a prospective history of venture capital as a project of capitalization, focusing on the forms of imagination, knowledge, and technologies of valuation that made it possible, rather than on individuals and institutions per se. Covering the period from the mid-1940s through the early 1970s, it reconstructs historically how "venture capital" evolved from a "patrician" business of wealthy families into what Weber called "capitalistic enterprise," or, in other words, how it became an investment, rather than a speculative gamble or a non-pecuniary expenditure akin to philanthropy. Put differently, "venture capital investing," as an action under a description, did not emerge full-blown with the creation of the first VC organizations.[40] Rather, it evolved gradually, first appearing as investing in "special situations," each unique and thus non-generalizable, moving on to the idea of a "scientific company" run by "creative people," until the latter category was finally converted into "technical entrepreneurs." In other words, venture capital investing as an economic action was constituted reciprocally with the objects and people to which it applied, in turn defining venture capital as a distinct line of business. This history is traced in the pages to follow.

Elements of Theory

The analysis presented below, while largely historical and descriptive, is informed by the following theoretical considerations. Firstly, following the "formation stories" approach, the mode of inquiry is historical rather than definitional.[41] Thus, instead of defining venture capital in terms of its functions, the narrative starts with the first organizations that explicitly designated themselves as specializing in "venture capital" investing or were described and perceived as such (Chapter II), proceeding to the practices and categories that preceded "venture capital" genealogically (Chapters III and IV), and concluding with the category that helped stabilize the meaning of "venture capital" by the start of the 1970s — "technical entrepreneurship" (Chapter V). Put differently, this thesis follows the Foucauldian approach of "eventalization" and "causal multiplication," seeking to identify historically the "surfaces of emergence" of the elements of venture capitalism when they did not (yet) cohere.[42] Each chapter focuses on specific individuals while attempting to pursue a "middle-range contextualization" by attending to the immediately relevant contexts in which the primary characters

[39] Levy, "Capital as Process and the History of Capitalism," 23.

[40] On action under a description, see G. E. M. Anscombe, *Intention* (Cambridge, MA: Harvard University Press, 1957); G. E. M. Anscombe, "Under a Description," *Noûs* 13, no. 2 (1979): 219; Ian Hacking, "Making Up People," in *Historical Ontology*, ed. Ian Hacking (1983; Cambridge, MA; London, England: Harvard University Press, 2002), 99–114.

[41] See Daniel Hirschman and Isaac Ariail Reed, "Formation Stories and Causality in Sociology," *Sociological Theory* 32, no. 4 (2014): 259–82.

[42] Michel Foucault, "Questions of Method," in *The Foucault Effect: Studies in Governmentality ; with Two Lectures by and an Interview with Michel Foucault.*, ed. Colin Gordon, Peter Miller, Gordon Burchell (London: Harvester Wheatsheaf; University of Chicago Press, 1991), 73–86.

were embedded.[43] Chapter II focuses on the intellectual history of Georges F. Doriot in the context of his teaching career at Harvard Business School; Chapter III narrates the histories of several early venture capitalists while grounding them in the relevant social history of the period; Chapter IV focuses on the categories and practices of security analysis profession, and in this context traces some important contributions to this "immature science" provided by several prominent practitioners; finally, Chapter V follows a group of early venture capitalists in their attempts to generalize from their experience of working with "creative technical people" in the early 1960s, while positioning their rhetoric and heuristics in the context of contemporaneous developments within another "immature" discipline, research administration.[44]

Secondly, drawing on the capitalization perspective described above, this thesis emphasizes its cognitive — or heuristic — aspects. The possibility of imagining things like assets is inscribed in a specific modality of knowing. Over the past two decades, a family of approaches addressing this issue has been developed within economic sociology and the adjacent disciplines. Doing major injustice to their diversity, three broad streams of research can be discerned. On the one hand, sociologists of finance, drawing on the "embeddedness paradigm," stressed the "epistemic embeddedness" of economic transactions: economic markets and organizations are sites of ongoing "epistemic work" that is "inscribed in and constitutive of economic objects as relevant to the practical activities of economic agents."[45] Being primarily focused on finance, rather than economic life at large, and on the applied, non-academic forms of expertise, this approach emphasized the necessity of practical economic knowledge for intersubjective coordination occurring in markets and organizations.

On the other hand, Michel Callon and his followers, drawing on the Pragmatist reading of actor-network theory (ANT), attempted to turn the notion of "embeddedness" on its head by arguing that if "the economy as a thing" is "embedded" in anything, it is first and foremost in economics, "the economy as a discipline." Accordingly, the objective of "economization" research programme was formulated as the exploration of "the diversity of calculative agencies, forms and distributions, and hence of organized markets" qua "many-sided, diversified, evolving device[s] which the social sciences, as well as the actors themselves, contribute to reconfigure," as part of the "formatting" activity performed by a wider network of human and non-human actants.[46] The key theoretical idiom in this

---

[43] On "middle-range contextualization," see Joel Isaac, "The Human Sciences in Cold War America," *Historical Journal* 50, no. 3 (2007): 725–46.

[44] On the notion of "immature sciences," see Ian Hacking, "Michel Foucault's Immature Science," *Noûs* 13, no. 1 (1979): 39–51.

[45] Karin Knorr Cetina and Alex Preda, "The Epistemization of Economic Transactions," *Current Sociology* 49, no. 4 (2001): 31; see also Daniel Beunza and David Stark, "Tools of the Trade the Socio-Technology of Arbitrage in a Wall Street Trading Room," *Industrial and Corporate Change* 13, no. 2 (2004): 369–400; Herbert Kalthoff, "Practices of Calculation: Economic Representations and Risk Management," *Theory, Culture & Society* 22, no. 2 (2005): 69–97. On the "embeddedness paradigm," see Greta R. Krippner and Anthony S. Alvarez, "Embeddedness and the Intellectual Projects of Economic Sociology," *Annual Review of Sociology* 33, no. 1 (2007): 219–40.

[46] Michel Callon, ed., *The Laws of the Markets (Sociological Review Monograph)* (Oxford; Malden, MA: Blackwell, 1998), 50–51; Bruno Latour, *Reassembling the Social : An Introduction to Actor-Network-Theory (Clarendon Lectures in Management Studies)* (Oxford; New York: Oxford University Press, 2005).

approach is that of "performation" — a historical process of mutual adjustments of "statements and their associated world."[47] The "statements" include not only verbal expressions but also mathematical formulae and scientific theories produced by "economics at large," including academic economic theory, marketing, accounting, finance, and other disciplines that perform "the economy."[48] On the other hand, "performation" also depends on the processes of practical rearrangement of the "world" associated with the statements, accomplished with the help of socio-technical devices.[49] Simplifying a bit, for Callon and his followers, it is science and technology — economics "at large" — that are primarily responsible for the constitution of the "economic" in the processes of "economization," "marketization" and, most recently, "valuation."[50]

The third major theoretical idiom addressing this problematic is more explicitly indebted to Foucault and developed primarily by accounting scholars.[51] Instead of looking for the cases of the performative effects of economics, it adopts a broader perspective of "governing economic life."[52] Extending Foucault's analyses of governmentality and technologies of the self, accounting scholars attended to the ways in which calculative practices allow "economization" processes to take place and to the diverse modes of the constitution of economic subjects across organizations and markets.[53] As Peter Miller puts it, somewhat paradoxically, accounting is "more personal than economics because accounting is better equipped to act on the actions of individuals": e.g., by setting (quantitative) standards of performance of which the individuals are aware and to which they react by modifying their courses of action, even though no direct intervention takes place.[54] In Ian Hacking's terms, if sociology of finance was stronger on "ideas," performativity of economics — on "things" broadly conceived, then Foucauldian accounting scholarship is arguably distinguished by its analysis of "people" and of the constitution of the "economic" by accounting technologies' ability to act on the

[47] Michel Callon, "What Does It Mean to Say That Economics Is Performative?," Working Paper, Centre de Sociologie de l'Innovation Ecole des Mines de Paris, 2006, 26, https://halshs.archives-ouvertes.fr/halshs-00091596/document; Michel Callon, "What Does It Mean to Say That Economics Is Performative?," in *Do Economists Make Markets? On the Performativity of Economics*, ed. Fabian Muniesa, Donald MacKenzie and Lucia Siu (Princeton and Oxford: Princeton University Press, 2007), 311–57.

[48] Michel Callon and Bruno Latour, "'Thou Shall Not Calculate!' Or How to Symmtricalize Gift and Capital," 1998, Translated by Javier Krauel (Duke University), http://www.bruno-latour.fr/sites/default/files/downloads/P-71%20CAPITALISME-MAUSS-GB.pdf

[49] Callon, "What Does It Mean to Say That Economics Is Performative?," 2007.

[50] Koray Çalişkan and Michel Callon, "Economization, Part 1: Shifting Attention from the Economy towards Processes of Economization," *Economy and Society* 38, no. 3 (2009): 369–98; Koray Çalişkan and Michel Callon, "Economization, Part 2: A Research Programme for the Study of Markets," *Economy and Society* 39, no. 1 (2010): 1–32.

[51] Andrea Mennicken, "Bringing Calculation Back in : Sociological Studies in Accounting," *Economic Sociology: European Electric Newsletter* 3, no. 3 (2002): 17–27; Miller and Power, "Accounting, Organizing, and Economizing: Connecting Accounting Research and Organization Theory."

[52] Peter Miller and Nikolas Rose, "Governing Economic Life," *Economy and Society* 19, no. 1 (1990): 1–31; Peter Miller, "Calculating Economic Life," *Journal of Cultural Economy* 1, no. 1 (2008): 51–64.

[53] Hopwood, "Accounting Calculation and the Shifting Sphere of the Economic."

[54] Peter Miller, "L'économisation de l'échec (Economizing Failure)," *Politiques et Management Public* 31, no. 4 (2014): 370; Peter Miller, "Accounting and Objectivity: The Invention of Calculating Selves and Calculable Spaces," in *Annals of Scholarship*, ed. Allan Megill (Durham and London: Duke University Press, 1994), 239–64.

actions of people and "govern at a distance."[55] Acknowledging the permeability of accounting to a variety of external influences, from adjacent disciplines of engineering and management to political-economic ideas, accounting scholars adopted a more open view on the processes of economizing as occurring across the levels of explicitly articulated "political rationalities" that are in turn translated into the "programmes of government" and enacted through "technologies" that act on the selves and actions of people.[56] As different from the performativity of economics argument, this view suggests that performative effects of economic metrics or financial models are not independent of "modalities of governing and forms of political power,"[57] and "historically varying ideas or rationalities that require or inspire them."[58] Put differently, "if objects, ideas, and practices for governing economic relations fit each other, this is because they have been made to fit."[59]

The approach taken by this thesis sympathizes with these Foucauldian sensibilities, suggesting that the relevant kinds of knowledge involved in the processes of capitalization are more durable and sometimes more formalized than the situational "epistemic work" highlighted by the sociologists of finance. On the other hand, as different from the Pragmatist idiom endorsed by Callon that "refuses the distance between the object and the discourse about it," it emphasizes distances between the "statements" and their "associated worlds."[60] As David Graeber puts it, the idea of "truth as success," underpinning the notion of performativity, amounts to the suggestion that "no meaningful distinction could be made between the nature of reality (even scientific reality), the techniques of knowledge designed to analyze and interpret that reality, and the forms of institutional power within which knowledge is produced."[61] On the other hand, the Foucauldian approach preserves these distinctions, thereby allowing for wider varieties of "politics of truth" to take place. Put differently, where performativity-oriented research would look for the instances of mutual adjustment between the "statements and their associated world" so that the former become increasingly "truer" of the latter, Foucauldian approach would attend to the processes by which statements "taken as true" shape the possibilities for being and acting.

Nevertheless, rather than relying on the distinction between "programmes" and "technologies" for "governing economic life," this thesis follows Ian Hacking's elaboration of Foucault's historical ontology, captured under the heading of "dynamic nominalism." By looking simultaneously at the discursive, as well as non-discursive dimensions, but without making any commitments to either homogenous

---

[55] On governing at a distance, see Miller and Rose, "Governing Economic Life." On the distinction between "ideas," "things," and "people," see Ian Hacking, *The Social Construction of What?* (Cambridge, Mass.: Harvard University Press, 1999).

[56] Miller and Rose, "Governing Economic Life."

[57] Andrea Mennicken and Peter Miller, "Accounting, Territorialization, and Power," *Foucault Studies* 13 (2012): 5.

[58] Andrea Mennicken and Peter Miller, "Michel Foucault and the Administering of Lives," in *The Oxford Handbook of Sociology, Social Theory, and Organization Studies: Contemporary Currents.*, ed. Paul S. Adler, Paul Du Gay, Glenn Morgan, Michael I. Reed (Oxford, UK: Oxford University Press, 2014), 5.

[59] Peter Miller, "Accounting for the calculating self," in *Globalisation in Practice*, ed. Nigel Thrift, Adam Tickell, Steve Woolgar, William H. Rupp (Oxford: Oxford University Press, 2014), 237.

[60] Callon, "What Does It Mean to Say That Economics Is Performative?," 2006, 23.

[61] David Graeber, "The Sword, the Sponge, and the Paradox of Performativity: Some Observations on Fate, Luck, Financial Chicanery, and the Limits of Human Knowledge," *Social Analysis* 56, no. 1 (2012): 28.

(the "social") or heterogenous ("assemblage") ontology, it allows to attend to the dynamic relationships occurring between subjects and their "names," including knowledge, classifications, and representations, without, however, necessarily implying any coherent, identifiable project of "governing" or "administering" human lives behind them.[62]

From the point of view of dynamic nominalism, classification is more fundamental and more resilient than knowledge: "classifying always involves knowledge of, or belief in, regularities about items of a class."[63] However, as different from the sociology of classification in the Durkheimian idiom, this claim does not involve an ontological commitment to the primacy of the "social" as the ultimate source of every classification. Following Goodman's skepticism towards the possibility of such reduction, Hacking suggests that the questions of ontology and semantics (that is, whether or not humanly-made classifications "correspond" to some natural kinds) are irrelevant; what matters from a dynamic nominalist point of view is dynamics — the interaction between classifications (and, a fortiori, knowledge), and the "thing classified," occurring in historical time.[64] Because classifications and knowledge are produced, developed, applied, and disseminated by organizations and institutions and are inscribed into their practices and rules, some of them tend to stick, so that the interaction between classifications and the "things classified" becomes durable. Put differently, for there to be any interaction between names and the named, the former must be able to stick, becoming temporarily stable: "All classifications that stick exist only within practices and institutions."[65] When such classifications pertain to people, they become capable of influencing some of these people's actions. Following Anscombe's argument that human action is intentional under some description, Hacking suggests that institutionalized classifications of people can provide new descriptions for these people's intentional action, thereby also enlarging their possibilities for being certain kinds of persons.[66] More specifically, people may purposefully identify with descriptions available to them, or, vice versa, attempt to avoid institutionally imposed classifications.

Inspired by Foucault, much of Hacking's argument is derived from the history of the human sciences in different stages of their "maturity," where classifications produce knowledge that is not merely instrumental.[67] Still, it could be extended

---

[62] For the most systematic exposition of Hacking's theory, see Ian Hacking, "Kinds of People: Moving Targets," *Proceedings of the British Academy* 151 (2007): 285–318; on Foucault and administering lives, see Mennicken and Miller, "Michel Foucault and the Administering of Lives"; the distinction between "programmes" and "technologies" is elaborated in Miller and Rose, "Governing Economic Life."

[63] Ian Hacking, "Degeneracy, Criminal Behavior, and Looping," in *Genetics and Criminal Behavior*, ed. David T. Wasserman and Robert Samuel Wachbroit (Cambridge: Cambridge University Press, 2001), 155.

[64] Ian Hacking, "Inaugural Lecture: Chair of Philosophy and History of Scientific Concepts at the Collège de France, 16 January 2001," *Economy and Society* 31, no. 1 (2002): 1–14; see also Hacking, "Kinds of People: Moving Targets"; Nelson Goodman, "Words, Works, Worlds," *Erkenntnis* 9, no. 1 (1975): 57–73.

[65] Ian Hacking, "Between Michel Foucault and Erving Goffman: Between Discourse in the Abstract and Face-to-Face Interaction," *Economy and Society* 33, no. 3 (2004): 285.

[66] Hacking, "Making Up People"; Anscombe, *Intention*; Anscombe, "Under a Description"; cf. Michel Foucault, "The Subject and Power," *Critical Inquiry* 8, no. 4 (1982): 777–95.

[67] Hacking, "Kinds of People: Moving Targets," 290; on the "maturity" of sciences, see Hacking, "Michel Foucault's Immature Science," *Noûs* 13, no. 1 (1979): 39–51.

further: thus, as economic sociologists have recently shown, similar "dynamics of classification" occur in what is presumed to be much more instrumental contexts — namely, in economic markets.[68] Further, if the history of capitalism can be reconstructed as a history of successive "regimes of investment," differing in terms of what assets get capitalized and under what terms, these "regimes" themselves can be analyzed in terms of classifications through which they operate.[69] Certain "things" cannot be imagined as assets in certain historical periods, while certain other "things" can and are imagined as such. Moreover, while the long arc of capitalist development can be described as the process of dissemination of an all-encompassing "investmentality," shorter historical distances would likely be characterized by intensive "boundary work" aimed at distinguishing solid and durable "investments" from reckless "speculations," "swindles," and "gambles," both as potential objects of investment, and as descriptions of corresponding actions.[70] For example, as Chapter IV of this thesis will attempt to demonstrate, precisely this difference was at stake during the electronics boom of the late 1950s, when American security analysts struggled to redraw the distinction between "investment" and "speculation," fundamental for their craft, in relation to what was then called "scientific companies." Conversely, it took more than a decade for the founders of the first venture capital organizations to be recognized as being in the investment business, rather than merely "gambling" or pursuing some philanthropic goals, and even longer for "venture capital" to be recognized as an asset class acceptable for institutional portfolios.

These considerations bring in the issue of uncertainty. As a forward-looking process, capitalization of necessity occurs under conditions of uncertainty about the future.[71] Following Frank H. Knight, economic sociologists conventionally contrast (incalculable) uncertainty with (calculable) risk, suggesting that to overcome it, economic actors rely on a variety of "social devices," including imagination, social norms, and calculative instruments.[72] In this perspective, the presence of uncertainty ultimately allows for introducing the properly sociological variables into the analysis of economic action, showing the limits of the "rational actor" theory and explaining why economic action is always embedded.[73] Pat O'Malley conveniently described this approach as "academic," pointing to the analytical, as opposed to the pragmatic, character of the distinction.[74] Arguably, however, the "academic" approach as developed by economic sociologists is problematic in so far

---

[68] Marion Fourcade and Kieran Healy, "Classification Situations: Life-Chances in the Neoliberal Era," *Accounting, Organizations and Society* 38, no. 8 (2013): 559–72; Greta R. Krippner, "Democracy of Credit: Ownership and the Politics of Credit Access in Late Twentieth-Century America," *American Journal of Sociology* 123, no. 1 (2017): 1–47.

[69] On "regimes of investment," see Levy, "Capital as Process and the History of Capitalism."

[70] On "investmentality," see Cook, *The Pricing of Progress*; on "boundary work," see Thomas F. Gieryn, "Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists," *American Sociological Review* 48, no. 6 (1983): 781–795.

[71] Levy, "Capital as Process and the History of Capitalism."

[72] Jens Beckert, *Imagined Futures: Fictional Expectations and Capitalist Dynamics*, 9; Jens Beckert and David Dequech, "Risk and Uncertainty," in *International Encyclopedia of Economic Sociology*, ed. Jens Beckert and Milan Zafirovski (London: Routledge. Pp, 2006), 582–87; Frank H. Knight, *Risk, Uncertainty and Profit* (New York: Hart, Schaffner and Marx, 1921).

[73] Jens Beckert, "What Is Sociological about Economic Sociology? Uncertainty and the Embeddedness of Economic Action," *Theory and Society* 25, no. 6 (1996): 803–40.

[74] Pat O'Malley, *Risk, Uncertainty and Government*, *Risk, Uncertainty and Government* (London: Glasshouse Press, 2004), 15.

as it is based on an asymmetrical interpretation of the Knightian distinction between risk and uncertainty. Firstly, as Mary Morgan shows, Knight introduced his distinction between risk and uncertainty at a specific point in a long history of the "model men" of economics, beginning with classical political economy.[75] In this context, Knight completed the movement away from idealization, which implied the possibility of comparing "economic men" to the real people (through observation or introspection), and towards formalization, whereby the *homo oeconomicus* became "an artificial character created by economists."[76] Thus, Morgan points out the difference of procedures employed by Knight and his immediate predecessor Jevons: the latter abstracted away uncertainty, while the former, in addition to that, endowed his "model man" with perfect foresight.[77] In this sense, neither uncertainty nor risk belongs to the "model world" explored by Knight, but both are present in the "actual world" where economic actors can't foresee the future perfectly. Thus, arguably, the distinction between risk and uncertainty is not equivalent to the one between "rational action" and "embeddedness." Rather, both can be treated as mutually non-exclusive ways of rendering the future knowable, whereby "risk" denotes a situation in which the imperfection of this knowledge can be expressed numerically.[78] Indeed, Knight himself seems to allow for such a reading: although he distinguishes between such "probability situations" as a priori probabilities, statistical probabilities, and "estimates" based on judgment and opinion, he argues that for "the student of business," the former two are subsumed into the latter.[79]

David Graeber makes a similar point, arguing that the very idea "of quantifying, in a precise way, the degree to which the future is unknown," and thus the distinction between risk and uncertainty as construed around the axis of calculability and/or measurability, is culturally specific, being a contingent outcome of the long historical process of "taming of chance."[80] From an anthropological point of view, the contemporary notion of "risk" is analogous to some of the concepts,

---

[75] Mary S. Morgan, "Economic Man as Model Man: Ideal Types, Idealization and Caricatures," *Journal of the History of Economic Thought* 28, no. 1 (2006): 1–27.

[76] Morgan, "Economic Man as Model Man," 22–23.

[77] Morgan, "Economic Man as Model Man," 22–23.

[78] For a similar argument derived from a historical case study, see Martin Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)," in *Uncertain Futures: Imaginaries, Narratives, and Calculation in the Economy*, ed. Jens Beckert and Richard Bronk (Oxford: Oxford University Press, 2018), 259–77.

[79] In the pivotal chapter on the "meaning of risk and uncertainty," Knight introduces a classification of different "probability situations," distinguishing between a priori probability based on "absolutely homogenous classification of instances" and approximated by the games of chance, statistical probability generated from data analysis that "rests on an empirical classification of instances," and "estimates," where "there is *no valid basis of any kind* for classifying instance" (emphasis in original). However, he repeatedly points out that only the latter type pertains to the "organic" world of business, and life in general, based on the "logic of conduct," as opposed to the "mechanic" world of logic and "the exact science of inference": "But the probability in which the student of business is interested *is* an estimate, though in a sense different from any of the propositions so far considered" (emphasis in original), namely, "estimates" in the mathematical sense, since "the exact science of inference has little place in forming the opinions upon which decisions of conduct are based, and… this is true whether the implicit logic of the case is prediction on the ground of exhaustive analysis or a probability judgment, a priori or statistical." See Knight, *Risk, Uncertainty and Profit*, 223–25.

[80] Graeber, "The Sword, the Sponge, and the Paradox of Performativity: Some Observations on Fate, Luck, Financial Chicanery, and the Limits of Human Knowledge," 32–33; see also Hacking, *The Taming of Chance* (Cambridge: Cambridge University Press, 1990).

"such as mana, baraka, or s'akti, regularly employed in other parts of the world to put a name on the play of chance or to explain otherwise inexplicable conjunctures or events."[81] Significantly, this observation pertains to the Knightian analysis of profit as "unimputable" residual income resulting from the capacity for superior judgment, which, however, in the final analysis, cannot be clearly differentiated from blunt luck: "in an individual case there is no way of telling good judgment from good luck, and a succession of cases sufficient to evaluate the judgment or determine its probable value transforms the profit into a wage."[82]

Moreover, Knightian emphasis on the singularity of "individual cases" and the lack of the basis for classification as the root cause of uncertainty can be interpreted along the lines suggested by Hacking. If "uncertainty" denotes a situation in which "instances" cannot be assigned to "classes," the possibility of calculating becomes secondary to the possibility of grouping or "sorting" the cases.[83] From this point of view, the introduction of sociological variables like interpersonal trust does not rule out the problem of uncertainty in so far as the people involved remain "individual cases," unique persons.[84] What is at stake, in other words, is not the opposition between numerical calculus and undifferentiated "people-knowledge," but, rather, the difference between two ways of attaining regularity: through numerical calculus, or through knowledge of the kinds of people that is generalizable beyond particular persons one knows and trusts.[85]

Two broad conclusions seem to follow from this. First, as Miller puts it, while calculability may be a "congenitally "failing" operation," "the "failure" of one way of calculating… tends to promote new calculative regimes rather than abandonment of calculability."[86] Interpreted more broadly, this suggests that, even with uncertainty present, actors will likely stick to their accepted "technologies of the future."[87] Second, as Power notes, uncertainty does not "exist sui generis but must of necessity be organized, ordered, rendered thinkable, and made amenable to processes and practices of intervention."[88] Hence, the real question is not whether the actors will attempt to calculate or rely on some set of "social devices," but which "technologies for knowing the future [will] come to be regarded at specific times and places as more reliable and acceptable than others."[89] Moreover, while uncertainty is never

---

[81] Graeber, "The Sword, the Sponge, and the Paradox of Performativity: Some Observations on Fate, Luck, Financial Chicanery, and the Limits of Human Knowledge," 32.

[82] Knight, *Risk, Uncertainty and Profit*, 311.

[83] Richard N. Langlois and Metin M. Cosgel, "Frank Knight on Risk, Uncertainty, and the Firm: A New Interpretation," *Economic Inquiry* 31, no. 3 (1993): 456–65.

[84] Beckert, "What Is Sociological about Economic Sociology? Uncertainty and the Embeddedness of Economic Action."

[85] Hacking, "Making Up People"; Steven Shapin, *The Scientific Life: A Moral History of a Late Modern Vocation* (Chicago; London: University of Chicago Press, 2008).

[86] Miller, "Accounting and Objectivity: The Invention of Calculating Selves and Calculable Spaces," 252.

[87] See Graeber, "The Sword, the Sponge, and the Paradox of Performativity: Some Observations on Fate, Luck, Financial Chicanery, and the Limits of Human Knowledge," for an anthropological discussion of this notion.

[88] Michael Power, *Organized Uncertainty: Designing a World of Risk Management* (Oxford: Oxford University Press, 2007), 9.

[89] Michael Power, "Fair Value Accounting, Financial Economics and the Transformation of Reliability," *Accounting and Business Research* 40, no. 3 (2010): 198; on "social devices," see Beckert, "What Is Sociological about Economic Sociology? Uncertainty and the Embeddedness of Economic Action"; Beckert, *Imagined Futures: Fictional Expectations and Capitalist Dynamics*.

given as such, it is also hardly imaginable as a practical category of action. Indeed, "acting on uncertainty" as a description of intentional human action arguably belongs to the same class as "to gamble" or "to bet on one's luck."

So far, it has been argued that capitalization implies knowledge of the "things" to be imagined as, or "turned" into, assets; that the attainment of such knowledge proceeds through the activity of classification; that such classification can be productive of new descriptions of intentional human action and hence possibly also of new human kinds; that capitalization occurs under uncertainty which is, however, never given as such, but only apprehended through some combination of "technologies of the future," not necessarily based on the calculus of risk. In this sense, specific historical "investment regimes" would be characterized not only by how they distinguish between "capitalizable" and "non-capitalizable" objects but also by the technologies on which they rely to make uncertainty organized. Finally, these two "elements" are not necessarily synchronous in time: a project of capitalization can be seen as logically and historically anterior to the actual instruments of "turning things into assets," entering the stage as a "spirit" or "imaginary" that prefigures specific practices, technologies, and institutions.[90]

From this point of view, the history of venture capitalism as a project of capitalization comes down to the emergence of "venture capital investing" as a description of certain kinds of economic action, involving both people who invest, as well as the "things" to be turned into capital assets.[91] However, new descriptions of economic actions do not arise in an empty space. Rather, they emerge through the overlaps of, or in the interstices between, existing classifications. Such processes — or events — of emergence can be identified historically. Accordingly, this thesis traces a series of historical episodes in the emergence of venture capitalism as a project of capitalization by looking at how early venture capitalists deployed informal "heuristics," and how these heuristics interacted with established bodies of knowledge and classifications — in particular, with security analysis and research management. This thesis then attempts to show how these heuristics were increasingly becoming centered on "people," eventually creating a novel action under a description and a corresponding human kind — "technical entrepreneurs."[92] In accordance with dynamic nominalism, no claim is made as to whether heuristics deployed by the actors featuring on the pages to follow could have served as a substitute for probabilistic calculation or any other formal calculative device. Yet however "effective" these heuristics might have been, they did have certain dynamic effects, creating new classifications of investment opportunities, companies, and, eventually, people. As a result, in the early 1970s, venture capitalists defined themselves as engaged in the "people business." Rather than effectively "turning engineers into entrepreneurs" through coercive or performative effects, they created the category of "technical entrepreneurs" as a human kind, that is, as an open possibility for being a certain kind of person, without necessarily becoming one.

---

[90] On this point, see Peter Miller, Liisa Kurunmäki, and Ted O'Leary, "Accounting, Hybrids and the Management of Risk," *Accounting, Organizations and Society* 33, no. 7–8 (2008): 942–67; Appadurai, "The Spirit of Calculation"; Cook, *The Pricing of Progress.*

[91] Muniesa et al., *Capitalization : A Cultural Guide*.

[92] Hacking, "Making Up People."

The Archive

This thesis relies on a range of published and archival sources that are used in several chapters. The most important body of historical evidence that is used throughout all chapters comes from the two extensive collections of oral history interviews with the pioneers of venture capital investing in America. "Venture Capitalists Oral History Project," directed and conducted by Sally Smith Hughes, available from the Regional Oral History Office of the Bancroft Library at the University of California, Berkeley, contains 19 interviews with leading first-generation Californian venture capitalists, investment bankers, and attorneys.[93] "Venture Capital Oral History Project" of the US National Venture Capital Association, Arlington, Virginia, conducted by Carole Kolker and Mauree Jane Perry, provides access to another 17 interviews with early American venture capitalists, made available through Computer History Museum in Mountain View, California.[94] Both collections are available online and open for research. In addition to these collections, two further oral history transcripts were obtained remotely from the Chemical Heritage Foundation, Science History Institute, Philadelphia, Pennsylvania.[95] Finally, selected oral history interviews with early venture capitalists not included in either of the above were consulted through the HBS Entrepreneurs Collection at Baker Library, Harvard Business School,[96] and the online collections Computer History Museum,[97] Babbage Institute of the University of Minnesota,[98] and Engineering and Technology History Wiki (ETHW).[99] All oral histories are referenced in the footnotes, and their complete list is available in the Primary Sources section. The second major source of historical materials used in this thesis is archival. It includes six archival collections related to some influential actors in the early history of venture capitalism: Georges F. Doriot, Peter O. Crisp, and William Elfers Papers were consulted at Baker Library, Harvard Business School in the fall term 2018; selected documents from John Hay Whitney and Betsey Cushing Whitney Family Papers were obtained remotely from Yale University Archives. Finally, published primary sources appearing in Chapters III-V come from the digital archive of The Analysts Journal available through JSTOR, published volumes of Research Management (RM) consulted at the British Library, as well as selected historical titles consulted at Baker Library Special Collections and Thomas P. O'Neil Library at Boston College. A detailed list of the primary sources is available in the References.

Overview of the Chapters

Chapter II,

Frames of Life, focuses on one of the East Coast pioneers of venture capital investing, the president and co-founder of American Research & Development Corporation, Georges F. Doriot. Doriot is credited as the "father" of organized venture capital, but, as this chapter argues, his most significant influence on the

[93] http://bancroft.berkeley.edu/ROHO/projects/vc/transcripts.html (all links appearing in the footnotes henceforth have been accessed in September 2019).
[94] https://www.computerhistory.org/exponential/nvca/
[95] https://oh.sciencehistory.org/
[96] https://www.library.hbs.edu/Entrepreneurs/
[97] https://www.computerhistory.org/collections/oralhistories/?s=%22NVCA%22
[98] http://www.cbi.umn.edu/oh/
[99] https://ethw.org/Oral-History:List_of_all_Oral_Histories/

nascent industry was through his teaching career at Harvard Business School, attended by many of the characters of the previous chapter. Drawing on the extensive archival record of Doriot's teaching at Harvard, this chapter argues that Doriot's teaching philosophy and pedagogical practice primarily were the media of what might be tentatively called "the spirit of venture capitalism." By grounding Doriot's teaching career in the historical sociology of business education, this chapter further argues that Harvard Business School proved to be a particularly favorable environment for the dissemination of such philosophy of business, given its initial emphasis on the broadly conceived "science of administration" based on experiential learning, and its institutional resilience during the post-war mathematization of business education in the US.

Chapter III, *Foot Soldiers of Capitalism*, reconstructs the collective biography of some pioneering American venture capitalists. Drawing on the collection of oral histories from the UC Berkeley's Bancroft Library, Computer History Museum, and National Venture Capital Association, it traces their social backgrounds, professional trajectories, and entry points into the venture capital business. It describes the two parallel "lineages" of venture capital in post-war America: as a "patrician" business of some long-established wealthy families and military-industrial elites in New York and Boston, and as an interstitially emerging practice of the "careerist" investment professionals in both the East and the West. It argues further that during the 1950s and the early 1960s, these "careerists," having discovered the opportunity for intermediation between the emerging technologies and pools of financial capital across the country, played an important role in legitimizing venture capital investing.

Chapter IV, *Financial Singularities*, studies the field of security analysis in post-war America on whose rich inheritance drew the first venture capitalists. Like Harvard Business School, in the late 1950s and early 1960s, the security analysis profession, dating back to the Great Depression, proved remarkably resilient to the rise of quantitative finance. Contrary to the emerging consensus, exemplified by the Efficient Market Hypothesis, that it is in principle impossible to "beat the market" since the stock prices immediately convey all available information, security analysts insisted on the irrelevance of high theory for their long-established craft of finding out the "intrinsic value" of traded companies. During the electronics boom of the late 1950s, however, security analysts' practice and the epistemology that underpinned it faced a major challenge. New companies exploiting the electronics technology, called "science companies," "glamour companies," "new ventures," or "special situations" by the contemporaries, defied the established categories of security analysis. The profession reacted by paying increasingly more attention to the "people" in charge of these companies, having been agnostic about the qualities of the management ever since the codification of security analysis by Benjamin Graham and David Dodd. The eventual solution to the problem of these "financial singularities" was found in the heretical undercurrent of security analysis concerned with investing in "special situations." This chapter focuses on the central proponent of this approach, Maurece Schiller, tracing his attempts to categorize the "science companies" during and after the electronics boom and against the background of the wider professional discussion.

The final Chapter V, *Turning Engineers into Entrepreneurs*, focuses on how the demand for "knowing the people" expressed by security analysts was met in an

unlikely site — the field of research administration and management. Following the end of World War II, scientists who worked in governmental wartime research laboratories joined the cadre of administrators of corporate R&D to discuss the condition of research personnel — "creative people," "technical men," or "professional employees" — within private and public bureaucracies. From 1945 through the late 1960s, research administrators tried to turn scientists and engineers into managers to overcome the problem of the "dual hierarchy" of scientific prestige and administrative rank, whose conflict appeared to be the most significant obstacle in the functioning of corporate research labs. By the beginning of the 1960s, increasingly attentive to the perceived crisis of R&D profitability, research administrators turned to social scientists for help. As a result, their input triggered the crucial shift in the discourse of research administration — the stunning recognition that although the "ideal scientist" cannot be turned into an administrator, he resembles the psychological profile of the "ideal entrepreneur." This shift made it possible to recast the managerial problems of research administration in terms of small business finance, thereby creating a niche for venture capital as a "people business": turning engineers into entrepreneurs.

A Conclusion summarizes the arguments of the preceding chapters. Overall, this thesis reconstructs the institutional and intellectual history of venture capitalism — starting with the cadre of the pioneers of venture investing, moving on to Doriot's pedagogy as an important articulation of the "spirit" that animated early venture capital, and then considering how financial markets — at the time still dominated by the qualitative expertise of the "immature science" of security analysis — accommodated the new kind of technological companies, or simply startups in today's language. Finally, the last chapter shows how the shifting discourse of research management linked the figure of the "ideal scientist" — creative, individualist and unmanageable within a bureaucratic setting — and the figure of the "ideal entrepreneur," thereby contributing to the creation of a new human kind, the "technical entrepreneur," who became the focus of the early venture capital investing.

Chapter II. Frames of Life

I believe that, for each period into which our economic history may be divided, there is a distinct and separate class of capitalists. In other words, the group of capitalists of a given epoch does not spring from the capitalist group of the preceding epoch. At every change in economic organization, we find a breach of continuity.

Henri Pirenne, *The Stages in the Social History of Capitalism*

Introduction

In March 1954, Challenge magazine, a publication of New York University's Institute of Economic Affairs aiming at the general public interested in economics and business, published an article entitled "Risk, Incorporated." The caption to the article stated that "a new kind of enterprise, the venture capital company, guides the fortunes of infant industries and encourages investment by 'betting' its own money on risk situations."[1]

> The spectacle of a handful of investment bankers, lawyers, engineers and economists cooly deciding how to put several hundred thousand dollars into a "risk situation" would make even the most hardened stock-market plunger grow a little light-headed. Yet, managing a "venture capital company" — risking money in a cautious way — is the business of these men. In looking for long shots, they are only conforming to that ideal of the conservative banking fraternity, the "reasonably prudent man."[2]

By the time the article was published, venture capital companies were indeed a "new kind of enterprise," having emerged in the immediate aftermath of World War II. By 1954, "a handful" was an accurate estimate of the number of venture capital organizations, most of them established by the heirs of great family fortunes. In January 1946, the Rockefeller siblings formed a limited partnership with the purpose of "finding, investigating and financing new, productive and constructive businesses and projects" to make "permanent or long-term investments" and "to manage and supervise" them.[3] Between 1946 and 1951, John Hay "Jock" Whitney, Joan Payson Whitney, William A.M. Burden, and the younger members of the Mellon family also pooled parts of their hereditary wealth into new organizations — corporations, partnerships and non-profit associations — created with similar purposes.[4] Most of these people were born at the turn of the century when the American bourgeoisie had consolidated, turning itself from a class into a status group with a common identity in addition to shared economic interests.[5] Notwithstanding the individual motives, from the desire to prove that inherited wealth can be used "constructively" and thus does not deserve to be excessively taxed to the fascination with aviation and other emerging technologies, their turn to

---

[1] "Risk, Incorporated," *Challenge* 2, no. 6 (1954): 6.

[2] "Risk, Incorporated," 6.

[3] "SIX ROCKEFELLERS TO INVEST JOINTLY: PARTNERSHIP WITH A CAPITAL OF $1,500,000 AIMS TO FIND AND FINANCE NEW BUSINESSES," *New York Times,* April 23, 1946, 24.

[4] "Risk, Incorporated"; Reiner, "The Transformation of Venture Capital: A History of Venture Capital Organizations in the United States," 135–61.

[5] See Sven Beckert, *The Monied Metropolis: New York City and the Consolidation of the American Bourgeoisie, 1850-1896* (New York: Cambridge University Press, 2001).

venture capital in the mid-1940s was inscribed in the "typical path of transformation in the social patterns of a wealthy family dynasty, from great entrepreneur to economic consolidator to patron of the arts, and eventually these days to a decadent roué or hedonistic-idealistic dropout," or a wealthy patron of inventors and entrepreneurs.[6] Testifying to this pattern, the Challenge article quoted Whitney saying: "I believe that the entrepreneur, no matter what the source of his money, can be a valuable member of society."[7]

In conclusion to their broadly sympathetic review of the family-based venture capital organizations, the editors of Challenge singled out one exception from the overall pattern, focusing on American Research and Development Corporation (ARD), "unique among venture companies" as "the only publicly owned corporation in the field."[8] Like most of the family-based organizations, ARD was established in 1946. With $3.75 million of capital, however, it had a much clearer focus, summarized in its name and noted by the magazine editors: "More than any other venture company, it has risked its money — close to five million dollars a year ago — on highly technical products and processes."[9] Unrelated to familial wealth, ARD represented a breach of continuity between "organized" venture capital and the tradition of informal patronage of inventors and entrepreneurs by the wealthy family dynasties.[10] Even though by modern standards, its venture capital career can hardly be characterized as successful, and its legal form of a closed-end investment fund is conventionally described as deficient, ARD left a lasting legacy on what could be described as the "spirit" of venture capitalism, mainly thanks to its co-founder and president, Georges F. Doriot, who is often referred to as the "father" of organized venture capital as such.[11]

Doriot came to the US from France in 1921 to study engineering at MIT but ended up being a professor of industrial management at Harvard Business School, a Brigadier General of the US Army, and a much-admired business visionary. In 1946, he co-founded the American Research and Development Corporation and served as its president for more than twenty-five years. Thanks to the article from Challenge, Doriot's venture capital career gained some publicity, making him "very visible in the community" by the end of the 1950s.[12] This visibility was dramatically amplified in 1966, when ARD's 1957 investment in Digital Equipment Corporation (DEC), a minicomputer startup company founded by two MIT engineers, yielded a return in excess of 100%. As summarized by Giraudeau, today, much of the literature on Doriot remains largely hagiographical, portraying him as a far-sighted member of the East Coast civic-minded elites, eventually becoming the "first venture capitalist"

---

[6] Immanuel Wallerstein, "The Bourgeois(Ie) as Concept and Reality," in *The Essential Wallerstein*, ed. Immanuel Wallerstein (New York: New Press, 1988), 327.

[7] "Risk, Incorporated," 9.

[8] "Risk, Incorporated," 10.

[9] "Risk, Incorporated," 10.

[10] See Reiner, "The Transformation of Venture Capital: A History of Venture Capital Organizations in the United States."

[11] See Spencer Ante, *Creative Capital: Georges Doriot and the Birth of Venture Capital* (Boston, Mass.: Harvard Business Press, 2008).

[12] According to the recollections of Charles Waite, see Charles P. Waite, "Oral History of Charles P. Waite," conducted by: Marguerite Gong Hancock, Ray Rothrock, February 16, 2017, San Francisco, CA. (Computer History Museum, Mountain View, California, 2017), p. 4. See also Francis Bello, "The Prudent Boston Gamble," *Fortune* 46, no. 5 (1952): 124; "Blue Ribbon Venture Capital," *Businessweek* October 29 (1960): 65–69.

and the "prophet of startups"; or else attends to the actual performance record of ARD and its struggles with the legal and regulatory environment of the time.[13] Thus, Hsu and Kenney have argued that the corporation "ultimately failed," being unfit for the existing market conditions and incapable of providing adequate compensation for its staff, in part due to its legal form of a publicly-traded company.[14]

While Doriot deserves the credentials of a pioneer in organized venture capital, the more significant channel of his influence on this field was arguably his teaching career, which, by and large, did not receive comparable scholarly attention.[15] This chapter attempts to offer a synoptic, long-term view of Doriot's teaching at Harvard, relying on the archival records of Doriot's teaching notes from the 1950s and 1960s. In so doing, it pursues a "middle-range contextualization," linking Doriot's intellectual development to the broader intellectual and institutional contexts, such as the evolution of US business education.[16] The interpretation of Doriot's teaching offered below is to a very large extent based on Giraudeau's reconstruction of Doriot's intellectual background and operational philosophy, which this chapter extends to his teaching career.[17]

The Harvard Graduate School of Business Administration (HGSBA) itself constitutes an important institutional topos for this story. During the formative

---

[13] See Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)"; for a sample of different versions of the East Coast elite narrative, see Leslie Berlin, "The First Venture Capital Firm in the Silicon Valley: Draper, Gaither & Anderson," in *Making the American Century: Essays on the Political Culture of Twentieth Century America*, ed. Bruce J. Schulman (New York: Oxford University Press, 2014), 155–71; Etzkowitz, *MIT and the Rise of Entrepreneurial Science*; Reiner, "The Transformation of Venture Capital: A History of Venture Capital Organizations in the United States." On Doriot as "the first venture capitalist" and "the prophet of startups," see, respectively, Udayan Gupta, *The First Venture Capitalist: Georges Doriot on Leadership, Capital, and Business Organization* (Calgary: Gondolier Publishers, 2004); Spencer Ante, "The Prophet of Start-Ups. An Unlikely HBS Professor Pioneers Modern Venture Capital," Harvard Business School Alumni Stories, June 1, 2008, <https://www.alumni.hbs.edu/stories/Pages/story-bulletin.aspx?num=673>; Spencer Ante, "Forbes's Robert Lenzner Gives Creative Capital 5 Stars!!!, Creative Capital," Creative Capital Blog, May 18, 2008, <https://creativecapital.wordpress.com/2008/05/18/forbescoms-robert-lenzner-gives-creative-capital-5-stars/>.

[14] See Hsu and Kenney, "Organizing Venture Capital: The Rise and Demise of American Research & Development Corporation, 1946-1973"; Ante, "Forbes's Robert Lenzner Gives Creative Capital 5 Stars!!!, Creative Capital, May 18."

[15] But see Chapter 3 in Ante, *Creative Capital: Georges Doriot and the Birth of Venture Capital*.

[16] On "middle-range contextualization," see Isaac, "The Human Sciences in Cold War America." For a sample of historical sociologies of American management thought and business education, see Stephen P. Waring, *Taylorism Transformed: Scientific Management Theory since 1945* (Chapel Hill: North Carolina University Press, 1992); Yehouda Shenhav, *Manufacturing Rationality: The Engineering Foundations of the Managerial Revolution* (Oxford: Oxford University Press, 1999); Esther Yogev, "Corporate Hand in Academic Glove: The New Management's Struggle for Academic Recognition—The Case of the Harvard Group in the 1920's," *American Studies International* 39, no. 1 (2001): 52–71; Rakesh Khurana, *From Higher Aims to Hired Hands: The Social Transformation of American Business Schools and the Unfulfilled Promise of Management as a Profession* (Princeton, NJ: Princeton University Press, 2007); Marion Fourcade and Rakesh Khurana, "From Social Control to Financial Economics: The Linked Ecologies of Economics and Business in Twentieth Century America," *Theory and Society* 42, no. 2 (2013): 121–59; Gabriel Abend, *The Moral Background: An Inquiry into the History of Business Ethics* (Princeton, NJ: Princeton University Press, 2014); Samuel Knafo et al., "The Managerial Lineages of Neoliberalism," *New Political Economy* 24, no. 2 (2019): 235–51.

[17] Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)."

period of American business education, when the fledging business schools tried to build their social and cultural profile by deriving legitimacy from their association with science and the professions, the HGSBA adopted the paradigm of professional education that emphasized "general management and social responsibility," positioning business administration as a "high profession," analogous to medicine and law.[18] After World War II, its credentials as a pioneering and most influential institution in this field, financial autonomy from the rest of the university, and corporate connections protected its distinctive "clinical approach" to business education from the competitive pressures that affected the larger organizational field of the business schools in the post-war period.[19] In particular, the relative insularity of the School made it an exception to the larger post-war trend towards positivist scientism and mathematical formalization of business education, best exemplified intellectually by the rise of the management science and institutionally by the trajectory of the Carnegie-Mellon Graduate School of Industrial Administration (GSIA). The latter "in many ways… organized itself as an anti-Harvard" and later became home for some of the most elaborate versions of rationalist economic thinking, such as the Miller-Modigliani proof of the irrelevance of capital structure to the market value of corporations and the rational expectations hypothesis.[20] All this allowed the HGSBA to reinforce its commitment to general management education, focused on the notion of "administration" as the practice of setting the broad strategic goals and policies of organizations, as opposed to "management" (associated with the Taylorist "scientific management"), meaning the process of their implementation.[21] In this way, the HGSBA was also able to resist the trend towards managerialization of strategy and governance spurred by the dissemination of operations research (OR) and systems analysis techniques developed at RAND Corporation after the war. This trend, again exemplified by the Carnegie-Mellon GSIA, amounted to

> […] a wager that optimization could be more than a technique for finding the best way to achieve a specific objective. It could be made into a framework for defining what should be the objective in the first place. This meant turning the conduct of strategy — traditionally associated with top levels of an organization and often conceived as an art or as intangibles, such as leadership — into *a technical matter more akin to the managerial and applied practices previously associated with lower orders of the organization.*[22]

By contrast, the intellectual and institutional features of Harvard's distinct position allowed it to preserve the emphasis on the intangible qualities of

---

[18] Khurana, *From Higher Aims to Hired Hands*, 112,154; Yogev, "Corporate Hand in Academic Glove: The New Management's Struggle for Academic Recognition—The Case of the Harvard Group in the 1920's."

[19] Fourcade and Khurana, "From Social Control to Financial Economics: The Linked Ecologies of Economics and Business in Twentieth Century America," 128.

[20] Fourcade and Khurana, "From Social Control to Financial Economics," 138. On the post-war evolution of mathematical economics and finance, see Philip Mirowski, *Machine Dreams: Economics Becomes a Cyborg Science* (Cambridge: Cambridge University Press, 2002); Donald MacKenzie, *An Engine, Not a Camera: How Financial Models Shape Markets* (Cambridge, Mass.: MIT Press, 2006); Kevin Brine and Mary Poovey, *Finance in America: An Unfinished Story* (Chicago and London: University of Chicago Press, 2017).

[21] Knafo et al., "The Managerial Lineages of Neoliberalism," 6–7.

[22] Knafo et al., "The Managerial Lineages of Neoliberalism," 5. Emphasis in original.

leadership, exemplifying a broader pattern of professional resistance to quantification and systematization.[23]

First, this chapter briefly discusses Doriot's education and early career in the context of several formative intellectual influences — above all, the philosophy of case-based teaching at Harvard Business School. It then advances an argument that Doriot should be seen as an important actor in the historical formation of venture capitalism not only because of his own experiments in this field of business endeavor but above all because he offered a pioneering articulation of what may be called a "spirit" or an "imaginary" of venture capitalism, as well as for having developed an influential teaching philosophy that turned on the notion of self-improvement, operationalized through a series of techniques of the self.[24] In this sense, Doriot may have been to venture capital(ism) what Peter Drucker was to modern management thought more generally — a prophet-like charismatic teacher, envisioning and legitimizing new practices *avant la lettre*, before the instruments for implementing them became available.[25]

A Fordist Career

Georges Doriot was born in 1899 to a family whose history bore witness to the Second Industrial Revolution and the opportunities for social advancement it brought about, coming of age amid the troubled beginnings of the "short twentieth century."[26] His grandfather was a farmer-turned-foreman at the local Peugeot factory in his native Valentigney, a Protestant region near the French-Swiss border; his father August also started there, working his way through to become a director of Peugeot's Paris facility, promoting the firm's brand as a car racer and Peugeot evangelist, and eventually starting his own car manufacturing business. Spending time at his father's factory as a child, Doriot read American engineering magazines and eventually became a "decent mechanic and draftsman," as well as a distant witness to the rise of Fordism and the booming car industry in the US.[27] This was soon followed by three years of "a very educational" period of service in one of the most technologically advanced units of the French Army during World War I, exposing him to modern technological warfare and its managerial problems.[28]

---

[23] See Theodore Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton, NJ: Princeton University Press, 1995).

[24] On the notion of "spirit" as an "imaginary," see Appadurai, "The Spirit of Calculation"; Jasanoff and Kim, *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*; on techniques of the self, see Michel Foucault, "Technologies of the Self," in *Technologies of the Self. A Seminar with Michel Foucault*, ed. Luther H. Martin, Huck Gutman, and Patrick H. Hutton (London: Tavistock, 1988), 16–49.

[25] On Drucker, see Nils Gilman, "The Prophet of Post-Fordism: Peter Drucker and the Legitimation of the Corporation," in *American Capitalism: Social Thought and Political Economy in the Twentieth Century*, ed. Nelson Lichtenstein (Philadelphia: University of Pennsylvania Press, 2006), 109–31.

[26] Eric Hobsbawm, *Age of Extremes: The Short Twentieth Century, 1914-1991* (London: Michael Joseph, 1994).

[27] "I became a little bit of a mechanic and very early in life became a fairly good draftsman. My main interest was reading American magazines having to do with machine tools and factory problems… I enjoyed driving cars and obtained my driver's license about a week after I was fifteen years old, which was the youngest age at which you could get it at that time". See Interview with General Georges F. Doriot by Aulikki Olsen, April 1980, Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 3 Folder 30, Baker Library Special Collections, Harvard Business School.

[28] Doriot served in the motorized heavy artillery unit (RALT), analogous to the US Ordinance Company, where he was quickly promoted to the position of an engineering officer in charge of the

Having demobilized, Doriot settled on a quintessentially Fordist career, following his father's suggestion to leave France to study manufacturing at MIT However, Doriot's only connection in the US, obtained via a friend of his father's, pointed to an entirely different social (if not geographical) location — namely, to the Boston brahmin Abbott Lawrence Lowell, then-President of Harvard University and a visible member of the lobbying coalition behind the establishment of the HGSBA[29] Established as a land-grant polytechnic college on the eve of the Civil War, by the early 1920s MIT was somewhat remote from Harvard, both socially and intellectually, catering primarily to middle-class students, and still embodied some elements of its foundational vision that stressed practically-oriented laboratory instruction and emphasized engineering over pure science.[30] This view of technical education dated back to the ideology of the Boston "mechanics," or skilled craftsmen, that faded away after the 1860s, having been defeated by the rival, bourgeois, hegemonic project which enforced strict symbolic borders between intellectual and manual labor.[31] Having introduced Doriot to the School's Dean Wallace Brett Donham, Lowell convinced him to enroll in the HGSBA instead of MIT In Spring 1921, Doriot became the first Frenchman to attend the recently established institution where he went through the basic core curriculum that was supposed to prepare the class for the vibrant business world of the Roaring Twenties. Towards the end of that year, Doriot was offered a job at the New York & Foreign Development Corporation, an affiliate of Jewish family investment bank Kuhn, Loeb & Company (founded in 1867), enlarging his network from New England's business establishment to New York City's financial community. In the absence of specialized venture capital institutions, investment banks' scope of attention included technological ventures.[32] During the next four years, interrupted by the occasional lectures at his alma mater, Doriot was exposed to the practices of evaluating new technologies and investment opportunities, from new production processes to overseas natural resource exploration ventures. However, when in 1925, Donham offered him an Assistant Dean position at the HGSBA, Doriot left New York City for Cambridge.[33]

---

artillery. "It was interesting because most of the soldiers who worked with me were very experienced repairmen from the best companies in Paris. At first they were very disciplined and very aloof, and they would always ask me for very detailed orders as to what to do to repair a car. I knew very well that they knew better than I but, of course, I was being tested and that is why they wanted detailed orders. Somehow, I survived the test and had a wonderful relationship with them. I benefited from my contact with those men even though I had a great deal of experience in father's factories." See Interview with Doriot by Aulikki Olsen; Ante, *Creative Capital*, 25–26.

[29] Khurana, *From Higher Aims to Hired Hands*, 111, 123–24; Abend, *The Moral Background,* 240–44.

[30] Roger L. Geiger, *To Advance Knowledge: The Growth of American Research Universities, 1900-1940* (New York: Oxford University Press, 1986).

[31] See Noam Maggor, *Brahmin Capitalism: Frontiers of Wealth and Populism in America's First Gilded Age* (Cambridge, MA: Harvard University Press, 2017); Beckert, *The Monied Metropolis*.

[32] See Naomi R. Lamoreaux and Kenneth L. Sokoloff, *Financing Innovation in the United States, 1870 to Present*, *Financing Innovation in the United States, 1870 to Present* (Cambridge, MA: MIT Press, 2007); Lamoreaux, Levenstein, and Sokoloff, "Mobilizing Venture Capital during the Second Industrial Revolution: Cleveland, Ohio, 1870-1920"; Reiner, "The Transformation of Venture Capital: A History of Venture Capital Organizations in the United States"; Michie, "Options, Concessions, Syndicates, and the Provision of Venture Capital, 1880-1913."

[33] Ante suggests that the likely reason for Doriot's move had to do with limited career opportunities he faced in the investment banking world, still based on the tight networks of kinship. However, there is no evidence to confirm or disprove that claim. I thank Martin Giraudeau for

Acting in this capacity, in the 1925/1926 academic year, following student complaints, Doriot suggested to Donham that the second-year course "Factory Problems and the Taylor System" was "not effective," to which Donham responded by telling him to replace the teacher. Having been appointed Associate Professor of Industrial Management in 1926, he started with the course on the Taylor system. Unsure whether he was up to the job, Doriot studied the subject "very hard," taking a further course in factory systems.[34] The following year Doriot began to teach Manufacturing, which became his full-year elective course offered to second-year students. In addition to that, in 1927/1928, he also taught a half-year Manufacturing Research course that involved no classes but consisted of personal tutoring with students who "had a special reason" to work with Doriot. Devoting increasingly more time to teaching, in 1929, Doriot was promoted to full professorship, stepping down from his position as Assistant Dean in 1931, and focused on teaching after that, embarking on a thirty-year long professorial career. Except for the academic year 1937-1938, when he taught Industrial Management "as an edition of Manufacturing," and the 1941-1947 service in the US Army, Doriot's teaching of Manufacturing as a full year second-year elective remained practically uninterrupted until 1966.[35]

Business Schools and the Rise of Fordism

The rise of Fordism in the US that Doriot witnessed — first from France, by reading American engineering magazines in his father's factory, and then on the ground, moving from New England to New York and back — was far from innocuous. In the decades immediately following the Great Merger Movement, America experienced a major exacerbation and intensification of industrial conflict that reinforced the lack of legitimacy of the emerging corporate form of capitalism.[36] The large corporation that arose out of the late nineteenth century's merger wave and divided ownership and control — arguably the most important organizational innovation of the American cycle of world-systemic hegemony — was subject to multiple competing claims.[37] Three interlinked developments are notable in this

drawing my attention to this. See Ante, *Creative Capital: Georges Doriot and the Birth of Venture Capital*, 41.

[34] Interview with Doriot by Aulikki Olsen; Ante, *Creative Capital*, 43.

[35] Interview with Doriot by Aulikki Olsen; see also Doriot's CV from April 1980 in ARD: Georges F. Doriot's Personal Notes, Remarks and Advice, 1961-1987. American Research and Development papers, Arch GA 19.1. Box 2 Folder 15, Baker Library Special Collections, Harvard Business School; see also G. F. Doriot document "Re Manufacturing Class Notes," May 1974, HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

[36] See Naomi Lamoreaux and William J. Novak, eds., *Corporations and American Democracy* (Cambridge, MA: Harvard University Press, 2017); Brine and Poovey, *Finance in America: An Unfinished Story*; Maggor, *Brahmin Capitalism*; Levy, *Freaks of Fortune*; Khurana, *From Higher Aims to Hired Hands*; Howard Brick, ed., *Transcending Capitalism: Visions of a New Society in Modern American Thought* (Ithaca, New York: Cornell University Press, 2006); Nelson Lichtenstein, ed., *American Capitalism: Social Thought and Political Economy in the Twentieth Century*, (Philadelphia: University of Pennsylvania Press, 2006); Beckert, *The Monied Metropolis*; Shenhav, *Manufacturing Rationality*. On the Great Merger Movement, see Naomi R. Lamoreaux, *The Great Merger Movement in American Business, 1895-1904* (Cambridge: Cambridge University Press, 1985).

[37] See Jessica L. Hennessey and John J. Wallis, "Corporations and Organizations in the United States after 1840," in *Corporations and American Democracy*, ed. Naomi Lamoreaux and William J. Novak (Cambridge, MA: Harvard University Press, 2017); on the world-systemic cycles of hegemony, see Giovanni Arrighi, *The Long Twentieth Century: Money, Power, and the Origins of Our Times* (London; New York: Verso, 1994); for the classic version of the managerial revolution narrative, see

respect as the building blocks of the intellectual and institutional environment in which Doriot assumed his university career: the rise of the new corporate occupations, their struggle for professionalization, and the business schools' role in furthering this project.

The rise of corporate capitalism in the US was linked to the rise of new professions that served the new institution — engineering, financial analysis, accounting, and management.[38] According to Khurana, as distinct from the traditional "free" professions like medicine and law, the route to professionalization of these new "foot soldiers of capitalism," most of all management, foreclosed the aspiration to achieve market control, due to the absence of markets for their professional services.[39] With professional autonomy resulting from monopoly control over the market for their services unattainable, the aspiring profession of management focused on the search for and assertion of its social status and became tied to the contested legitimacy of the large corporation.

Consequently, the new strata of corporate professionals adopted a form of normativity that was relatively independent of, if not at times downright hostile to, competitive market coordination — what Boltanski and Chiapello labeled "the second spirit of capitalism."[40] Bracketing the national differences in the development of management as an occupation and an aspiring profession, this broad generalization seems warranted, and indeed, the threat posed by the large corporation and its cadres to "private capitalism" preoccupied some of the major contemporary thinkers, including Max Weber and Joseph Schumpeter, in Europe and America alike. In other words, the managers' "collective mobility project" can be seen in the context of a more extended genealogy of radical critiques of capitalism, aiming at the abolition of private property-based domination and installing an alternative regime, where social domination derives from the specialized expertise of the "new classes."[41] In the interwar period, engineering and management, the latter inheriting much of the former's cognitive tools, were among the obvious candidates for this subversive "new class."[42] Perhaps most eloquently, this view was articulated by Thorsten Veblen in his book *Engineers and the Price System* (1921), in which he argued that educated engineers, and not the workers, will bring socialism to the US.[43] The attempt to professionalize management through graduate education with an emphasis on ethics was thus a notable example of

---

Alfred D. Jr. Chandler, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, Mass.; London: Harvard University Press, 1977).

[38] Khurana, *From Higher Aims to Hired Hands*; Lawrence King and Iván Szelényi, *Theories of the New Class: Intellectuals and Power* (Minneapolis: University of Minnesota Press, 2004), 145–46.

[39] See Khurana, *From Higher Aims to Hired Hands,* 103. The expression "foot soldiers of capitalism" was coined by Ted O'Leary. I thank Peter Miller for drawing my attention to this apt metaphor.

[40] Luc Boltanski and Eve Chiapello, *The New Spirit of Capitalism* (1999; London: Verso, 2005).

[41] King and Szelényi, *Theories of the New Class: Intellectuals and Power*.

[42] Khurana, *From Higher Aims to Hired Hands*, 91.

[43] Veblen's work appeared as a book in 1921 and was based on a series of articles originally published in *The Dial* magazine in 1919. See Thorstein Veblen, *The Engineers and the Price System.* (1921; New York: Kelley, 1965); King and Szelényi, *Theories of the New Class: Intellectuals and Power*; Ivan Szelenyi and Bill Martin, "The Three Waves of New Class Theories," *Theory and Society* 17, no. 5 (1988): 645–67.

institutional entrepreneurship and innovation and a response to the emerging threats to the capitalist economic order.[44]

Notably, Veblen was one of the most outspoken critics of the very idea of business education and the business school as an institutional project. Responding to these critiques, the intellectual avant-garde behind the business education movement sought to draw on the legitimacy of some of the most cherished institutions of the Progressive era, the research university and the professions, positioning management as potentially both a science and a profession, and thus worthy of a place within the university.[45] In line with the late nineteenth-century perceptions of science, management qua science could be construed as a disinterested, rational, and inherently moral pursuit capable of resolving violent industrial conflict. With the purpose of maximizing the efficiency of the labor process as a means to increase the total amount of spoils to be divided between workers and managers, the latter presented themselves as coordinators, rather than masters of the former, appealing to the authority of Taylorist scientific management and industrial psychology. Even though in effect the implementation of scientific management was more conducive to managerial control over labor, skilled craftsmen, and the shop floor, rather than efficiency and productivity, scientific management and industrial psychology acquired widespread legitimacy in the early decades of the twentieth century and were put at the center of the business school curriculum, including the HGSBA.[46]

Upon his return to Harvard, Doriot found himself in the middle of the Business School's struggle to structure its teaching, which was another measure to achieve legitimacy through imposing some cognitive order on business education and thereby responding to the charges of anti-intellectualism.[47] In his capacity as Assistant Dean, Doriot took charge of organizing the "educational process": systematizing the curriculum and the contents of classroom instruction as the HGSBA was gradually changing its model of business education, which initially followed the functional divisions of a typical business enterprise, divided into "departments" (industrial management, marketing, finance, accounting, plus statistics as a general-purpose analytic method).[48] Effectively, however, the teaching

---

[44] Abend, *The Moral Background*; Yogev, "Corporate Hand in Academic Glove: The New Management's Struggle for Academic Recognition—The Case of the Harvard Group in the 1920's."

[45] Khurana, *From Higher Aims to Hired Hands*, 49.

[46] Khurana, *From Higher Aims to Hired Hands,* 91–103; Yogev, "Corporate Hand in Academic Glove: The New Management's Struggle for Academic Recognition—The Case of the Harvard Group in the 1920's"; Shenhav, *Manufacturing Rationality.*

[47] Khurana, *From Higher Aims to Hired Hands*; Abend, *The Moral Background,* 284–90.

[48] Reflecting on these experiences some fifty year later, Doriot remarked: "Somehow, those five parts had to come together and fit together in the students' minds. In could be, for instance, that in the first hour, or at any hour, a course would be talking about a subject which could not possibly be understood unless another course had discussed something beforehand, etc." See G.F. Doriot document "Re Manufacturing Class Notes," May 1974, HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School. Among the other activities Doriot engaged in as the Assistant Dean, Doriot tried to "coordinate the flow of knowledge and information" by consulting with the teachers and compiling a master list of keywords and subjects to be discussed in class; for some time, he also ran a "Committee on Terminology" to order the emerging business parlance, deeming the effort "very useful," even though it might not have been. See Ante, *Creative Capital*, 43. Finally, he also established the procedure of "Introductory Problem" which was discussed by the Dean at the opening of the first year. See also Interview with Doriot by Aulikki Olsen.

at HGSBA, like in many other business schools of the time, was centered on "factory problems" and the Taylor system. Doriot found such division "artificial" and "arbitrary," and thus was likely to support the shift from the "functional" model toward the one emphasizing general business education. The latter model was pioneered at Dartmouth College and attempted to build the curriculum around a broad "science of administration," rather than task-specific applied management.[49] A version of this approach also emerged independently at Harvard, being conceived in direct opposition to training for specific tasks and instead emphasizing general management and business's social responsibility.

The "Science of Administration" and the Case Method at Harvard in the 1920s

As early as 1915, it was argued that "the trades of business" — like bookkeeping or statistics — could be taught from textbooks, as opposed to the "profession of business" that required a different approach to teaching.[50] The School's first Dean, institutional economist Edwin B. Gay, also emphasized the ethical dimension of professionalism, which was then carried forward by his influential successor Wallace B. Donham, who occupied the position from 1919 to 1942. In the very first issue of the Harvard Business Review, Donham made clear that his approach to the professionalization of management was inspired by medicine and law.[51] Himself a lawyer, Donham argued that the contemporary "theoretical background for business" stood "somewhat where the law of England and France stood in the period from 1200-1300" and advocated a broad effort of accumulating and sharing the experience of "business precedents," dispersed across numerous enterprises analogous to small territorial units where the law was being applied during the Middle Ages.[52] Under the joint influence of his legal training and the process philosophy of Alfred North Whitehead, who joined Harvard in 1924, Donham developed the notion of a "science of administration," emphasizing foresight, experience, and judgment as the necessary qualities of the "broad executive," as well as the importance of "human relations" in administration.[53] Referring to the developments in the fields of accounting and scientific management, Donham argued that this "technical equipment," coupled with the qualities of energy, creativity, and enthusiasm required of business leaders, had to be complemented by knowledge of the "broad underlying forces controlling business," the only basis for "sound judgment."[54] Further refining his approach in the 1930s, Donham emphasized ethics and the social responsibility of business as concerns with its legitimacy exacerbated during the Great Depression, incorporating them into his definition of administration as "determination of policies." Such an approach reinforced the opposition between general management, emphasized by Harvard, and specific task-based education: administration was non-technical, intangible,

---

[49] Khurana, *From Higher Aims to Hired Hands,* 158–59.

[50] Benjamin Baker, "Teaching the Profession of Business at Harvard," Supplement to Official Register of Harvard University, vol. 12, no. 1, pt. 6 (February 27,1915): 9–10. Quoted in Khurana, *From Higher Aims to Hired Hands,* 114.

[51] Wallace B. Donham, "Essential Groundwork for a Broad Executive Theory," *Harvard Business Review* 1, no. October (1922): 1–10.

[52] Donham, "Essential Groundwork for a Broad Executive Theory," 5.

[53] See Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)"; Khurana, *From Higher Aims to Hired Hands,* 266–67.

[54] Wallace B. Donham, "Business Teaching by the Case System," *The American Economic Review* 12, no. 1 (1922): 53–65.

based on experiential learning, and primarily concerned with the goals of corporate policy, leaving implementation to the middle ranks of management.[55]

With this vision in mind, Donham was also a major promoter of the case method of instruction as the central pedagogical device at the HGSBA, again drawing on his Law School's experience, where the case method was introduced by Dean Langdell and linking it with similar instruments adopted by the established professions: the decisions of the courts in law, hospital cases and clinical records in medicine, and laboratory experiments in science.[56] Moreover, the use of the case method exemplified a specific stance towards the pressing issue of business ethics. Reminiscent of the ancient practice of moral reasoning — casuistry — business cases were embedded in a specific type of "moral background" that emphasized an "ethics of doing," as opposed to that of "being."[57] Stressing action, decision, and judgment, this moral problematic was not merely derivative of management's struggle for professionalization, but, in so far as "business" emerged as an ontological category endowed with moral agency, the question of ethics permeated the entire effort to establish graduate schools of business in the US, reaching beyond the narrow discipline of "business ethics." In turn, this effort implied a concern "with safeguarding the American way of life and institutions, and ultimately the capitalist system, which the profusion of unethical and irresponsible business practices seemed to undermine."[58] In this context, Harvard's use of the case method appears to be a very concrete manifestation of this broader set of aspirations. However, since the cases had to represent actual business experiences, there was a need to collect data. Thus, the research effort emerged at the HGSBA as a corollary of case-based instruction. The business schools' engagement in research and data collection was part of their broader effort to achieve legitimacy within the research-based universities; in this context, the case-based form of data aggregation and (re)presentation was analogous to other contemporary forms of "imagining the economy," like the study of business cycles developed by Wesley Mitchell at the National Bureau of Economic Research.[59] Under Donham, case-based teaching expanded into the School's research activities in the form of industry studies carried out by faculty, the teaching of business ethics, and later human relations and other disciplines. More importantly, "the case method smuggled in with it a lens or prism through which business reality was apprehended," reducing it to the "making of decisions."[60]

---

[55] Knafo et al., "The Managerial Lineages of Neoliberalism."

[56] Donald K. David, "Foreword," in *The Case Method at the Harvard Business School. Papers by Present and Past Members of the Faculty and Staff*, ed. Malcolm P. McNair (New York: McGraw-Hill Book Company, 1954), vii–x. On the legal inspiration behind the case method, see Donham, "Essential Groundwork for a Broad Executive Theory"; Abend, *The Moral Background*; and especially Chapter 2 in Joel Isaac, *Working Knowledge: Making the Human Sciences from Parsons to Kuhn* (Cambridge, Mass.: Harvard University Press, 2012).

[57] Abend, *The Moral Background*.

[58] Abend, *The Moral Background*, 25.

[59] See Khurana, *From Higher Aims to Hired Hands,* 150; on Mitchell's studies of the business cycle, see Chapter 3 in Brine and Poovey, *Finance in America: An Unfinished Story*; Mary Poovey, "Risk, Uncertainty, and Data: Managing Risk in Twentieth- Century America," in *American Capitalism: New Histories*, ed. Sven Beckert and Christine Desan (New York: Columbia University Press, 2018), 221–35.

[60] Abend, *The Moral Background.*

Martin Giraudeau reconstructed the more immediate intellectual context in which Doriot began his teaching career. According to him, the likely influences on Doriot's thinking and teaching included such prominent figures as Joseph Schumpeter, Lawrence Joseph Henderson, and Alfred North Whitehead, whose process philosophy was particularly important as an intellectual underpinning of Doriot's approach to the management of ARD.[61] Another possible influence was Elton Mayo, who, although formally affiliated with the School of Business Administration, distanced himself from its activities.[62] Moreover, as a member of the Pragmatist movement in business education, Doriot endorsed the view of "knowledge as always incomplete and consequently advocated the need for constant observation and learning from events."[63]

On a more mundane level, Doriot participated in the Business School's teaching and research activities. On Donham's request, in 1928/1929 he taught Business Policy, a course mostly concerned with the "social aspects" of business, together with Melvin Copeland, a Professor of Marketing and a devoted advocate of the case method; during the late 1920s' aviation boom, he participated in the School's research effort, studying the aircraft industry together with the Finance Professor Cecil Eaton Fraser who authored one of the School's first collections of teaching cases.[64] Finally, although his Manufacturing course initially was "bent towards the factory matters," Doriot emphasized the fieldwork component from the outset, assigning his students to local plants in which they were supposed to spend one day per week in the second term, studying the managerial problems to develop

---

[61] Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)."

[62] Richard Trahair, *The Humanist Temper: The Life and Work of Elton Mayo* (New Brunswick, US: Transaction Books, 1984).

[63] Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)," 260.

[64] See Cecil Eaton Fraser and Georges F. Doriot, *Analyzing Our Industries* (Doriot. New York: McGraw-Hill, 1932); Muniesa, "Setting the Habit of Capitalization: The Pedagogy of Earning Power at the Harvard Business School, 1920-1940." The aviation boom was spurred by Charles Lindbergh's transatlantic flight in 1927. The stock market interpreted it as a sign of reliability and commercial profitability of aircraft industry. While Fraser was more interested in the stock performance, Doriot, leveraging his industry connections developed during his time in New York, maintained extensive correspondence with several dozens of the newly emerged aircraft companies, collecting technical characteristics of the engines and operating data. See Graduate School of Business Administration, Memorandum from Ruth Sanborn to Mr. Bowser and Mr. Lowell, February 11, 1950. Georges F. Doriot aviation research, circa 1929. Box 1 Folder 5. Georges F. Doriot research collection, Arch GA 19. Baker Library Special Collections, Harvard Business School; Secretary to C.E. Fraser to Adams & Peck, March 13, 1929; Adams & Peck Investment Securities to Mr. C.E. Fraser, March 14, 1929. Georges F. Doriot aviation research, Feb.-March 1929. Box 1 Folder 2. Georges F. Doriot research collection, Arch GA 19. Baker Library Special Collections, Harvard Business School. In 1929/1930, Harvard Business School produced a casebook on aviation based on research funded by the Guggenheim grant. One of Doriot's students was Herbert Hoover, Jr., an engineering graduate of Stanford University, who took Doriot's Manufacturing course and was among the few students who submitted theses devoted to the aviation industry. In 1928 Hoover, Jr. was hired by Western Air Express, where he quickly rose to the position of chief engineer, and later became the first President of Aeronautical Radio, Inc., making his way to the *Time* cover. Other theses included the studies of air traffic, aviation's position within the larger transport industry, and a study of the production problems of the Curtis Aeroplane and Motor Company, Inc. See Herbert Hoover, Jr. Report on Commercial Aviation and the Airplane Industry, 1927; and Recent Theses on Aviation Submitted in Manufacturing Course. Georges F. Doriot aviation research, Feb.-March 1929. Box 1 Folder 2. Georges F. Doriot research collection, Arch GA 19. Baker Library Special Collections, Harvard Business School.

"constructive suggestions" for their solution.[65] The exercise was supposed to train students in the application of the methods of management control to "a specific problem under a particular set of conditions."[66] Subsequently, Manufacturing became a platform in which Doriot could develop his ideas on business and, from 1946 onwards, venture capital. Moreover, through Manufacturing, Doriot exerted his influence on several generations of American business leaders, including many of the pioneering venture capitalists. By the 1950s, the course structure and contents had stabilized, along with Doriot's teaching routines, exhibiting many of the ideas he was exposed to during the 1920s and developing them further.

Doriot's Manufacturing Course

Doriot's Manufacturing course left a lasting legacy at the HGSBA and is remembered by his students as the only course that did not follow the case system.[67] Nevertheless, as shown by Giraudeau, Doriot was significantly influenced by Wallace B. Donham and other colleagues who advocated the case method of instruction as an educational vehicle embedded in a set of broader concerns about the proper place of business in society and the specificity of knowledge required for executive decision-making. As Giraudeau points out,

> Doriot… embraced the case method, to the point that he exported the method to France, by initiating the creation of the Centre de Préparation aux Affaires at the Paris Chamber of Commerce, and then INSEAD. Like Donham, Doriot believed in the merits of non-standardized approaches to specific business situations, and of broad analysis at the crossroads of numerous disciplines, rather than within the closed bounds of unique theories.[68]

Thus, even though Doriot's apparent deviance is vividly remembered by his former students, he appears to have conceived the Manufacturing course as an extension of the School's case system. As stated repeatedly in his teaching notes, "total work of the course is a form of 'case system'."[69] In June 1952, Curtis Tarr, leaving his position of a personal assistant to Doriot, left an elaborate instruction for his successor, explaining that:

> Manufacturing stands as a bulwark for the lecture system in the valley of preference for the case system. Though I never felt that I had to justify this difference, I did seek to understand it. Here at the School teachers started using cases long ago. The case probably became popular as a means of demonstration. It never found use here as it has in the Law School where court decisions become the framework for legal wisdom. We have never referred to previous cases with much vigor. In business the decision had to

---

[65] Interview with Doriot by Aulikki Olsen.

[66] Instructions for Field Work, Spring 1926. Factory Problems and The Taylor System. Half Course. First Half Year, 1925-1926. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 1 Folder 3, Baker Library Special Collections, Harvard Business School.

[67] E.g., see: Peter O. Crisp, "Venture Capital Greats: A Conversation with Peter O. Crisp," interviewed by Carole Kolker on October 21, 2008, in Mill Neck, New York (National Venture Capital Association, Arlington, Virginia, 2009), pp. 21–22.

[68] Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)," 266.

[69] G.F. Doriot document "Re Manufacturing Class Notes," May 1974, HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

> stand on the facts of the current situation. Yet the real thinking behind the use of cases came later to this School.[70]

By this "real thinking" Tarr referred to the educational philosophy of the HGSBA, explaining it as follows: since "all knowledge comes from experience," "the decision which the student makes in handling the case becomes another experience which he can use when he faces the live situations in business."[71] Tarr attributed the general idea of this approach — that, despite the conventions of the English language, "knowledge by acquaintance" cannot substitute "knowledge by experience," even though both are covered by the same term — to Elton Mayo.[72] In his programmatic book, *The Social Problems of Industrial Civilization* (1945), Mayo endorsed this distinction as previously formulated by William James.[73] Before coming to Harvard to earn his fame for the Hawthorne experiments analysis, Mayo pursued a career in philosophical logic, advocating the merits of the exercise of inductive judgment. In the paper titled "The Limits of Logical Validity" he defended the usefulness of deductive reasoning ("formal logic") by arguing that it can only attain its validity within the limits of inductively generated classifications: thus, a syllogism is valid only if its terms are clearly defined within such classification.[74] More specifically, Mayo suggested that "the unit of knowledge and meaning is the judgment" that is decisively context-dependent; however, "since symbolic formulae are habitually employed to denote the various species of judgment, it is commonly assumed that the logical possibilities of, for instance, the formula S is P may be discussed without reference to any particular context."[75] Yet it was the context that mattered most in the business decisions, necessitating a training procedure that would stress the lived experience of "business situations" in class, educating students to classify them inductively by judging on the nature of the case at hand before proceeding with the methods of formal reasoning. Whether or not Doriot was aware of this argument, his approach could well be described in similar terms, as Tarr went on to suggest:

> The outline of the Manufacturing course does not mean that Professor Doriot disagrees with the advantages of the case system. It does mean that he believes another way exists to provide instruction for students. His comments are designed to help the listener readjust his views on situations he has faced in the past and to help the listener seek a frame of mind with which he can face the future. Certainly many speakers, teachers, and ministers have attempted to do the same thing.[76]

---

[70] Curtis Tarr to Ralph Barford. Memo re: Notes on the Duties of the Assistant to Professor Georges F. Doriot, June 1952. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 1 Folder 6, Baker Library Special Collections, Harvard Business School.

[71] Tarr to Barford. Memo re: Notes on the Duties of the Assistant to Professor Georges F. Doriot, p. 1.

[72] Tarr to Barford. Memo re: Notes on the Duties of the Assistant to Professor Georges F. Doriot, p. 1.

[73] Elton Mayo, *The Social Problems of Industrial Civilization* (Boston, Mass.: Graduate School of Business Administration, Harvard University, 1945), 15–16; William James, *The Principles of Psychology*, vol. 1 (London: MacMillan and Co., Ltd, 1890), 221.

[74] Elton Mayo, "The Limits of Logical Validity," *Mind* XXIV, no. 1 (1915): 70–74.

[75] Mayo, "The Limits of Logical Validity," 70.

[76] Tarr to Barford. Memo re: Notes on the Duties of the Assistant to Professor Georges F. Doriot, p. 2.

As an attempt to achieve the purposes of the case teaching through lecturing, Doriot's Manufacturing course was a peculiar hybrid. Despite the title, it was not "a course about making anything; it was a course about his ideas about business and his philosophies," part of which some of the students perceived as "just plain baloney."[77] Even though the course did have a formal structure that stabilized by the end of the 1950s, it exhibited only a superficial similarity with the conventional structure of industrial management courses of the time. Thus, the classic handbook on the subject by Richard H. Lansburgh and William H. Spriegel, first published in 1923, focused on such issues as management decisions, plant location, types of organizational structure and industrial relations, proceeding through a sequence of topics that began with the plant "as a tool of management," the product, personnel relations and wages, culminating in the discussion of managerial control and operations.[78] Doriot, on the other hand, divided his lectures into eight big topics with somewhat ambiguous headings such as (1) Framework; (2) Seeking Advice; (3) Research and Development; (4) Analyzing a Company; (5) Organization; (6) Purchasing, Engineering, Production and Sales; (7) Cost, Volume, Quality; (8) Studies of Various Industries.[79] For example, under the rubric of "Framework," Doriot would discuss such items as "definitions," including "conception of a business," "conception of how to manage" and "management problems," "problems of information" and a variety of "frames" in which the conduct of business occurs — international, national, technical, social, and so forth. When talking about the "development of a management (operating) team," he would address the "inside" and "outside" aspects thereof: first, the "problem of credit," personal and business; second, what in today's language might be called networking: "advice, guidance, help, services," considered from the point of view of "giving — getting" or "seeking — using." With "Manufacturing" serving as a "great big tent,"[80] Doriot offered the students "his philosophy of life,"[81] which was valued by the School's administration and the student body.[82] The students often referred to the course as simply "Doriot"

---

[77] In the words of Franklin P. Johnson. Johnson recalls that Doriot advised his students to never trust a man who wears a bow tie, or how one should read the *New York Times* in ten minutes, starting with obituaries, because only an accomplished person deserves to have an obituary (rather than a mere "me too" mention) and it is important to learn from the example of such individuals. The "art" of reading the *New York Times* was given much attention in Doriot's classes, where he would skip the sports section as something "not important" and focus on the business affairs and international relations instead. See Franklin P. Johnson, "Bay Area Venture Capitalists: Shaping the Economic and Business Landscape" conducted by Sally Smith Hughes in 2008 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), p. 8.

[78] Richard H. Lansburgh and William R. Spriegel, *Industrial Management* (London: John Wiley & Sons, Inc.; Chapman & Hall, Limited, 1940).

[79] Curtis Tarr to Ralph Barford. Memo re: Notes on the Duties of the Assistant to Professor Georges F. Doriot, June 1952. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 1 Folder 6, Baker Library Special Collections, Harvard Business School, p. 2.

[80] Walter J. P. Curley, "Venture Capital Greats: A Conversation with Walter J. P. Curley," interview by Carole Kolker, March 24, 2010 (National Venture Capital Association, Arlington, Virginia, 2009), pp. 28–29.

[81] William H. Draper III, "Venture Capital Greats: A Conversation with William H. Draper III," interview conducted and edited by Mauree Jane Perry, October 2005 (National Venture Capital Association, Arlington, Virginia, 2009), p. 9.

[82] The School's teaching surveys over the period from 1952 through 1963 consistently show that most of Doriot's students considered the course to be of "general", rather than "special" interest. This attitude to Doriot's teaching is most evident in those years when the question included four answers ("special," "mostly special," "mostly general," "general"): in 1957, 77% of the students surveyed answered that they considered Manufacturing as being of "general interest," and another

or "free enterprise," which was considered his "holy grail."[83] *Harbus News*, the HGSBA's student newspaper, reported in 1952 that most of them thought of Manufacturing as "more a course in business philosophy and top management policies for effective company operation," and "a must for all students regardless of their field of endeavor."[84] Even though he did not teach "any particular business school practice," like accounting or investment management,[85] it was thought that Doriot "tied together… much else that has been learned in other courses," with the course being "not so much a course in production as a course in Professor Doriot's experience, viewpoints and comments upon the business world."[86] Still, despite some controversy around Doriot's abandonment of the case method and heavy workload, most students rated the course "excellent" and regarded it as valuable in, at least, three ways:

> First, General Doriot's lectures give the student the benefit of a great deal of personal advice on how to operate a business and how to conduct himself in the business world. Second, the course provides experience in working as part of a seven- or eight-man group for a full year. Third, the course provides an opportunity to work closely with the managements of several companies in the Boston area, as well as an opportunity to investigate and write a group report on some special topic which may be of importance and interest in the future. "Operations Research," "Automation" and "The Automobile Industry" are examples of topics that some of the groups chose this year.[87]

Even though not universally popular, Doriot was able to impress those students who took Manufacturing with his charismatic style of lecturing and the heavy workload in the second part of the course that consisted in preparing a

---

17% replied "mostly general" (77% and 19%, respectively, in 1958; 12% and 88% in 1959; 5% "mostly special" and 95% "mostly general" in 1962). See *Harbus News*, May 1, 1952; *Harbus News*, May 1, 1953; "Course Evaluation," *Harbus News*, April 30, 1954; *Harbus News*, April 29, 1955; "Second Year Courses Rated by Students," *Harbus News*, April 20, 1956; "Survey Lists 43 Courses," *Harbus News*, April 26, 1957; *Harbus News*, April 25, 1958; *Harbus News*, April 24, 1959; *Harbus News*, April 30, 1960; *Harbus News*, May 5, 1961; *Harbus News*, May 4, 1962; *Harbus News*, May 10, 1963. Harbus News ratings. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 1 Folder 1, Baker Library Special Collections, Harvard Business School. Thomas Perkins and William Draper III also refer to Doriot's popularity among the students, see Thomas J. Perkins, "Oral History of Thomas J. Perkins," conducted by John Hollar, July 22, 2011, San Francisco, California (Computer History Museum, Mountain View, California, 2012), p. 5; William H. Draper, III, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," oral history conducted by Sally Smith Hughes in 2008 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), p. 9.

[83] Walter J. P. Curley, "Venture Capital Greats: A Conversation with Walter J. P. Curley," interview by Carole Kolker, March 24, 2010 (National Venture Capital Association, Arlington, Virginia, 2009), pp. 28–29.

[84] *Harbus News*, May 1, 1952. Harbus News ratings. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 1 Folder 1, Baker Library Special Collections, Harvard Business School.

[85] Thomas J. Perkins, "Oral History of Thomas J. Perkins," conducted by John Hollar, July 22, 2011, San Francisco, California (Computer History Museum, Mountain View, California, 2012), p. 5.

[86] *Harbus News*, May 1, 1952; "Course Evaluation," *Harbus News*, April 30, 1954. Harbus News ratings. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 1 Folder 1, Baker Library Special Collections, Harvard Business School.

[87] "Course Evaluation," *Harbus News*, April 30, 1954. Harbus News ratings. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 1 Folder 1, Baker Library Special Collections, Harvard Business School.

company report, based on a field study of local companies, and a more speculative topic report that concerned long-range technological and economic forecasting. While the lecturing part was supposed to "give the student a good general background into the problems a manufacturer faces and a point of view for the manufacturer of the future to take," covering seven "general topics," in the eighth topic, "study of various industries," the background thus acquired was put to the test by exposing students to "some actual situations." As Tarr explained in his instructions, these situations "have the same effect on the student as would a case in another class," provided that the student makes the required mental effort.[88]

Doriot's division of the course had a more complex structure that evolved over the 1950s and took its final form by the mid-1960s. Thus, in the outline of 1965, he divided Manufacturing into four parts and explicitly deemphasized the first one, consisting of class lectures. The literal content of the topics covered did not matter for Doriot; instead, he stressed its applications and extension — "not a matter of what is said but of what it means, of what it suggests."[89] Parts three and four were concerned, respectively, with the "company studies" and the "topic reports," both of which embodied the key vocabulary of Doriot's philosophy. According to Giraudeau,

> Doriot was opposed to the notion of 'administration' altogether — regretting, for instance, that the term figured in the name of the Harvard school he taught at. But if Doriot rejected knowledge systems, and their application in business under the rubric of 'administration', he did like another term, 'operations'. He considered that an approach focused on operations would have some purchase on the constant shifts and uncertainties that business actors were confronted with, especially in smaller, newer, and/or more innovative entities.[90]

Thus, the purpose of the company studies was to help the students develop a "sense of operation" through a thorough exposure to the company's "daily activities," while the threefold aim of the topic reports stressed the nurturing of a "sense of the future," and such capacities as "looking in the future" ("imagination") and "fitting in" — socially, but also in the broader sense of adjusting to environmental changes broadly conceived. Sometimes Doriot also added the fifth part, consisting of "unexpected" group talks in class about the topic reports; this exercise was intended to train the students to "express themselves" and "to decide on worth-while topic and explain it in public" under time pressure.[91] However, it was the second part of the course — "self-improvement and development" — that overwhelmingly dominated the rest and received most of Doriot's attention when

---

[88] Curtis Tarr to Ralph Barford. Memo re: Notes on the Duties of the Assistant to Professor Georges F. Doriot, June 1952. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 1 Folder 6, Baker Library Special Collections, Harvard Business School.

[89] G.F. Doriot document "Manufacturing Course-1965. Outline of course by method," 1965. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

[90] Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)," 263–64.

[91] See G.F. Doriot document "Manufacturing Course-1965. Outline of course by method," 1965; G. F. Doriot document "Re: Class #14," 3 November 1958. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School. See also William H. Draper, III, "Oral History of William H. Draper III," conducted by John Hollar, April 14, 2011 (Computer History Museum, Mountain View, California, 2012).

planning the lectures. Indeed, the available evidence — administrative and planning documents by Doriot and his assistants, memoirs of the former students, and contemporary publications of the HGSBA — suggests that lecturing as such was of little importance both for Doriot and for his audience. As an academic teacher, Doriot hardly conformed to either a "subject master" or a "puzzler," to utilize the distinction coined by F.A. Hayek; rather, as hinted by Tarr, he resembled a teacher in a less formal sense bordering ethical or religious teaching, a teacher of "life," whose lectures conveyed an overarching ethos, rather than commented on specific topics.[92] Accordingly, the in- and out-of-class exercises operationalized this ethos, constituting a set of what Michel Foucault has called "techniques of the self" — aimed at attaining neither purity nor immortality, but at cultivating the "alertness of the future" and, above all, the ability to "pass judgment."[93]

One of Doriot's students and associates at ARD, Charles Waite, explicitly compared him to Peter Drucker, suggesting that many of the ideas attributed to the latter actually originated with the former.[94] Indeed, it is no coincidence that Doriot is quite often compared to Drucker, perhaps the first management theorist to attain a "guru" status, a spiritual leader rather than a narrowly professionalized expert. In this sense, both can be counted as belonging to the "experiential tradition in business pedagogy" that stresses "the importance of vitalist, existential, constructivist, almost epic ideal of business reality."[95] However, as distinct from Drucker's intellectual background of interwar European existentialist philosophy, Doriot was deeply influenced by a specific variety of vitalist thinking, emphasizing "the indeterminacy and 'vitality' of the business world."[96] Seen in this light, Doriot's teaching is indeed best described as an "extension" of the case system. If the latter was intended to simulate the lived act of decision-making in the classroom, assuming that this kind of knowledge cannot be derived from "acquaintance" but only from the actual (lived) experience, Doriot effectively suggested that the interaction could go in the opposite direction: "business" feeding back into "life." Put differently, in the Manufacturing course, "life" and "business" were continuous and

---

[92] On the distinction between "subject masters" and "puzzlers," see Friedrich A. Hayek, "Two Types of Mind," in F.A. Hayek, *New Studies in Philosophy, Politics, Economics and the History of Ideas* (Chicago: The University of Chicago Press, 1978), 52–53.

[93] Foucault, "Technologies of the Self."

[94] See Charles P. Waite, "Oral History of Charles P. Waite," conducted by Marguerite Gong Hancock, Ray Rothrock, February 16, 2017, San Francisco, CA (Computer History Museum, Mountain View, California, 2017). Ante suggests that Doriot might be even more deserving the "business guru" credentials than Drucker himself: "Doriot WAS larger than life and his ideas were just as radical and important as Drucker's, but Doriot was not a self-promoter… One major reason is that Doriot, unlike Drucker, never poured his ideas and visions into a book that could outlive him." See Ante, "Forbes's Robert Lenzner Gives Creative Capital 5 Stars!!!"; Ante, *Creative Capital: Georges Doriot and the Birth of Venture Capital*, xv. The extensive archival collections devoted to Doriot at Harvard Business School, from which this chapter benefited, are another testimony to the near-cult status of the French General in the business folklore.

[95] Fabian Muniesa, "The Live Act of Business and the Culture of Realization," *HAU: Journal of Ethnographic Theory* 7, no. 3 (2017): 359; on business vitalism, see also Muniesa, "Setting the Habit of Capitalization: The Pedagogy of Earning Power at the Harvard Business School, 1920-1940"; Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)"; Giraudeau, "The Business of Continuity."

[96] Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)," 264–66. On Drucker's intellectual genealogy, see Gilman, "The Prophet of Post-Fordism: Peter Drucker and the Legitimation of the Corporation."

coextensive, in accordance with the Whiteheadian vitalist philosophy underlying Doriot's thinking.[97]

For Doriot, self-improvement ultimately turned on the "main goal": "to build men."[98] As the business "problems" and "situations" change over time, "men" will have to learn "the method" of dealing with these changes, rather than specific techniques applicable to specific problems — here Doriot appears to be rephrasing one of the formulations of the rationale behind the case method which stressed the experientially developing "administrative capacity," evocative of Donham's "administrative science," or, in one of Doriot's preferred phrases, "executive ability."[99] On the other hand, the future changes result from the same general evolutionary processes which pertain to people as much as to the surrounding "frames." As shown by Giraudeau, having been influenced by Whitehead's process philosophy, Doriot approached the problems of business from an evolutionary point of view: in managing ARD, for example, he relied on "a number of intellectual guidelines designed to help employees crystallize what their sense of a given project was," which included:

> A number of 'curves' or 'chains' of 'evolution', which described the different paths that a human individual or a company could go through in their' lives'. ARD employees were invited to reflect on what the latent curve of a given individual or company was (rising? flat? falling?), and at what place on that curve the person or firm was currently (at the time of evaluation)—all with the purpose of answering the fundamental question: 'can individual and organization grow?'[100]

As evidenced by his teaching notes, in the Manufacturing course, Doriot utilized the same approach, referring to the necessity to anticipate and prepare for the period of "aging" in accordance with one's evolutionary curve.[101] Here, again, the "method" becomes central as a means to cope with the inevitable process of "aging" through continuous learning and self-developing. The "method," consisting of a series of techniques or "assignments" was geared to develop in the students a "sense of operation," an "inner steering mechanism" in the present, as well as imagination, a "capacity of looking into the future," in order to be able to "fit" into it — the latter expression connoting a clearly evolutionary meaning.

---

[97] Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)."

[98] See, for example, G.F. Doriot document "Manufacturing I – 1958-1959. Class I (continued)," 15 September 1958. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

[99] G.F. Doriot document "Class 16," 13 April 1959. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 9, Baker Library Special Collections, Harvard Business School; G. F. Doriot document "Curve of Evolution. Classification by Age," undated. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 8, Baker Library Special Collections, Harvard Business School.

[100] Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)," 270.

[101] G.F. Doriot teaching note for Class I of Manufacturing, September 1963. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

Looking into the Future

Like for other members of his generation, the two World Wars and the Great Depression, which destroyed his father's car business, were defining experiences of Doriot's life. Throughout his teaching career, as evidenced by his lecture notes, he remained profoundly preoccupied with the problem of foresight — of seeing the future coming ahead of time, constantly returning to what he called "accelerated social evolution" (notably, dating the beginning of this acceleration back to 1914). Living in such an environment required a constant exercise of anticipation, coupled with a purposefully nurtured readiness to abandon obsolete habits. In 1950, Doriot wrote:

> Evolution since 1914. Differences 1914 — 1953. Accelerated rate of change — evolution. Can we see evolution of our frames — resistance to change. We went through two wars — expected no change. Through long depression — expected no change. Through important technical development — expected no change. Still, all of these precipitates, accelerate social evolution.[102]

In his Manufacturing lectures, Doriot repeatedly warned the students about the "excessive belief" that "things in general will pretty much stay as they now are during their lifetime."[103] The problem posed thereby was not "so much to foresee the future in details but to recognize trends, their possibilities," constructive or destructive character, in order to interpret and evaluate them. Here neither economic forecasting nor science more generally were helpful.[104] What was needed, instead, was "a sense of operation," another key term in Doriot's philosophy, to be acquired by the company study, and an ability to "look into the future," to be developed through the topic report, the rationale of which was explicitly tied to the problem of "accelerated social evolution."[105]

The purpose of the company report was twofold. On the one hand, it was designed to help students get first-hand experience with manufacturing processes in a more or less narrow sense. More importantly, however, the company report was aimed at developing in the students a "feeling for the business," namely, a lived experience of competition from the point of view of an "operating unit" in a given industry which the report was supposed to convey "so alive that someone reading the report could enter the business with perspective."[106] The students, however, often struggled to understand this less tangible part of the exercise, although for Tarr, and likely also for Doriot himself, "this type of analysis" had "as much

---

[102] G.F. Doriot notes on "social evolution," October 1953. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 9, Baker Library Special Collections, Harvard Business School.

[103] G.F. Doriot notes on "social evolution," October 1953.

[104] G.F. Doriot document "Class #14," 3 November 1958. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

[105] G.F. Doriot document "Class 15," 17 March 1959. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School. On the "sense of operation," see Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)," 263–65.

[106] Curtis Tarr to Ralph Barford. Memo re: Notes on the Duties of the Assistant to Professor Georges F. Doriot, June 1952. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 1 Folder 6, Baker Library Special Collections, Harvard Business School, p. 3.

importance in their preparation for business as any other kind of preparation the School can give. It gives them background to ask the all-important question of themselves: "What must I do to compete?"[107]

This part of the coursework was to be done in small groups and meant to mobilize the students' capacities of "analysis, imagination, creation, action."[108] More specifically, it was intended as a direct analog to the case-based instruction used in other classes, "testing the student's background by posing for him some actual situations."[109] The company study aimed to develop "a sense of operation" through a field study of one of the local firms where the skills acquired in Manufacturing were supposed to find a point of application. As Giraudeau shows, Doriot disliked the word "administration," associating it with the rigidity of management systems, and preferred "operation," evoking a sense of self-generating organic movement. Developing "a sense of operation" and speeding up the students' evolution "toward the role of the effective operator" was one of the purposes of his Manufacturing course.[110] As he explained in his teaching notes, the goal was to "develop in men a sense of "operation" which has a dynamic connotation as opposed to "administration" which *at the present time* seems too often to convey a modern feeling of contemplation and button pushing."[111] Note the temporal qualifier — written in 1965, just a year before Doriot's retirement from teaching and thus reflecting his teaching philosophy in its most developed formulation, the emphasis on the relative novelty of the prevalent semantics of administration was probably intended as a criticism of the post-war rise of "administrative science."[112] To make sense of Doriot's reservations, the intellectual and institutional bifurcation of the post-war American business education must be recalled: as different from the "science of administration" promoted by Doriot's mentor Donham, the post-war "administrative science" was associated with formal modeling of decision-making processes, pioneered during the war and further developed, among others, by Herbert A. Simon at Carnegie-Mellon GSIA. Contrary to Harvard's endorsement of the separation between "administration" as policy determination based on experience and judgment, and Taylorist "scientific management," the new "administrative science" of the post-war period reflected the more ambitious project of "managerialization" and "scientization" of the intangible sphere of leadership.[113]

---

[107] Tarr to Barford. Memo re: Notes on the Duties of the Assistant to Professor Georges F. Doriot, p. 4.

[108] G.F. Doriot document "Manufacturing 1 and 2. General Outline 63-64," 1964. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

[109] Curtis Tarr to Ralph Barford. Memo re: Notes on the Duties of the Assistant to Professor Georges F. Doriot, June 1952. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 1 Folder 6, Baker Library Special Collections, Harvard Business School, p. 4.

[110] *Harbus News*, May 1, 1952. Harbus News ratings. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 1 Folder 1, Baker Library Special Collections, Harvard Business School.

[111] G.F. Doriot document "Manufacturing Course-1965. Outline of course by method," 1965. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School. Emphasis added.

[112] See Isaac, "The Human Sciences in Cold War America"; Ethan Schrum, "To 'Administer the Present': Clark Kerr and the Purpose of the Postwar American Research University," *Social Science History* 36, no. 4 (2012): 499–523.

[113] Knafo et al., "The Managerial Lineages of Neoliberalism."

It is likely that Doriot's emphasis on "operation" reflected his critical stance towards these new developments, of which he was well aware.[114]

One of the means to remain alert of the ongoing developments were the students' topic reports, which constituted a significant part of the Manufacturing coursework. To develop "a sense of the future," students formed groups of six to eight and analyzed the prospects of some industry or new technology for the next 10 to 15 years: high vacuum, automation, nuclear power, steroid hormones, new materials, computers ("electronic business machines") and even operations research in the 1950s. Doriot would give very little definition of the assignment and leaving his assistants to deal with the students' questions and frustration: "Professor Doriot literally wants to be surprised with the work of his students. Because of this, his assignments have no boundaries."[115] In May 1953, *Harbus News* reported that "Professor Doriot pointed out that in the past industry leaders who have read the reports have been surprised by the great ability to see the future exhibited by the students."[116] The completed reports were then available for purchase from HBS Publication was not encouraged, however. The purpose of the reports was to encourage and stimulate imagination, and thus it was desirable to avoid the tendency towards factual conservatism that inevitably resulted from the responsibility attached to the printed word. However, "wild ideas" were equally unwelcome:

> Basically, the Professor asks for a ten-year report dated ahead because it makes a man do a more careful thinking and calculating than it would if you asked him for a ten-year forecast. The forecast would have plenty of wild ideas. The unrestricted kind of imagination does not develop a student of business. When he takes this other point of view, however, he is much more realistic in his approach.[117]

The company and topic reports were Doriot's techniques of teaching the case method without relying on the actual classroom cases. While appreciative of the idea of experiential learning, Doriot seems to have disliked the "playing it safe" approach in which the "business situations" were simulated in the classroom. Ideas and knowledge presented in class "are more organized than it will be in business," having been prepared for the students in advance and presented in a form conducive for handling them:

> Even when using cases, the subjects are selected and presented to them. In business, they shall look and search. They will have to determine subjects of importance at the time. Determine sequence — emphasis. They will have

---

[114] For example, in 1954, a group of Doriot's students conducted a survey of 300 corporate executives at different hierarchical levels to investigate the impact and prospects of operations research. See John J. Caminer and Gerhard R. Andlinger, "Operations Research Roundup," *Harvard Business Review* 32, no. 6 (1954): 132–36.

[115] Curtis Tarr to Ralph Barford. Memo re: Notes on the Duties of the Assistant to Professor Georges F. Doriot, June 1952. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 1 Folder 6, Baker Library Special Collections, Harvard Business School, p. 3.

[116] "Technical, Industry Advances Covered by Student Reports", *Harbus News*, May 6, 1953. Harbus News ratings. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 1 Folder 1, Baker Library Special Collections, Harvard Business School.

[117] Tarr to Barford. Memo re: Notes on the Duties of the Assistant to Professor Georges F. Doriot, p. 3.

> to look for what they should be thinking about beyond what they are told to.[118]

The reports were thus intended to be more realistic than cases. However, their value was not merely instrumental: the sense of operation and the ability to see the future coming were intertwined with the more general concern of the Manufacturing course — self-improvement. Moreover, self-improvement tied together the "theoretical" and the "practical" parts of Manufacturing: the four parts of the course, as he wrote in the teaching notes, "must always be fitted together in their [the students'] minds. It is not really 4 independent parts, but a "whole" which is divided up for practical reasons... The same need for bringing such different parts or even forms of activity together will exist in life."[119] Finally, as conceived by Doriot, self-improvement was no less than a form of practical ethics — or a "technique of the self" concerned with preparing future businessmen for the daily exercise of freedom.

Turning Selves into Assets

As noted above, the sequence of topics covered in the lectures did not follow the convention adopted by thematically similar courses; according to one of Doriot's former students, "he would discuss any one of a number of things. It seemed random — it probably wasn't."[120] Thus, in his teaching notes Doriot himself stressed that the specific contents of the lectures did not matter, instead repeatedly and explicitly emphasizing the "method of work" over the subject of his course:

> Other subjects than the ones selected might have been picked. The time given to any particular subject is relatively unimportant and should vary according to epochs and students' backgrounds. The subjects must be well selected enough so that the desired methods can be applied effectively. The subjects selected might be considered as samples. Indeed new subjects, difficult to foresee now, others which can be foreseen now but do not seem acceptable as yet, many more cannot even be foreseen now, will undoubtedly arise in their [students'] lifetime, and it is hoped that the method advised at this time will still apply.[121]

In his teaching notes for Manufacturing, Doriot's "outlines by subject" were always accompanied by the much more detailed "outlines by method," characterized as "the most important"[122] and elaborating on the "work to be done — (School and

---

[118] G.F. Doriot document "Outline of the course," September 1963. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

[119] G.F. Doriot document "Note reference class #13," undated. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

[120] William K. Bowes, Jr., "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2008 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), pp. 6–7.

[121] G.F. Doriot document "Outline of the course," September 1963. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

[122] G.F. Doriot document "Outline of the course," September 1963.

life)," by which he invariably meant "self-improvement and development."[123] For example, in the 1958 outline, Doriot wrote that "these remarks do not merely apply to the course and their relationship to it — they apply to their lives as businessmen,"[124] later elaborating on this as follows:

> Every action taken in the course must have a business meaning. It must a valid, constructive worthwhile experience. The method of work suggested in this "outline by method," if properly understood and applied to the course, is equally adaptable to daily life. It is applicable to the home, family life, to the work in a company, and to the individual's life as a useful citizen.[125]

In 1965, he extended the "method's" possible field of application even further stating that it "should apply to individuals — groups — companies — products — business methods — nations, etc."[126] The outline "by method," centered around self-improvement, was meant to be a universally applicable technology of conduct: "Really it is not an outline of a course, it is a possible conceptual scheme, a possible attitude, a possible method of conducting one's life in the world of business. I cannot speak about worlds other than business but perhaps it might apply also."[127] Addressing an imagined audience of students in his teaching notes, Doriot stated the following reasons for the need for self-improvement: "business is difficult — competitive; this is not the only School of Business; up to now their work has been guided, they have been measured — graded; next year — on their own — lonely," facing the necessity of making ever more consequential decisions.[128] For Doriot, decision-making was as central to business as to life in general:

> Studying business means studying: art and ability, the skill, of making correct — profitable and competitive decisions. Making decisions exists in every form of human — business activity. It is the power to choose. It goes with opportunity and freedom.[129]

Developing the ability of "passing judgment" or making decisions was contingent on the possibility of choice and freedom of action, which, for Doriot, was identical with "free enterprise" and thus also competition.[130] However, like happiness, freedom — material, moral, or freedom of choice — was to be "re-deserved — regenerated every day."[131] Self-improvement towards a greater ability

---

[123] G.F. Doriot document "Manufacturing 1 and 2. General Outline 63-64," 1964. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

[124] G.F. Doriot document "Manufacturing 1 and 2. General Outline 63-64," 1964.

[125] G.F. Doriot document "Manufacturing 1 and 2. General Outline 63-64," 1964.

[126] G.F. Doriot document "Manufacturing 1 and 2. General Outline 63-64," 1964.

[127] G.F. Doriot document "Class 2. Outline of the course," 25 September 1961. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

[128] G.F. Doriot document "Class 16," 13 April 1959. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 9, Baker Library Special Collections, Harvard Business School.

[129] G.F. Doriot document "Class 16," 13 April 1959.

[130] G.F. Doriot outline of remarks, HBS Club of New York, Business Statesman Award, 3 May 1966. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 9, Baker Library Special Collections, Harvard Business School.

[131] G.F. Doriot document "Introduction to Class 14," undated. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 9, Baker Library Special Collections, Harvard Business School.

to make correct decisions and exercising the "power to choose" was a continuous exercise, reaching beyond the field of business narrowly understood. As a technology of daily "regeneration of freedom," it approached a technology of the self as defined by Foucault, permitting the students of business "to effect by their own means or with the help of others a certain number of operations on their own bodies and souls, thoughts, conduct, and way of being, so as to transform themselves" — in Doriot's case, to achieve the state of freedom, contingent on the ability to "operate and direct."[132] At the start of the Manufacturing course, Doriot framed this issue around the "problem of information":

> All information necessary or believed to be necessary is seldom available when one needs it — sometimes one cannot wait. Information one thinks is needed compared to what one wants or should want or can get. Ability — necessity to reach decision without all desirable or seemingly necessary information and with information of questionable value and accuracy.[133]

The process of decision making began with information — or perception, which, once accumulated, translated into experience. Further, and in line with the case method philosophy, experience allowed one to pass judgment, but also imagine the future on this basis. The development of this ability further translated into the task of "building men": the change of events will make specific methods of decision-making and experiences obsolete; hence the ultimate task of self-improvement was to sustain the ability to learn from it, to "operate and direct" in an environment of accelerating evolution.[134]

A member of the Pragmatist movement, Doriot relied heavily on the notion of habit. Part of the work of self-improvement was concerned with "acquiring good habits," considered not as a matter of discipline, but as that of "respect for oneself."[135] However, like for his senior Pragmatist colleague Cecil E. Fraser, for Doriot, habit was mutable and changeable by conscious effort and exercise.[136] He repeatedly stressed the need to improve "working and living" habits to ensure that there always is "a constant variation to the better from any daily required routine."[137] More importantly, however, a large part of business — and hence of life more generally — consisted, according to Doriot, in "acquiring good habits" throughout a life-long learning effort:

> Would like them not to feel that they are students. At least not in the accepted school sense of the word. In a way we are students during the

---

[132] G.F. Doriot document "Introduction to Class 14," undated. See Foucault, "Technologies of the Self."

[133] G.F. Doriot teaching note on "Methods – Attitude (Effect on one's self and on others)," undated. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 9, Baker Library Special Collections, Harvard Business School.

[134] G.F. Doriot document "Class 22," 5 May 1959. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 9, Baker Library Special Collections, Harvard Business School.

[135] G.F. Doriot document "Manufacturing Class #24," 12 May 1959. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 9, Baker Library Special Collections, Harvard Business School. On Doriot's Pragmatism, see Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)."

[136] On Fraser, see Muniesa, "Setting the Habit of Capitalization: The Pedagogy of Earning Power at the Harvard Business School, 1920-1940."

[137] G.F. Doriot document "Manufacturing Class #24," 12 May 1959.

> whole of our life. They should not feel that we are in class. We are at a business meeting, acquiring good business habits, discussing business and related subjects.[138]

Acquiring good habits was a matter of "tidying up" the students' "thinking and working habits, also their living habits" in order to "make their ordinary living and working easier, more logical, simpler, more effective" — for example, by learning "the art of taking notes," but also writing, watching for and noticing opportunities, among other things.[139] The general point of the exercise was to free up the mind towards the "difficult situations":

> There must be: a constant tiring mental effort all the time [...] Watch the importance of so-called simple things — the things we believe we know but really do not. Good habits liberate our minds for difficult situations — make living easier — more efficient.[140]

Again, acquiring habits was part of a total effort at self-improvement, within and beyond the classroom: in order to do well, one must have freedom of action, and acquiring good habits was a method of freeing oneself from the "untidy" ways of working and living that hinder action, as well as obsolete beliefs and habits that have become undesirable or inaccurate due to new knowledge or "the evolution of the person."[141] Doriot repeatedly stressed that

> We must acquire a pattern, to be improved as we go along, of course, but it is imperative that we have a pattern, or perhaps we may say "a set of habits" or a minimum code which is so much part of ourselves that operating under and within it more or less automatically gives us strength and frees our mind for forward thinking and action.[142]

Following the Pragmatist idiom, Doriot's self-improvement method was based on the recognition that people are creatures of habits. Therefore, an essential part of self-improvement was reflexive management of habits, or "pattern acquisition" process — getting rid of the "bad" habits, like believing that the future will always resemble the past and acquiring the "good" ones in order to detach the mental effort from the everyday matters and direct it towards the future. To this end, Doriot's primary technique of the self was the so-called "notebook assignment."

The first technique for self-improvement to be conducted individually was the "notebook assignment." Quite simply, starting with the very first classes, Doriot kept insisting that the students should exercise in the "art of taking notes," keeping a notebook and writing down their thoughts — both in order to catch potentially valuable ideas, as well as to free up the mind for actionable thinking. Like with the

---

[138] G.F. Doriot document "Manufacturing Class #24," 12 May 1959.

[139] G.F. Doriot document "Last Manufacturing Class," 17 May 1966; G.F. Doriot document "Manufacturing Class #24," 12 May 1959. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 9, Baker Library Special Collections, Harvard Business School.

[140] G.F. Doriot teaching note for Class I of Manufacturing, September 1963. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

[141] G.F. Doriot teaching note for Class I of Manufacturing, September 1963.

[142] G.F. Doriot document "Class 2. Outline of the course," 25 September 1961. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

company studies and topic reports, the "notebook assignment" provoked mixed reactions from the students. Designed to give the students "some momentum when they enter the business world," in the early 1950s it was received by most students "as a silly chore without a very good purpose behind it," as Tarr explained in the 1952 memorandum, calling for a better "marketing job" of promoting it.[143] In November 1958, Doriot observed that some of them "still do not believe in the notebook self-improvement idea. In most cases it is due to conceit that 'I am above that' attitude. They should postpone conceit until they are old enough to learn that it is not worthwhile."[144] Nevertheless, the assignment stuck, appearing in Doriot's course outlines up until his retirement.

The notebook was supposed to "mirror their [students'] thinking — their curiosity," "measure their intellectual and other progress," especially relative to the goals of the practice of self-improvement — "developing sense of responsibility and pride in their work."[145] Part of it was to be devoted to keeping contacts of other "men" to seek help, advice, and guidance, spilling over to the second major part of self-improvement — "picking men" and learning to be "picked by good men." Doriot conceived of self-improvement as both an individual and a group exercise. In one of his schemes, the individual was divided into two aspects: A, "as an individual," and B, "as part of a group." Accordingly, "self-improvement must apply to A as such and as part of B."[146] The notebook was a simple recording device to keep track of one's progress in self-improvement and "making contribution to one's self," while verbal communication served as a medium of intergroup relationships. Students had to learn to "pick men" to work for and with them, make contributions and recognize and create opportunities through communication.

A notable feature of Doriot's techniques of the self was his reliance on the language of accounting. For example, the notebook assignment was conceived as an exercise of "making an inventory" which would not only put on record the students' progress in self-improving but also reveal a pattern of evolution, on which it was then possible to act. As Doriot advised his students, "make an inventory as of today. Then watch it change. How and why. Then make a new one. Try to foresee. Get sense of evolution — direction. Guide your action accordingly. Prepare desirable inventory for the future."[147] While accounting has arguably become one of the currently privileged modes of "governing oneself and others," Doriot used it perhaps in the broadest sense, often imbued with explicitly moral meaning.[148] Thus, the second part of the work of self-improvement consisted in "understanding of assets and liabilities, credits and debits" — again, not in a narrowly technical sense, but as belonging to both financial and moral contexts simultaneously, reestablishing the

---

[143] Curtis Tarr to Ralph Barford. Memo re: Notes on the Duties of the Assistant to Professor Georges F. Doriot, June 1952. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 1 Folder 6, Baker Library Special Collections, Harvard Business School, p. 2.

[144] G. F. Doriot document "Re: Class #14," 3 November 1958. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

[145] G.F. Doriot document "Outline of the course," September 1963. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

[146] G.F. Doriot document "Outline of the course," September 1963.

[147] G.F. Doriot document "Outline of the course," September 1963.

[148] On accounting as a technology for governing oneself and others, see Mennicken and Miller, "Accounting, Territorialization, and Power."

link between the moral and the economic successes and failures, severed at the turn of the century.[149] First, not only companies but also people could be analyzed in accounting terms, as bundles of assets and liabilities; conversely, Doriot referred to the abstract accounting concepts as if they were living entities — speaking, for example, of "dead" and "living" assets. While the latter expression is not too distant a metaphor to convey the conventional meaning of these terms, Doriot seems to have had in mind a much more general approach: as he explained in 1960, "determination of assets and liabilities" pertained to:

> Men — Money — Ideas — Time — Timing. Assets and liabilities are relative — changing — shifting — hard to measure. What advantages and handicaps do they mean to us? What have we that others do not have? What have others that we do not have? To what extent? What can we do? Apply this thinking to individuals — groups — organizations — companies.[150]

"Men," or individuals, were likewise to be analyzed in terms of their "inherent and potential assets and liabilities," as well as evolution and development thereof: thus, an "abnormal" man would be able to "make assets out of liabilities" out of the sheer "drive" to succeed.[151] A similar kind of analysis also applied to one's self. In the various "outlines by method" prepared in the early 1960s, Doriot referred to "positive determination of assets and liabilities (personal ones)" interchangeably with "understanding and respect for commitments," playing with the polysemy of "commitment," spanning the financial and the moral realms:

> They committed themselves to the course. I committed myself to them. Commitments to their family — school — companies — nation. Respect for time. Proper use of time. (At 65 years of age they will have been fully committed).[152]

At that time, "much of their effective life will be behind them," which necessitated a prudent management of one's life in the present.[153] The moral commitment was conceived of as a commitment of resources, of the ultimate "capital" that consisted in the person's entire "life," and vice versa. Situated on the same continuous of life and its evolution, "men" and "organizations" were to be governed and improved by the same means: if "business is human activity — it is life itself — business and art of livin0g,"[154] then one could reasonably say that the

---

[149] See Liisa Kurunmäki and Peter Miller, "Calculating Failure: The Making of a Calculative Infrastructure for Forgiving and Forecasting Failure," *Business History* 55, no. 7 (2013): 1100–1118.

[150] G.F. Doriot document "Class #7," 23 February 1960. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 8, Baker Library Special Collections, Harvard Business School.

[151] G.F. Doriot document "Class #7," 23 February 1960. See also Doriot untitled teaching note, November 1964. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 8, Baker Library Special Collections, Harvard Business School.

[152] G.F. Doriot document "Manufacturing 1 and 2. General Outline 63-64," 1964; G.F. Doriot document "Manufacturing Course. Outline by subjects," 1965. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

[153] G.F. Doriot document "Class 1," 18 September 1961. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 7, Baker Library Special Collections, Harvard Business School.

[154] G.F. Doriot document "Class 16," 13 April 1959; G.F. Doriot document "Last Manufacturing Class," 17 May 1966; G.F. Doriot document "Manufacturing Class #24," 12 May 1959.

"best organization is one man."[155] This kind of reasoning allowed Doriot to extend his accounting metaphors to the realm of organizational life: "Is an organization an extension of that man or is it something else? Can there be a conception or feeling of an "organization" unless all members have the same goals, motives, conceptual schemes?"[156] For Doriot, the answer was "no": perhaps the very word "organization" pertained only to the military units, from which "there is no escape," but precisely this latter condition distinguished them from the "free enterprise." For the latter, the proper way of "governing oneself and others" would require an approach based on the recognition of the "power to do well" that comes with the "freedom of action."[157] Because individuals and organizations were continuous, with the transition from the former to the latter occurring without any radical break or rupture, the methods of governing oneself — by getting rid of inefficient habits and "automating" the efficient ones, but above all by imagining oneself as a bundle of "assets and liabilities" — pertained equally to the governance of organizations and companies. Referring implicitly to William H. Whyte's *Organization Man* (1956), Doriot suggested that perhaps "organization" as a "molding process" had to be discarded because it creates "organization problems even of organization man"[158]; a subtler approach, based on the "positive determination of assets and liabilities" was needed to govern the endless evolution of "men" and businesses.

Conclusion

In sum, Doriot's teaching appears to be an extension of the case method philosophy into a series of particular techniques of the self, pertaining to both business management and the conduct of life more generally. The "philosophy of business and life" that his Manufacturing course lecture notes reveal was based on the three major ideas that run through the entire corpus of Doriot's teaching documents. Martin Giraudeau demonstrated the origins of these ideas in Doriot's allegiance with the Pragmatist movement in business education and his endorsement of the vitalist metaphysics.[159] This chapter complements Giraudeau's insights by offering evidence of how these influences were articulated in Doriot's teaching. The problem of deciding — judging — stemmed from the necessity to anticipate the evolutionary trajectory of people and companies, determining the particular period of this evolution at the right time and the shape of the "curve" to be able to act upon it. With its emphasis on accounting metaphors, self-improvement was a means of making the "curve" — the "direction of evolution" visible and actable upon. The self-improvement techniques offered by Doriot were aimed at both representing the evolutionary tendencies and acting on them through the

---

HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 9, Baker Library Special Collections, Harvard Business School.

[155] G.F. Doriot document "Class #7," 6 October 1958. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 8, Baker Library Special Collections, Harvard Business School.

[156] G.F. Doriot document "Class #7," 6 October 1958.

[157] G.F. Doriot outline of remarks, HBS Club of New York, Business Statesman Award, 3 May 1966; G.F. Doriot document "Last Manufacturing Class," 17 May 1966; G.F. Doriot document "Manufacturing Class #24," 12 May 1959. HBS Manufacturing Class Notes, Book B1, 1927-1964. Georges F. Doriot papers, Mss:784 1921-1984 D698. Box 2 Folder 9, Baker Library Special Collections, Harvard Business School.

[158] See William Holley Whyte, *The Organization Man* (New York: Simon and Schuster, 1956).

[159] Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)."

acquisition (or abandonment) of habits. Based on an understanding of business and life as coextensive and continuous, they applied equally to the individuals who were primed to imagine themselves as bundles of assets and liabilities, as well as to groups and companies which could be managed in the same way. Likewise, the accelerating pace of evolution necessitated the application of the same approach to "governing oneself and others": neither static "administration," nor coercive "organization" were capable of anticipating the evolutionary changes in "men," "ideas," and "frames"; what was required instead was the development of a "sense of operation" facilitated by a variety of specific techniques.

Throughout his teaching career, Doriot occupied a strategic position at Harvard Business School, preserving and extending its "broad executive" approach at the time when the very same problems of governance — deciding under conditions of limited information and uncertainty — were increasingly addressed by formal mathematical tools like systems analysis or operations research. In this way, his importance for the formation of venture capitalism is related not only to his own pioneering experiences in "organized venture capital," but in the ability to articulate an "imaginary" — or a "spirit" — conducive for its project of capitalization.[160] Put differently, for several generations of business leaders, Doriot offered a set of descriptions to be applied to economic actions to motivate and justify them. If Peter Drucker can be counted as a "prophet of post-Fordism," Doriot may deserve the credentials of a "prophet of startups," in many ways prefiguring the kind of vitalism that saturates contemporary business education and practices.[161] By casting the problems of management in terms of an all-encompassing evolutionary process that could be made knowable and actionable through a set of "hybrid" accounting instruments, Doriot effectively offered a way of imagining and thinking about oneself and others as forms of capital — or, in other words, a way of "capitalizing" on the potentialities of individuals.[162] Thus, his teaching career can indeed be seen as an articulation of an "imaginary" or "spirit" of venture capitalism before the more "fitting" organizational instruments were in place. In this perspective, his actual career in venture investing amounts to an experiment — ultimately a "failed" one — with one of these instruments, a closed-end investment fund.[163]

[160] Appadurai, "The Spirit of Calculation."

[161] See Gilman, "The Prophet of Post-Fordism: Peter Drucker and the Legitimation of the Corporation"; Ante, "The Prophet of Start-Ups. An Unlikely HBS Professor Pioneers Modern Venture Capital"; on business vitalism, see Giraudeau, "The Business of Continuity."

[162] On accounting hybrids, see Miller, Kurunmäki, and O'Leary, "Accounting, Hybrids and the Management of Risk."

[163] Hsu and Kenney, "Organizing Venture Capital: The Rise and Demise of American Research & Development Corporation, 1946-1973."

Chapter III. Foot Soldiers of Capitalism

Let me emphasize once more that it was thanks to the spontaneous expansion of the economy, at the grass roots, that such business people were able to further their careers. They were carried along on the current. Even if there is a grain of truth in Schumpeter's theory of the spirit of enterprise, empirical observation nine times out of ten shows that the innovator was borne along on a rising tide.

Fernand Braudel, *The Wheels of Commerce*

The careerist's loyalty is rational and sincere. Capitalism works, especially for himself. The economic expansion and stability provided by corporate capitalism and bureaucratic states have been reflected in career development.

Michael Mann, *The Sources of Social Power*

Introduction

In January 1955, the 75th-anniversary issue of Yale Daily News, the college newspaper of Yale University, published a paper entitled "Modern Venture Capitalism," authored by John Hay Whitney, senior partner and founder of J.H. Whitney & Co. and a Yale graduate of the class of 1926. Later that year, the paper appeared in the Wall Street magazine, which introduced the author as a "well known experimental financier and philanthropist."[1] The paper opened with a cliché refutation of the Marxist argument about capitalism's eventual demise under the weight of its endogenously generated contradictions. Whitney observed that a century has passed since Marx "tolled the bell for our capitalist economy," and yet it continued to be "growing more robust all the time," creating new enterprises, products and services, increasing the standard of living, and producing "new concepts of social responsibility." Whitney further argued that the ultimate cause of this dynamism lay in the flexibility of the American economic system, enabling it to "bring the products of technological change so quickly to flower." The challenge was to match it with similarly flexible financial arrangements: "the more complex the product and the less aware the world is of how much it is missing by not having it, the harder it will be for the originator to finance his brainchild. This is the area in which venture capital is needed."[2]

Whitney continued by explaining that while the concept of venture capital was not new, in its distinctively modern form that took shape after Industrial Revolution, the connotation of speculative recklessness conveyed by the words "venture capital" was eliminated: "nothing could be more distant from the operating approach of the modern venture capital organization." The task of financing new industrial enterprises was beyond the interest of large corporations and financial institutions, concerned with "the careful husbanding of other people's money," but also beyond the reach of an individual investor engaged in small business financing, given that "the required sums are likely to be much larger, the investigation more intricate, and the degree of risk incalculably greater." Thus, Whitney argued, modern

[1] John H. Whitney, "Modern Venture Capitalism," *Wall Street*, 1955. John Hay Whitney and Betsey Cushing Whitney Family Papers, MS 1938, Series I, Box 213 Folder 2, Yale University Library Manuscripts and Archives, p. 33.

[2] Whitney, "Modern Venture Capitalism," p. 33.

venture capital could exist only as "a full-time job for an organization." The paper concluded with a summary description of a "handful of new venture capital organizations," whose operation Whitney described as "experimental." First, they were being run on a "hard-headed business basis," without a trace of altruism or philanthropy. Second, they were staffed with "specialists in the techniques of modern industrial management, research and development, factory organization, production, marketing, and all the other aspects of successful commercial operation." Third, the need for such experts was partly created by the excesses of taxation and regulation. And yet, Whitney concluded that "to suggest that the ultimate in diligence or in technical competence could guarantee a profitable outcome for every venture" would be foolish: "The investment of venture capital as practiced in these firms is still a test operation."[3]

By the time Whitney's article was published, the idea of venture capital was indeed not new, at least in the financial centers of the East Coast, like New York and Boston. The first appearance of "venture capital," in a sense roughly equivalent to Whitney's — as well as current — is conventionally traced back to the testimony of Lammot Du Pont, given before the Senate Committee on Unemployment in 1938.[4] Du Pont complained about the lack of a special kind of investment capital, the one to be put to work "without definite assurance that the funds will produce, at the outset, income commensurate with the commitment."[5] At the time, the idea of "venture capital" was mobilized by American investment bankers in their virulent critique of the New Deal financial and tax regulations. In their public rhetoric, "venture capital" was roughly equivalent to any "risk capital," from individual investments in common stock to the activity of company promoters. Since the 1930s through the aftermath of World War II, public appeals to "venture capital" were usually linked to a concern for the future of "private capitalism," unconstrained by the regulatory agencies of the increasingly powerful interventionist government that emerged out of the Great Depression.[6] What set Whitney's vision of venture capital apart from this discourse was his strong sympathy to the post-war American capitalism — the "new capitalism" of professional management, organized financial markets, and cooperative labor unions. In an unpublished paper written in the same period as his Yale Daily News article, Whitney described this "new capitalism" as a unique American achievement of the post-war decade and worried about its ability to sustain the accumulated momentum and continue "making sweeping adaptations to new ideas and institutions." American capitalism has survived an unprecedentedly severe depression and a world war, and its popular legitimacy was continuously backed by the rising standards of living. As different from the investment bankers in the 1930s, fearing that the very existence of "private capitalism" was under threat, Whitney's concern was whether this "new capitalism" — what some of his more academic contemporaries would refer to as "organized capitalism," — will be able to adapt to its own dynamism. It is in this context that Whitney conceived the proper

[3] Whitney, "Modern Venture Capitalism," pp. 34–35.

[4] See Reiner, "The Transformation of Venture Capital: A History of Venture Capital Organizations in the United States"; Kenney, "How Venture Capital Became a Component of the US National System of Innovation."

[5] "Two Kinds of Capital," *Wall Street Journal,* January 13, 1938, 35.

[6] This discourse is exhaustively reconstructed in the first chapter of Reiner, "The Transformation of Venture Capital: A History of Venture Capital Organizations in the United States." See also Kenney, "How Venture Capital Became a Component of the US National System of Innovation."

place for a "brand new institution," the venture capital company "specifically organized to put expert help and risk capital to work in new enterprises."[7] It this modern sense, venture capital was a "test operation," but, if successful, it could perform a function "of great usefulness both to business and to society."[8] In light of this vision, during the 1950s, Whitney repeatedly described himself in public as a "venture capital business" practitioner.[9]

Whitney's partners shared this thinking. In 1952, Fred Marinus van Eck, an associate at J.H. Whitney & Co. since 1950, argued that, despite its highly demanding nature, success was possible in venture capital investing, as judged by the criteria of "the free enterprise system, where the opportunity for profit is the justification for risking capital."[10] And yet, profit-making was only part of the original motivation that prompted Whitney to begin his venture capital operation in 1946. Three years after "Modern Venture Capitalism" appeared in print, Charles Wrede Petersmeyer, another partner of J.H. Whitney & Co., explained that, when Whitney came back from the war, "he decided he wanted to do something "worthwhile" with his funds. He felt he was in a position to take risks that others were not. He knew there would be new products, new processes, new companies that would grow as a result of the general stimulation of the economy in the post-war era."[11] Accordingly, Whitney divided his inherited fortune into income-generating investments, philanthropic activities, and venture capital, separating $10 million to establish J.H. Whitney & Co. as "a source of money" for "somebody with some good ideas that no bank will look at… somebody to build a better mousetrap."[12] Venture capital investing was supposed to be highly selective and restricted to the "worthwhile" projects — not necessarily "great money-makers," but something the partners could be "proud of when it's over," and Whitney was "deadly serious about that."[13] According to one of the partners, Walter Curley, J.H. Whitney & Co. — and the East Coast venture capital science more generally, — was run by "patrician thinking," only loosely coupled to the goal of making a return on investment commensurate with risk:

---

[7] "New Capitalism". John Hay Whitney and Betsey Cushing Whitney Family Papers, MS 1938, Series I, Box 213 Folder 2, Yale University Library Manuscripts and Archives, pp. 5–6.

[8] Whitney, "Modern Venture Capitalism," p. 35.

[9] See John H. Whitney, "Freedom Is Our Business." An Address by John Hay Whitney, 20th Annual New York Herald Tribune Forum, Waldorf-Astoria Hotel, October 22, 1951. John Hay Whitney and Betsey Cushing Whitney Family Papers, MS 1938, Series I, Box 211 Folder 10, Yale University Library Manuscripts and Archives; John H. Whitney, "The meaning of Modern Capitalism." Address delivered to the Fortieth Anniversary Dinner of the National Industrial Conference Board, May 17, 1956, New York City. John Hay Whitney and Betsey Cushing Whitney Family Papers, MS 1938, Series I, Box 213 Folder 1, Yale University Library Manuscripts and Archives.

[10] Fred M. van Eck, "Venture Capital Investing", May 7, 1952. John Hay Whitney and Betsey Cushing Whitney Family Papers, MS 1938, Series I, Box 213 Folder 2, Yale University Library Manuscripts and Archives, p. 7.

[11] Charles Wrede Petersmeyer, "The Potentialities and Pitfalls of Financing Small Enterprises," Transcript of the talk given before the American Management Association Seminar on The Small Business Investment Act of 1958. Savoy-Hilton Hotel, New York City, December 2, 1958. John Hay Whitney and Betsey Cushing Whitney Family Papers, MS 1938, Series I, Box 119 Folder 2, Yale University Library Manuscripts and Archives, p. 3.

[12] Walter J. P. Curley, "Venture Capital Greats: A Conversation with Walter J. P. Curley," interview by Carole Kolker, March 24, 2010 (National Venture Capital Association, Arlington, Virginia, 2009), p. 36.

[13] Petersmeyer, "The Potentialities and Pitfalls of Financing Small Enterprises," p. 2; Curley, "Venture Capital Greats," p. 37.

> [J.H. Whitney] had a very big amount of certain things he never wanted to do because of their nature, and other things he thought he should do. But he always said, "Whatever we go into, we're not going into this as philanthropy." He said, "I try to do plenty of that on the side. We're not giving any money away. We want to put it into things we can grow and make money, and when we do that, we can then put it into something else." So that's what we did. But it was run by patrician thinking. [...] Venture capital was this: You put your money into the venture; if you win and you make some money out of it, that money goes right into your pocket — your pocket. If you lose, you don't get your money back — it's gone.[14]

Other pioneering venture capital organizations established by the heirs of old moneyed families operated on similar principles. For example, the investment policy of Laurance Rockefeller, who also began his venture investing in 1946, building on his pre-war experience of backing early aviation ventures, was conceived in terms of "sponsorship" of the aircraft industry as a means for "furthering the political, social and economic welfare of the United States and of the world community."[15] However, unlike Whitney, Rockefeller, a noted philanthropist, did not make any public commitments to put venture capital investing on a "hard-headed business basis." Doriot's American Research and Development Corporation, the only venture capital firm not based on the family wealth, was likewise created as an attempt to couple pecuniary business activity with the "civic" purpose of supporting "constructive" ideas to foster the industrial development of New England.[16] As a publicly-traded closed-end fund, ARD had to face the challenge head-on: during the 1950s and the better part of the 1960s, Doriot struggled to convince the Wall Street that it was a profit-making business, rather than "a freak philanthropic enterprise dreamed up by a strange mélange of Harvard professors and State Street financiers."[17] Nevertheless, ARD's first dividends payment — "a modest twenty-five cents a share,"[18] — appeared only in 1954, and the corporation had to wait until 1960 to have its first public offering underwritten by a major investment bank, Lehman Brothers.[19] In other words, Whitney's characterization of venture capital as a "test operation" was well-timed: during the 1950s, its prospects as a commercial, profit-making activity were profoundly uncertain. The gap between Doriot's and Whitney's public pronouncements stressing organization, expertise and professionalism of the new venture capital firms, and their actual

---

[14] Curley, "Venture Capital Greats," p. 38.

[15] See Laurance S. Rockefeller, "Aviation investment policy," April 1, 1948. Peter O. Crisp papers, Mss:784 1946-2008 C932. Box 1 Folder 30, Baker Library Special Collections, Harvard Business School. Rockefeller's aviation policy was prepared in 1948 as a "general guide for venture capital and other investments in aviation and related activities," stressing the necessity of "fostering better international relations" and "accelerating acceptance of the principles of the United Nations and the concept of a World Community," subordinating private profit from venture capital to the task of "strengthening our National economy, welfare and security." See also Laurance S. Rockefeller, "Aviation and Related Activities. Resume of 1953 – Plans for 1954," 1953. Peter O. Crisp papers, Mss:784 1946-2008 C932. Box 1 Folder 31. Baker Library Special Collections, Harvard Business School.

[16] Hsu and Kenney, "Organizing Venture Capital: The Rise and Demise of American Research & Development Corporation, 1946-1973."

[17] Ante, *Creative Capital: Georges Doriot and the Birth of Venture Capital*, 135–36.

[18] "Risk, Incorporated," 10.

[19] Ante, *Creative Capital: Georges Doriot and the Birth of Venture Capital*, 165–68.

operating philosophies, permeated by "patrician thinking" and "civic-mindedness," remained wide open.

For J.H. Whitney & Co., "patrician thinking" eventually proved to be incompatible with the "hard-headed business basis" of operation endorsed by Whitney's article. In 1958, when Whitney temporarily abandoned the firm, having been appointed Ambassador to the UK, Petersmeyer openly admitted that, judged by the criterion of commensurability between risk and return, the firm's "batting average has not been particularly outstanding in the so-called small investment field."[20] By that time, J.H. Whitney & Co. has been in operation for 12 years and had 13 partners assisted by 20 supporting staff members, who carefully researched the incoming investment propositions. Nevertheless, the original idea of investing "only in new processes or new products" proved to be too ambitious even for a professional operation. Explaining that the firm had to broaden its investment policy to include "growth situations in growth industries" and refrain from investing in small-scale projects "still in the experimental or inventive stage" or in "somebody [who] comes in with an idea of a product he would like to make," Petersmeyer suggested that venture capital was hardly "suitable for the investor who may not be prepared to lose all of his money."[21] While J.H. Whitney & Co. performed better than what could have been achieved by investing its original capital in a portfolio of listed securities, Petersmeyer attributed the differences to the few "early successes," without which J.H. Whitney & Co. "may not have been nearly as venturesome, nor able to make the later major investments that have accounted for a large part of its growth."[22]

And yet, precisely during this uncertain period, an entire "formation" of future venture capitalists launched their careers. Unlike the founders of ARD, they were not acting out of a "civic spirit," and unlike Whitney and Rockefeller, they did not feel themselves "in a position to take risk others were not." Instead, they pursued opportunities for their own economic welfare and career advancement, some of which appeared as "measured risks," while others were simply "obviously" attractive. During the 1950s, people like Reid Dennis, William Bowes, William Edwards, Arthur Rock, Donald Lucas, William Hambrecht, Charles Lea, and Peter Brooke discovered the opportunity for intermediation between the emerging technologies and pools of financial capital across the country. As different from the heirs of the old wealth, like Rockefellers and Whitney, who struggled to reconcile their concern for social responsibility with the task of generating a return on investment commensurate with risk, and unlike the well-connected military-industrial elites, such as the founders of ARD and Draper, Gaither & Anderson, these people were coming from modest socio-economic backgrounds and began their professional lives by starting hierarchical careers in formal financial institutions. Occupying lower- and middle-level positions within these organizations, they participated in the intra-organizational divisions of labor and knowledge, acquiring categories and classificatory schemes that facilitated opportunity recognition. More specifically, these individuals found themselves favorably positioned between the emerging technology companies and the institutional pools of financial capital, pushing their careers into that direction. Based on their oral histories, this chapter

[20] Petersmeyer, "The Potentialities and Pitfalls of Financing Small Enterprises," p. 2.
[21] Petersmeyer, "The Potentialities and Pitfalls of Financing Small Enterprises," p. 12.
[22] Petersmeyer, "The Potentialities and Pitfalls of Financing Small Enterprises," p. 12.

will follow these individuals' careers through the major milestones, while at the same time, by way of a "middle-range contextualization," attempting to reconstruct the social conditions of post-war America that enabled their development.[23]

Generations and Social Trajectories

Several broad-based demographic and social-structural changes in post-war America enabled and facilitated the careers of these people. Born between the Great Depression and the end of World War II, they began their professional lives during the post-war economic boom and were able to reap many of its benefits, including the expansion of higher education, the broad shift in the employment destinations from blue-collar to predominantly managerial and professional jobs, moderately low levels of labor market competition and increased pay-offs from higher education, jointly enabling remarkably fast and successful movements through such milestones of early adulthood as education and early career. In short, the dominant trend of the decade was economic progress "that ultimately — in the 1950s and 1960s — shot millions of people into the ranks of the home-owning, high-consuming, ever-better-educated middle classes."[24]

The passage of the Servicemen's Readjustment Act of 1944, colloquially known as the GI Bill, has arguably been "the most significant development in the modern history of American education," creating "the most expansive system of social provisioning in the history of the country," rivaling the welfare projects of the New Deal.[25] The Bill offered a range of social benefits for the returning servicemen, including low-interest farm, home, and business loans, unemployment benefits, as well as access to higher education and vocational training, which turned out to be the most popular part of the benefits package.[26] Initially, the legislation offered payment for up to three years of instruction and additional financial support to cover room and board and attendant expenses. These benefits were used by 51% of the veterans who accounted for 49% of college enrollments in 1947.[27] By 1956, when the original GI Bill expired, 7.8 million veterans had used its educational benefits, with some 2.2 million having attended college or graduate school, and 5.6 million received vocational training in such fields as auto mechanics, electrical wiring, and construction.[28] Moreover, as the ascendant global military superpower, since 1945, the US has effectively never demobilized, creating a massive standing peacetime military force.[29] Thus, the GI Bill program was extended in 1952 to

---

[23] On "middle-range contextualization," see Isaac, "The Human Sciences in Cold War America."

[24] James T. Patterson, *Grand Expectations: The United States, 1945-1974* (New York: Oxford University Press, 1995), 64.

[25] Patterson, *Grand Expectations*, 65; Stephen R. Ortiz, *Beyond the Bonus March and GI Bill: How Veteran Politics Shaped the New Deal Era* (New York: New York University Press, 2010), 3, 188; Michael D. Gambone, *The Greatest Generation Comes Home: The Veteran in American Society* (College Station: Texas A&M University Press, 2005), 191–92.

[26] Suzanne Mettler, "The Creation of the GI Bill of Rights of 1944: Melding Social and Participatory Citizenship Ideals," *Journal of Policy History* 17, no. 4 (2005): 345–74; Gambone, *The Greatest Generation Comes Home*; Ortiz, *Beyond the Bonus March and GI Bill*.

[27] Ortiz, *Beyond the Bonus March and GI Bill*, 199–201.

[28] Mettler, "The Creation of the GI Bill of Rights of 1944: Melding Social and Participatory Citizenship Ideals"; Olson, Keith W., "The GI Bill and Higher Education: Success and Surprise," *American Quarterly* 25, no. 5 (1973): 596-610.

[29] David R. Segal and Mady Wechsler Segal, "America's Military Population," *Population Bulletin* 59, no. 4 (2004): 3–40.

accommodate the veterans of the Korean War, and in 1967 made permanently available for all honorably discharged servicemen who spent no less than six months in the Army, Navy, Marine Corps, Air Force and Coast Guard.[30] Until the Vietnam War, for an entire generation of Americans, military service records provided an otherwise unavailable opportunity for social advancement.[31]

More importantly, "what the war successfully accomplished, even before the GI Bill became law, was to bridge the gap between the general public and the university," increasing educational attainment and turning higher education from "a rare milestone in American life" into an obligatory passage point on the way to non-manual employment.[32] Again, the benefits of the GI Bill were crucial for these developments: calculated on a monthly, rather than on a monetary basis, they eased the costs of education for the veterans, allowing them to choose from a variety of American colleges and universities, including the elite Ivy Leagues institutions, thus promoting an overall democratization of their admissions in the immediate post-war years.[33] As summarized by Mettler, the GI Bill opened the doors of the country's top-tier academic institutions to many people previously denied this opportunity, including those coming from rural, working- and middle-class families, Catholic and Jewish religious backgrounds, as well as to the children of first-generation immigrants.[34] The influx of the GIs into colleges and universities also "jolted faculty and administrators, who had to reach out beyond the predominantly upper-middle-class young people whom they previously had served, to deal with older students, to offer married housing, to accelerate instruction, and to provide a range of more practical, career-oriented courses."[35] While Harvard, Yale, and Princeton had provided "the most prestigious academic ladder, training proportionately more leaders than any other undergraduate colleges in the United States" since their colonial beginnings, after World War II they had to "enter the talent search and offer more scholarship and financial aid," as well as to "broaden and diversify their student body in order to maintain educational leadership," allowing greater shares of immigrant and minority students to enter.[36] In turn, the increased access to higher education both pushed the academic standards and promoted meritocracy, spurring the search for talent and ability. Cold War political and social landscape "produced a trend toward meritocracy of the intellectual elite and briefly aggravated

---

[30] Harry Gehman Good and James Davis Teller, *A History of American Education.* 3rd Ed. (New York: Macmillan, 1973), 536.

[31] Elwood Carlson, *The Lucky Few: Between the Greatest Generation and the Baby Boom* (Dordrecht; London: Springer, 2008), 77–78, 84–85.

[32] Gambone, *The Greatest Generation Comes Home*, 65–66.

[33] Marcia G. Synnott, "The Admission and Assimilation of Minority Students at Harvard, Yale, and Princeton, 1900-1970," in *The Social History of American Education* (Illinois: University of Illinois Press, 1988), 313–32; Ronald Story, "Harvard Students, the Boston Elite, and the New England Preparatory System," in *The Social History of American Education*, ed. B. Edward McClellan and William J. Reese (Illinois: University of Illinois Press, 1988), 73–90; John R. Thelin, *A History of American Higher Education* (Baltimore: Johns Hopkins University Press, 2004).

[34] Mettler, "The Creation of the GI Bill of Rights of 1944: Melding Social and Participatory Citizenship Ideals."

[35] Patterson, *Grand Expectations: The United States, 1945-1974 (Oxford History of the United States)*, 69.

[36] Synnott, "The Admission and Assimilation of Minority Students at Harvard, Yale, and Princeton, 1900-1970," 313–14.

inequalities from the mid-1940s to the 1980s".[37] A telling illustration of these developments can be found in the words of John Kenneth Galbraith, who, speaking on the Harvard Class Day on June 11, 1975, was able to observe that "during his forty-one-year professional career at Harvard University… the greatest change for the better had been the conversion of its undergraduates from a slightly ludicrous aristocracy to a somewhat serious meritocracy."[38]

Increased educational attainment resulted in increased employment chances. On the one hand, the post-war economic boom witnessed an explosion of the corporate population, which grew at an average annual rate of 5.2% since 1950, "many times faster than the population of actual people."[39] On the other hand, as noted by Patterson, in the 1950s and 1960s, US employers competed fiercely for the few available young employees, driving up wages and accelerating promotions up the career ladder, so that "by the mid-1950s the average earnings of young men after a few years of graduation from college approached those of considerably older men," creating a situation in which "as never before, a college degree literally paid off."[40] As different from the three preceding generations, in which less than 25% of all men found careers as managers, officials, or in the professions, more than one-third of the male Americans born between 1928 and 1945 joined the new corporate organizations as managers or professionals, witnessing the "big jump" towards white-collar jobs that followed the turn-of-the-century transition from farms to blue-collar employment. At the same time, while most men began their careers immediately after school, most women found themselves employed in the "pink-collar ghetto of clerical jobs," or service occupations without much career prospects.[41] Likewise, the socio-economic effects of the GI Bill and the expansion of higher education more generally, were highly unequal, with the benefits accruing primarily to white male Americans while worsening the existing class, race, and gender cleavages in the US society.[42]

The "white-collar jump" accomplished by the post-war generation, marked a qualitative shift in the US social structure that can be described as the rise of the careerists. Of course, career employment as such was not new, having emerged in the 1870s with the increasing amount for clerical required by the bureaucratizing states and corporations, increasingly reliant on routinized collecting, storing, and recalling written records of the past and present activities, themselves contingent on discursive literacy. With the expansion of formal mass schooling, the clerical positions have become separated from more senior tasks, such as management, that, in addition to basic discursive literacy, required experience in "relating diverse pieces of information in an uncertain environment" and the skills "cultivated by modern secondary and tertiary education, either technical or searching for

---

[37] Allan C. Ornstein, *Class Counts : The Shrinking Middle Class* (Lanham, MD: Rowman & Littlefield Pub. Group, 2007), 171.

[38] Synnott, "The Admission and Assimilation of Minority Students at Harvard, Yale, and Princeton, 1900-1970," 323.

[39] Carlson, *The Lucky Few: Between the Greatest Generation and the Baby Boom*, 103.

[40] Patterson, *Grand Expectations: The United States, 1945-1974 (Oxford History of the United States)*, 313.

[41] Carlson, *The Lucky Few: Between the Greatest Generation and the Baby Boom*, 97–98; Michael Mann, *The Sources of Social Power: Volume 2: The Rise of Classes and Nation-States, 1760-1914* (1993; Cambridge: Cambridge University Press, 2012), 560–61.

[42] Ortiz, *Beyond the Bonus March and GI Bill: How Veteran Politics Shaped the New Deal Era*, 200–201.

relationships in a mass of empirical phenomena too large to memorize."[43] About 1900, there emerged a gap between managerial positions and other specializations like clerical work and sales, and between the "mechanical" and "intellectual" grades in the civil service; the first business schools were created in the US roughly in the same period.[44] After World War II, the expansion of secondary and tertiary education reinforced this separation, triggering a significant shift in the composition of the middle classes in the industrially developed countries.

Michael Mann provides a useful synthesis of the sociological debate on middle classes, distinguishing between their three fractions: the "petite bourgeoisie," owners of small, family businesses; the "careerists," waged or salaried employees moving up the corporate and bureaucratic hierarchies; and "professionals," "learned," collectively organized occupations licensed by the state.[45] In other words, while different in terms of the relations of production, the middling groups are integrated by their shared "segmental middling participation in the hierarchies of capitalism and nation-state."[46] Despite the internal distances between the "top" and "bottom" positions within each fraction, they are bound together by "anticipatory socialization" and the prospects of hierarchical mobility, reflected by the concepts of merit and achieved status.[47] Mann's core argument states that "industrial capitalist society has had a middle class for about a hundred years," although its composition changed over time.[48] By 1900s, one group — independent artisans, vital during the First Industrial Revolution — was proletarianized; by the mid-twentieth century, the same process also encompassed the clerical, sales and some technical jobs without career prospects which "became filled by women recruited from manual jobs or from outside the workforce (as female participation in education and the formal labor market grew)," who did not subjectively experience it as proletarianization.[49] In other words, throughout the twentieth century, the male-dominated middle class remained stable in its tripartite configuration. For example, the petite bourgeois remained firmly within the middle class, distancing itself from the working class after the proletarianization of artisans, declined only in relative proportions during the entire century, and unevenly across different sectors of the economy.[50]

Careerists, the other middle-class fraction identified by Mann, is most relevant for the present context. Mann defines careerists as white-collar workers, non-manual workers, managers, civil servants, salesmen, higher technicians, and other people "employed within, but mobile through, the hierarchical organizations

---

[43] Mann, *The Sources of Social Power: Volume 2*, 560–61.

[44] Mann, *The Sources of Social Power: Volume 2*, 561; Khurana, *From Higher Aims to Hired Hands.*

[45] Mann, *The Sources of Social Power: Volume 2*, 549–96; on professions, see also Andrew Delano Abbott, *The System of Professions: An Essay on the Division of Expert Labor* (Chicago: University of Chicago Press, 1988); for a critique of Mann's approach, see Erik Olin Wright, *Understanding Class* (London; Brooklyn, NY: Verso, 2015).

[46] Mann, *The Sources of Social Power: Volume 2*, 550.

[47] Mann, *The Sources of Social Power: Volume 2*, 570; see also Barbara Weinstein, "Commentary on Part I," in *The Making of the Middle Class: Toward a Transnational History. Radical Perspectives*, ed. A. Ricardo López and Barbara Weinstein (Durham, NC: Duke University Press, 2012), 107–21.

[48] Mann, *The Sources of Social Power: Volume 2*, 588.

[49] Mann, *The Sources of Social Power: Volume 2*, 561.

[50] Mann, *The Sources of Social Power: Volume 2*, 557.

of capitalist corporation and modern state bureaucracies" that distinguishes them from other classes and fractions. Most importantly, their "overall life chances are determined less by a single current job than by access to a career."[51] Mann rejects the notion of "managerial revolution" on the grounds that there is no significant difference in the goals and achievements of firms controlled by entrepreneurs and managers, supposedly oriented in different directions as a result of the separation of ownership and control. However, Mann's analysis allows to introduce several tentative generalizations. First, while the separation of ownership and control in corporations happened before World War II, in the US, management has become an *en masse* occupation during the post-war economic boom, following the shifts in the occupational structure. Second, and related, the middle class as a general category has been present in the West since the Industrial Revolution but went through several qualitative changes in its composition. Thus, following Mann, the "careerist" ascendancy can be safely located in the post-war US and interpreted as one of the most available openings for a social rise at that time.[52]

While the pioneering East Coast venture capital organizations endorsed the professionalization of management, their recruiting patterns remained relatively elite — in part because of their proximity to the prestigious educational institutions, like the Ivy League universities, and partly due to the character of the social networks in which the founders themselves were embedded. For example, the original team behind Laurance Rockefeller's venture capital operations included Joseph Richardson Dilworth, a graduate of Yale University and Yale Law School, who served as a lawyer and an investment adviser of the Rockefeller family; Harper Woodward, a graduate of Harvard College and Harvard Law School who worked in Pentagon procurement during the war; Thaddeus Walkowicz, an MIT PhD who spent 11 years in the Air Force, achieving the rank of a lieutenant colonel; and Randolph Marston, a graduate of Lafayette College who had a career with Chase National Bank in New York before joining Rockefeller.[53] Peter Crisp, the only new associate admitted during the first 15 years of Rockefeller's venture capital operation, also possessed a similar social profile, being a Yale graduate and a Harvard MBA, and having spent three years of service as an Air Force intelligence officer. More importantly, Crisp considered joining the Rockefeller venture capital operation as an opportunity to pursue his long-standing interest in philanthropic activities.[54] Similarly, at different stages of its history, J.H. Whitney & Co. counted high-ranking military officials, financiers, and politicians among its partners, while Doriot's ARD likewise had to rely on the Harvard Business School talent pool, as well as the extended networks of "Boston civic-minded elite."[55] However, during the 1950s, an entire "formation" of people with very different social origins began their

---

[51] Mann, *The Sources of Social Power: Volume 2*, 560.

[52] Cf. Weinstein, "Commentary on Part I."

[53] Peter O. Crisp, "Venture Capital Greats: A Conversation with Peter O. Crisp," interviewed by Carole Kolker on October 21, 2008, in Mill Neck, New York (National Venture Capital Association, Arlington, Virginia, 2009), pp. 8–9; "Dr. T.F. Walkowicz," *New York Times*, October 9, 1983, Section 1, 44. <https://www.nytimes.com/1983/10/09/obituaries/dr-t-f-walkowicz.html>.

[54] Crisp, "Venture Capital Greats: A Conversation with Peter O. Crisp," p. 8. See also Laurance S. Rockefeller remarks at Wings Club Distinguished Achievement Award, 1977. Peter O. Crisp papers, Mss:784 1946-2008 C932. Box 2 Folder 7. Baker Library Special Collections, Harvard Business School.

[55] Hsu and Kenney, "Organizing Venture Capital: The Rise and Demise of American Research & Development Corporation, 1946-1973."

careers in venture capital investing. Thus, besides the visibly privileged path to venture capital — through elite boarding schools like Andover, Middlesex, and Hotchkiss, and college years in Yale, Princeton, or Harvard — there emerges a parallel story of a social rise from modest beginnings. The remainder of this chapter follows the trajectories of a group of such "careerists" through the significant milestones of their careers, and up to the point of their entry into venture capital business.

Rising Tides

Arthur Rock was born in 1926 in Rochester, New York, to a "very poor household." His father was a Jewish immigrant from Russia, while his maternal grandparents, also Jewish, immigrated from Poland. The family owned a small candy store where Rock worked during his youth while attending a local public school. In his final high school year, Rock volunteered and spent one year in the US Army. When he completed the basic training program, however, the war already over. Having demobilized, Rock enrolled at Syracuse University on the GI Bill to study political science and finance.[56] Without the Bill, which Rock describes as "fantastic," the family would not be able to afford college.[57] Upon graduation, after a one-year stint in the accounting department at the New York-based Vick Chemical Company, Rock went to Harvard Business School, having solicited a recommendation from the dean of the business school at Syracuse who was formally affiliated with Harvard. The business school experience was an opening for Rock. While the interaction with the fellow students coming from privileged backgrounds was partly intimidating, it helped Rock realize "what was possible": "that there was another life! There's Wall Street and stocks and bonds and being CEO of a company," something he "really hadn't experienced or thought of, or had no way of knowing about."[58]

Having learned about "another life" of trading pits and boardrooms, at Harvard Rock also acquired some of the social graces necessary for finding one's way in this world: "the big contribution Harvard made to my life — the relationships and teaching me how to get along with all kinds of people. I didn't know all of these things were possible before HBS. I just lived in a much smaller world until that time."[59] With a Harvard MBA at hand, and as a person "not uninterested in money, unlike many of his peers going to manufacturing or consulting companies, Rock opted for Wall Street. In 1951, he accepted the offer from New York investment firm Wertheim and Company, eventually moving to the investment bank Hayden, Stone as a security analyst. Working in the research department, Rock was responsible for analyzing the emerging scientific companies in the East Coast and Midwest, where Hayden, Stone conducted its operations. The work of junior security analysts included field trips, in which people like Rock would visit the companies, meet "the scientists" running them, and try "to figure out what they are about, and then writ[e] it up for stock recommendations":

---

[56] Arthur Rock, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2008 and 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), pp. 2–5.

[57] Rock, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," p. 5.

[58] Rock, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," p. 9.

[59] Arthur Rock, "Interview with Arthur Rock," by Amy Blitz, March 2001 (HBS Entrepreneurs Oral History Collection, Baker Library Special Collections, Harvard Business School).

> It got sent out to customers of the firm to see whether they would buy stock in those companies that I recommended. […] Trying to figure out whether the business is going to grow, if it's going to be profitable, what the products are, what is their research going into, what kind of products, and I try to figure out whether they're economically feasible and try to evaluate the management at all times.[60]

Having developed a "natural affinity for technology-type deals" and "the people who were doing technology" whom he was finding "fascinating" and relatable, Rock started "doing quite a few small projects raising money for small technology companies," so that by the late 1950s, he enjoyed a reputation of Hayden, Stone's "science man."[61] In 1954, Herman Fialkov, by then the chief mechanical designer at the New York-based Radio Receptor Corporation, founded a new company, General Transistor, to manufacture germanium transistors and sell them to the defense contractor companies that procured the first digital computers for the US Army. Like Rock, four years his junior, Fialkov was a child of Jewish immigrants from Brooklyn and grew up on welfare during the Great Depression. He studied engineering at the City College of New York, served in the US Army Signal Corps during the war, and attended the Polytechnic University of New York on the GI Bill, graduating in 1951. Within two years since founding General Transistor, Fialkov and his colleagues made an employee buyout, and the company went public, with a representative of Hayden, Stone joining the board of directors.[62] Soon after, General Transistor arranged a private offering, whereby Rock became the company's "young contact person" at Hayden, Stone.

The experience was "quite positive — everyone did well" so that, when shortly thereafter he learned the eight engineers working for Shockley Semiconductor in California, were asking for help in finding new employment, Rock, being "only peripherally" aware of William Shockley's 1956 Nobel Prize in physics for inventing the silicon transistor, thought "that there was a possibility there."[63] The letter was sent by Eugene Kleiner, an engineer at Shockley Semiconductor, whose father had an account with Hayden, Stone, operated by a colleague who knew that Rock was partial to the small scientific companies so that if anyone were interested in helping the eight engineers, it would be him. Rock went to his boss at Hayden, Stone, one of the firm's partners, Alfred Coyle, suggesting that the proposition was worth a trip to California; Coyle agreed so much that they went together. Having met the scientists, Coyle and Rock suggested that instead of finding a new employment for the eight, they would help them start a new company, in which Hayden, Stone would acquire a stake. This proposition, according to Rock, was "extremely unusual."

---

[60] Arthur Rock, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2008 and 2009 (Regional Oral History Office, The - Bancroft Library, University of California, Berkeley, 2009), pp. 17–18.

[61] Herman Fialkov, interview by David C. Brock and Richard Ulrych in New York City, New York, Philadelphia, Pennsylvania, and Boca Raton, Florida, on 24 September and 23 November 2009 and 27 February and 28 June 2010 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript # 0667, 2010), pp. 2–8.

[62] Fialkov, interview by David C. Brock and Richard Ulrych, pp. 2–8.

[63] Arthur Rock, interview by David C. Brock in San Francisco, California, 9 October 2002 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript #0265, 2002), p. 3.

> It was so unusual that the first thirty-five companies we went to couldn't understand how it would work, how they would be able to set up a separate division in which the proprietors had a financial interest, how that would work with their present workforce, or how they would assimilate the whole thing. It was just beyond all their spheres of knowledge. […] My experience at General Transistor, certainly, gave me some confidence that what the seven of them wanted to do was highly doable. Silicon was a different medium, but it looked as though it had superior possibilities.[64]

Because of the novelty of such an arrangement, Rock encountered significant difficulties in finding a financial backer for the new company. He approached 35 corporations and was turned down by all of them, because they either feared the risks involved in the project, or were uninterested in the group's expertise, having started their own research programs in silicon, or lacked the necessary experience for structuring such a deal outside of their field of business.[65] Through a connection at Hayden, Stone, Rock was introduced to Sherman Fairchild, a wealthy entrepreneur and inventor, and a major stockholder of IBM Corporation, who agreed to finance the project.[66] In 1957, the "Treacherous Eight," as they became known thanks to Shockley's angry phrase, formed Fairchild Semiconductor, a pioneering silicon transistor manufacturer and an iconic Silicon Valley company, launching the business careers of Gordon Moore and Robert Noyce. Like for them, for Rock, the experience was defining:

> I started coming out to California, to not only see what was going on there, but I got interested in other kinds of companies here and that then opened my eyes to what could be done then out here. And so a couple of years later I left Hayden, Stone and formed the Davis & Rock partnership.[67]

The launch of Rock's venture capital career is a particularly visible example of the "careerist" trajectory: having begun from modest circumstances, Rock went through the major milestones of the "careerist" biography, from the GI Bill to white-collar employment on Wall Street, which enabled him to see the opportunities emerging in California. While Rock might have been unusually lucky, his path to venture capital is by no means unique. Moreover, at the end of the 1950s, the tide of innovation was rising not only in California. In many ways similar to that of Rock, the career of Charles Lea is a case in point.

Charles Lea was born in 1927 in Richmond, Virginia, to a family of modest means, went to public schools, and after graduation in 1945, was immediately drafted, serving two years in the infantry in Guam and Korea. Returning to the US, he enrolled in Kenyon College in Ohio on the GI Bill, later transferring to Cornell University. Shortly before his graduation in 1952, Lea was recruited by the New York-based chemical conglomerate W.R. Grace, where he began in the mailroom but soon was noticed by the head of the statistical department. "Knowing the

---

[64] Rock, interview by David C. Brock, pp. 3–5.

[65] Lécuyer, *Making Silicon Valley: Innovation and the Growth of High Tech, 1930–1970*, 135–36.

[66] Rock, interview by David C. Brock, p. 5. See also Christophe Lécuyer and David C Brock, *The Makers of the Microchip: A Documentary History of Fairchild Semiconductor* (Cambridge, MA: MIT Press, 2010).

[67] Arthur Rock, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2008 and 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), p. 27.

vocabulary" from his Cornell training in economics, Lea spent the next six months as a corporate statistician, preparing the background data for the board meetings and working "ungodly" long hours, because of the slow pace of mechanical calculations and typing machines. When W.R. Grace decided to cut on its office expenses, the department was reorganized, forcing Lea to return to the labor market. Following the advice of his former boss, Lea approached John Kingsley, the general investment officer of the Phipps family, who at the time was in charge of managing a $200 million portfolio with the help of a small supporting staff. By a stroke of luck, it turned out that Lea and Kingsley were connected through a mutual acquaintance in Pittsburgh; as a result, Kingsley hired Lea as a securities analyst, right before his promotion to be the president of Bessemer Securities Corporation.[68]

Bessemer Securities, or Bessemer Trust, was founded in 1907 by Henry Phipps, Jr. (1839-1930), the co-founder of Carnegie Steel.[69] As the company's second-largest stockholder, Phipps earned $48 for his share upon the company's sale to the US Steel Corporation in 1901, and in 1907 set up the trust to manage the proceeds, choosing the name after the inventor of the revolutionary steel process. In 1911, Phipps transferred a total of $4 million in stock and bonds from Bessemer Investment Company in the name of his children, thus creating a family trust and urging the children to maintain control over the company and conserve the inherited wealth. By 1953, when Kingsley became president, the firm was not trading in stocks, managing a portfolio of long-term investments of the Phipps family members. As Kingsley's assistant, Lea was initially responsible for overseeing various small holdings of the family members.[70] Through this work and his closeness to Kingsley, the president, he became embedded in the East Coast financial elite, including the senior members of the Phipps family and New York investment banking community. Moreover, working at Bessemer was for Lea an opportunity to hone his analytical skills and develop an expertise of risk evaluation, as he gradually began to "get a feel, after a while, what I thought the risks were in terms of what we were doing; from my limited experience I could see that some things didn't make any sense at all and some of them, relatively few, looked like they were pretty exciting opportunities."[71] As a younger associate, Lea's responsibilities also included field trips, some of which exposed him to the small scientific companies emerging around the nation's major scientific and technological hubs. Bessemer held convertible preferred stock in Farrington Manufacturing Company, a jewelry and eyeglass case manufacturer based in Needham, Massachusetts, that expanded into optical character recognition and electronics in the mid-1950s. Charged with overseeing this company, Lea had a chance to meet some of the scientists running the OCR business, as well as venture capitalists who were interested in it — in particular, William Elfers, Doriot's right-hand man at the ARD Corporation. Having spent eight years at Bessemer, Lea acquired "an education and a half" and became well-connected, so that in 1961, upon Kingsley's retirement, he was offered a partnership at a "small but prestigious firm," F.S. Smithers, allowing him to "commit the firm to anything they cared to."

---

[68] Charles L. Lea Jr., "Venture Capital Greats: A Conversation with Charles L. Lea," interviewed by Carole Kolker on October 10 and 11, 2008, in Easton, Maryland (National Venture Capital Association, Arlington, Virginia, 2009), pp. 13–30.

[69] See David Nasaw, *Andrew Carnegie* (New York: Penguin Books, 2006).

[70] Lea Jr., "Venture Capital Greats," p. 52.

[71] Lea Jr., "Venture Capital Greats," pp. 44–45.

While at Bessemer, Lea arranged a leveraged buyout of Acme Visible Records, a Virginia-based manufacturer of documents storage and retrieval equipment established in 1954, through which he met and "got very friendly with" Harold Geneen, then the senior vice-president of Raytheon, and David Margolis, Geneen's "chief young lieutenant" and Raytheon's assistant treasurer. Founded in 1922 by Vannevar Bush, Raytheon was a major US defense contractor, manufacturing weapons and military and commercial electronics. In 1959, Geneen became the CEO of International Telephone and Telegraph Corporation (ITT), and Margolis, following him, assumed the position of the ITT's treasurer. Margolis introduced Lea to David Kosowsky, his first cousin, who graduated first in his class from the City College of New York in 1951 and earned a PhD in physics from MIT. In 1961, Kosowsky suggested Lea to start a company based on Kosowsky's graduate work on piezoelectric sensor devices and crystal filters, in Needham, Massachusetts, where Lea made many connections through his involvement with Farrington Manufacturing company in the 1950s.

> So here I am this junior partner of Smithers on the back porch of this Jewish guy, who I'm very friendly with in Needham, Massachusetts. And Needham, as you may by now know, is one of my backyards, given that Farrington is right around the corner. So I go and raise the $750,000; and Dave raises parts from his little community; and I tap a couple of venture capital friends; and we get this company going.[72]

Lea went on board of the newly established company, Damon Engineering. Being run by Kosowsky and his scientist colleagues specializing in electronics, the firm secured government contracts and quickly turned profitable.[73] The company went public in 1968, underwritten by Lea's former colleagues from F.S. Smithers and the investment syndicate Whyte, Weld and Company, who initially refused to pay a 30 times price to earnings ratio demanded by Kosowsky. Damon Engineering's shares were offered at 15, opened at 30, and went to 45 at the end of the IPO's first day, launching Lea's career in venture capital, where he shifted from the generic investment banking field.[74]

Defiant Careerists

Part of the funding for Damon Engineering came from Bessemer Securities, where Lea was succeeded by Peter A. Brooke, whose trajectory can be described as one of a "defiant patrician." Born in 1929 in Worcester, Massachusetts, Brooke attended Fessenden grammar school and Phillips Exeter Academy, prestigious New England private schools, preparing for Harvard College, where he studied thereafter, from 1948 to 1952. In his final year at Exeter, Brooke attended Harvard's commencement ceremonies and was deeply impressed by the speech delivered by General George C. Marshall on what would later become the Marshall Plan.[75] In 1953, Brooke went to the Business School and enrolled in Doriot's Manufacturing course, which, however, he disliked, walking out of class in the middle of the lecture

---

[72] Lea Jr., "Venture Capital Greats," pp. 56–57.

[73] Lea Jr., "Venture Capital Greats," p. 61.

[74] Lea Jr., "Venture Capital Greats," pp. 76–77. See also "Damon Engineering Offering," *Wall Street Journal,* November 4, 1968, 35.

[75] Peter A. Brooke and Daniel Penrice, *A Vision for Venture Capital: Realizing the Promise of Global Venture Capital and Private Equity* (Hanover and London: New Venture Press and University Press of New England, 2009), xiii–xvi.

and developing a strained relationship with Doriot after that. Having graduated from HBS, Brooke was commissioned to the US Army, joining the Army Audit Agency in Baltimore, but was quickly transferred to Boston. Through his auditing work, Brooke first became exposed to the technology companies that worked on the government military contracts, auditing Raytheon and Sylvania. In 1956, after demobilization, he joined the First National Bank of Boston via an introduction provided by his father-in-law.

In the mid-1950s, First National "dominated the banking scene in New England" and controlled half of the region's banking assets.[76] At the bank, Brooke found himself bored, failing, and faced with a "bleak future." Being the 13th largest bank in the country, First National concentrated on building a national profile and shunned the risks of funding regional technological companies spinning-off from MIT, which for Brooke, influenced as he was by the vision of the Marshall Plan, seemed an "obvious" way to industrial recovery. Six months before he became an officer with the bank, the credit department head told Brooke that he had a limited future at First National and should consider something else. Being not a "highly regarded" employee and growing increasingly dissatisfied with the hierarchical career prospects ahead of him, Brooke decided to turn his inspiration with the Marshall plan and the conviction that lending to technological companies was an "obvious" way to reanimate the war-torn economy of Massachusetts into an opportunity to advance his career at First National — by demonstrating that it would also be "the source of growth for the bank."[77] At the same time, he met two colleagues in the Western Division of the bank, who shared the vision of the region's recovery through technology. Feeling that the idea needed some "intellectual underpinning," Brooke wrote a paper suggesting that the bank could segregate about $20 million of its loan portfolio and lend to the new technology-based businesses in the area with no assets to secure as collateral, except their contract with the government.[78] The argument worked, allowing Brooke to start "using the bank's money like it was venture capital, because there were hardly any assets to secure. The only thing that we had to take as collateral were the contracts from these small companies that were supplying research to the federal government."[79] Once a company reached the lending limit, Brooke acted as an intermediary, relying in his banking connections, and brought it to the family pools of venture capital in New York — the Rockefeller brothers, J.H. Whitney & Co., and Bessemer Securities, building himself a reputation that would allow him to join the latter firm in 1961 to run their venture capital operation. However, it is important to note that Brooke's strategy of getting access to the companies was mediated by the formal knowledge practices of the banking industry.

> I made a point of calling on virtually all of the companies in the technology area in the greater Boston area. I did that by accessing the SIC codes, the industrial codes of various companies in the electronics business, because that's what it was: the electronics industry was the industry that was springing out of MIT and Harvard in late '59 or '60 when I was able to win

[76] Peter A. Brooke, Venture Capital Greats: A Conversation with Peter A. Brooke," interview by Carole Kolker, April 6 and September 1, 2010, Boston, Massachusetts (National Venture Capital Association, Arlington, Virginia, 2010).

[77] Brooke, "Venture Capital Greats," p. 28.

[78] Brooke, "Venture Capital Greats," p. 18.

[79] Brooke, "Venture Capital Greats," p. 21.

> the account of Wang Laboratories for the bank [...] I had done a lot of research on the company that was available through Dunn and Bradstreet and also product literature. So I knew a little bit about it when I made those calls.[80]

Thus, at the same time as Arthur Rock and Charles Lea were doing the fieldwork for Hayden, Stone and Bessemer Securities, seeing with their own eyes what perhaps was not as easily visible from the commanding heights of large investment firms, Brooke was likewise trying to establish a direct contact with technological companies and convince them to become First National's clients by offering extremely favorable loan terms. In all three cases, however, the immediacy of direct observation was guided by the institutional practices of assembling and aggregating financial knowledge. If Rock, Lea, and Brooke were unusually perceptive, their ability to perceive was contingent on their embeddedness into the institutional divisions of labor and knowledge, and the proximity to the "rising tides" of technological innovation on which they capitalized resulted from their movements within organizational hierarchies.

The career of Donald Lucas resembles a similar pattern. Born in 1928 in Upland, California, to a Catholic family operating a commercial ranch, Lucas went to a local public school and studied economics at Stanford thereafter, enrolling on an athletic scholarship. Having graduated in 1951, he went to Stanford Graduate School of Business, where he specialized in finance. Stanford served as an opening for Lucas to make connections in the regional financial elite. His roommate and fraternity brother was Bill Witter, the son of Dean Witter, who worked at his father's firm; moreover, while at Stanford, Lucas had a chance to talk with Charles Blyth about a possible career on Wall Street, who refused to offer Lucas a job at his investment house and advised him to go to Wall Street instead.[81] After earning his MBA, Lucas got a direct commission to the US Army, served in the Occupied Germany during the Korean War. Upon returning, Lucas was told that the Wall Street investment bank Smith Barney & Co. had the best training program, applied there, and was accepted.[82] After the training, he began working for the senior partner, Charles Barney Harding, whose family owned a large share of the firm. At the corporate finance department, assisted by a secretary, Lucas assumed the role of a "statistician": he was responsible for doing the "grunt labor" of preparing the data for sales pitches conducted by partners to get new business for the firm. The work was "not creative" and consisted of comparisons of different companies based on the statistical data on their earnings, sales growth, profitability, and similar metrics collected from the auditing and accounting reports. While with Smith Barney, he met the head of the firm's Minneapolis office, Ken Joas, who brought to his attention the

---

[80] Brooke, "Venture Capital Greats," pp. 28–29.

[81] "Of course, he lived in a different place than I did [chuckling]. He went in a limousine to work and all that. I liked going to his club every so often. 14; In fact, while I was at Stanford, I had talked to Mr. Charles Blyth about going to Wall Street. And I said, "Well, how about coming to work for you, sir?" "Go back to New York and learn from the big boys." [chuckling] Well, I want to go back to Mr. Harding and whoever else came into the Smith Barney thing. I was the hardest worker in the department, and I got my work done". See Donald Lucas, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010), p. 14.

[82] Donald Lucas, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010), p. 7.

newly created Control Data Corporation (CDC), a Minneapolis-based computer memory company that spun off from Sperry Rand Corporation in September 1957. At that time, not unlike Boston's Route 128 and San Francisco Bay Area, Minnesota was emerging as a computing-centered industrial district.[83] When Lucas attempted to introduce the company's president, William Norris, to one of the senior partners of Smith Barney & Co., Charles W. Kennard, the latter replied that the firm was not interested in financing CDC.

By that time, Lucas was getting increasingly dissatisfied with his position and the prospects in the firm. He enjoyed the reputation of one of the best corporate finance analysts, but the presence in the elite club of investment bankers "got him going." During his time at Smith and Barney & Co., Lucas met William Barclay Harding, the brother of his boss, Charles B. Harding, who was an investment adviser of the Rockefeller family. Moreover, Lucas's classmate from Stanford was working for William B. Harding, and Lucas had a chance to learn about the Rockefellers' venture capital activities through him. Finally, Lucas "wanted to do more than comparisons," and saw the opportunities created by financing such companies as CDC, even though he was not specifically following the developments in the computing field:

> But then what really got me going was the Control Data Corporation. And here was this guy [who] had worked for the Navy and secret aspects of the government to develop new computers. So I thought this was a hot deal, and of course it turned out to be a very hot deal. And I bought 1,000 shares. And it went up, a lot of money [...] Computers, by definition, they had a good market, and I.B.M. sold at a stratospheric price even then. So this was a new computer, and it worked for the government. This was good. [...] That was enough. And this fellow — he had led the development. It's a simple story.[84]

Two years later, Ken Joas, the head of Smith and Barney & Co.'s Minnesota office, brought to Lucas another deal, also connected with Sperry Rand Semiconductor: in May 1959, a group of eight engineers, led by Dr. Bernard J. Rothlein, left the semiconductor division of Sperry Rand based in New York and founded National Semiconductor in Danbury, Connecticut.[85] Smith Barney & Co. refused to finance the startup, at which point Lucas decided to raise money privately, himself, still working for the firm.[86] Capitalizing on his Stanford connections, Lucas raised money from William Witter and his own parents' acquaintance from Minneapolis. Having arranged the financing, Lucas asked Smith and Barney & Co. if they would let him go on National Semiconductor's board of directors. However, the firm refused, worrying about its reputation, and Lucas decided to quit, forsaking the possibility of a career rise, but equipped with investment banking experience and Wall Street connections. In late 1959, he accidentally met one of the firm's investors, who told him about the formation of the

---

[83] Thomas J. Misa, *Digital State: The Story of Minnesota's Computing Industry* (Minneapolis: University of Minnesota Press, 2013).

[84] Donald Lucas, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010), pp. 12–13.

[85] Lécuyer, *Making Silicon Valley: Innovation and the Growth of High Tech, 1930–1970*.

[86] Donald Lucas, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010), p. 14.

Draper, Gaither & Anderson in Palo Alto, California. Once again, he was helped by a connection developed at Smith Barney & Co.: during his time in the training program, Lucas met Jack Schumm, whose father was an investment adviser to H. Rowan Gaither, one of the founders of Draper, Gaither & Anderson, the first venture capital limited partnership on the West Coast. As summarized by Lucas himself, "who cares about connections; we just create connections." After an interview with Gaither and General Anderson, Lucas joined the firm as a junior associate and the only person trained in finance.

Draper, Gaither & Anderson was founded in 1959 by a trio of high ranking and well-connected members of the military-industrial elite of the East Coast — General William H. Draper, formerly a New York investment banker and the US Ambassador to NATO, General Frederick L. Anderson, the youngest Major General in the US Air Force, who worked with Draper in NATO after the war, and H. Rowan Gaither, a Californian lawyer and a powerful administrator of the Ford Foundation, who served as assistant director of the MIT Radiation Laboratory during the war, helped found the RAND Corporation and authored the Gaither Report, an influential Cold War policy document.[87] Except for Lucas, the partners' junior associates came from similarly well-connected backgrounds; moreover, the firm's capital was provided by the Rockefeller family. However, while DG&A did indeed bring East Coast "funding and business practices, as well as strong military ties, into the service of western entrepreneurs," this "transplantation" of networks did not happen in an empty environment.[88]

Transplanted Networks

Unlike in New York, where venture capital emerged after World War II as a "patrician" business, continuous with the tradition of patronage of the entrepreneurs and inventors by wealthy families, in California, the heirs of family fortunes also invested in new enterprises individually. One of them was Edward Hellman Heller, a multimillionaire scion of a local banking dynasty, who "inherited" the vice-presidency of Wells Fargo bank from his father after the World War I.[89] Having graduated from Harvard Law School in 1923, he worked at Wells Fargo, quitting in 1925 while retaining his directorship. Since then, Heller became a stockbroker with a San Francisco-based brokerage and investment firm

[87] The report entitled "Deterrence and Survival in the Nuclear Age", also known as Gaither Report, was prepared by the Security Resources Panel of the President's Science Advisory Committee. H. Rowan Gaither chaired the panel at the time of the report preparation. Moreover, an outspoken Cold Warrior, Gaither published several papers on national security and the role of foundations in it. See US National Security Council, *Report to the President by the Security Resources Panel of the ODM Science Advisory Committee* (Washington, DC: United States National Security Council, 1957); H. Rowan Gaither, Charles Dollard, and Milton Katz, "Communication: Foundations in American Society and the World Today," *Bulletin of the American Academy of Arts and Sciences* 8, no. 1 (1954): 1–2; H. Rowan Gaither, "Private Philanthropy and Human Welfare," *Pakistan Horizon* 8, no. 2 (1955): 339–47; H. Rowan Gaither, "We Must Have Courage: Law, National Security and Survival," *American Bar Association Journal* 44, no. 5 (1958): 425–28.

[88] Berlin, "The First Venture Capital Firm in the Silicon Valley: Draper, Gaither & Anderson," 155.

[89] On December 4, 1944, *Time* magazine reported that President Roosevelt appointed Heller to serve on the Surplus Property Board, describing him as follows: "Lieut. Colonel Edward Hellman Heller, 44, multimillionaire member of one of San Francisco's first families, who resigned seven directorships to join the Army," "Stormy Weather," *Time*, December 4, 1944, <http://content.time.com/time/subscriber/article/0,33009,797011,00.html>.

Schwabacher & Co., established in 1919, eventually joining the San Francisco Society of Security Analysts, founded in 1929. During World War II, Heller was consulting the Federal Reserve Bank of Boston, where he met Ralph Flanders, one of the founders of American Research and Development Corporation and served on the War Surplus Property Board. After the war, Heller invested privately in aviation, radar, and radio ventures, like the East Coast old moneyed families of Rockefeller, Whitney, and Mellon. Another important source of informal venture capital on the Peninsula were brothers Joseph and Henry McMicking, the younger members of the McMicking de Ynchausti family that owned a major conglomerate company in the Philippines.[90] Having served in the Air Force during the war, both worked in the financial industry of San Francisco and, like Heller, used their inherited wealth to invest privately in new business ventures, not necessarily technology based. However, unlike the "patrician" families of New York, they were acting like the "people who were willing to gamble," rather than as socially responsible patrons.[91]

Nevertheless, the take-off of venture capital in California was largely carried out by a different group of people, who, while coming from well-established local families with roots in the region stretching back to the late nineteenth century and listed on the San Francisco Social Register, moved along the "careerist" trajectory. While being employed in the local financial industry, these people organized into an informal network, calling themselves "The Group," and operating in the interstices between formal organizations. William Bowes, Jr. (1926-2016) was born in San Francisco to a well-established family of educated professionals, attended a local public school with a "pipeline to Stanford," where he enrolled in 1943 to study chemical engineering.[92] A year after he was drafted and served in the US Army Infantry in the Philippines and Occupied Japan, returning to the university and switching to economics. In 1946, together with the returning servicemen enrolling to Stanford on the GI Bill, Bowes entered the largest freshmen class the university would have for the next 25 years, together with Reid Dennis, another member of "The Group." Also a native Californian, Dennis came from a family of means, attended a prestigious private school Thatcher, and in 1944 was accepted to Stanford, but volunteered for the Navy, spending two years in the military as a radio technician and returning to the university to study electrical engineering. Having completed their undergraduate studies, Bowes went to Harvard Business School, attracted by its reputation, while Dennis, realizing his lack of abilities to be a

[90] McMicking de Ynchausti family owned Ynchausti and Company, a major Philippine multinational conglomerate, founded in 1816 and engaged in shipping, banking, sugar production, insurance and other lines of business. See Alejandro R. Roces, "The Entrepreneurs," *The Philippine Star,* July 10, 2010, <https://www.philstar.com/opinion/2010/07/10/591542/entrepreneurs>; "Henry A. McMicking Obituary," March 16, 2008 <https://www.legacy.com/obituaries/sfgate/obituary.aspx?n=henry-a-mcmicking&pid=105717990>; Reiner, "The Transformation of Venture Capital: A History of Venture Capital Organizations in the United States."

[91] See Reiner, "The Transformation of Venture Capital: A History of Venture Capital Organizations in the United States," 223, quoting McMicking.

[92] See William K. Bowes, Jr., "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2008 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), pp. 1–11; see also "William Ketcham "Bill" Bowes, Jr.," *SF Gate*, January 6 to January 8, 2017, <https://www.legacy.com/obituaries/sfgate/obituary.aspx?pid=183434037>.

"creative engineer," enrolled in the Stanford Graduate School of Business.[93]By the early 1950s, they began their careers in the local financial industry.

Although Dennis was initially exposed to high technology investing through his family's connection with Ampex Corporation, it was his career employment in the financial industry of San Francisco that allowed him to build on that. Having completed his business school degree, in 1952, Dennis was hired by Fireman's Fund Insurance Company that was looking "to take somebody who knows something about engineering and teach him something about investments," rather than vice versa. He began in the investment department as a security analyst trainee, working under Fred H. Merrill, an insurance professional and a member of the local security analysts' society who became the company president in 1962.[94] Like Arthur Rock, who was starting on Wall Street at the same time, Dennis became involved in the routine tasks of data collection via field trips:

> Security analysis in those days was quite different than what it later became. But nevertheless, he [Merrill] just wanted, whatever training I got, it was primarily field trips. At that time I would say more than almost anything else it was—we made an awful lot of investment decisions based on our appraisals of the management of these companies and whether we thought they were doing a good job as well as, of course, the markets for their products. You wanted to have good sales and so forth. But it wasn't a really very formal training program. It was more or less on-the-job training.[95]

Perceiving Dennis's interest in small technological companies, Merrill allowed him to visit them during the regular business trips to the Fireman's primary objects of interest — big industrial firms like General Electric, Westinghouse, or Radio Corporation of America. Merrill's rationale was that, by "visiting the xyz company or the abc company," Dennis would be able to learn about the factors that could potentially affect Fireman's investments in the industrial companies. Moreover, Dennis had a competitive advantage of being the only person with an engineering background in San Francisco financial district, and soon he started receiving calls from brokerage houses and other financial organizations, asking him to consult them on the projects of technology companies that were approaching them in increasing numbers — "the guys with a black box." Like Rock at Hayden, Stone, Dennis became Montgomery Street's "science man."

A year after Dennis began his career at Fireman's, Bowes returned to San Francisco from Harvard and took a job at the local investment bank Blyth & Co., "a small, high-quality investment banking firm" and a major client of Fireman's Fund, starting at the trading desk and later becoming involved in mergers and initial public offerings. By the mid-1950s, Blyth & Co. rose to the status of a "premier investment banking firm up and down the [West] coast" and one of the nation's top investment

---

[93] Neither Bowes, nor Edwards recalled any specific influences or takeaways from Doriot's Manufacturing course.

[94] Earl L. Sever, "Security Analysts of San Francisco," *The Analysts Journal* 5, no. 2 (1949): 43–44; Fred H. Merrill et al., "The Insurance Industry," *The Analysts Journal* 8, no. 4 (1952): 129–39; Fred H. Merrill, "Fire and Casualty Insurance Companies," *Financial Analysts Journal* 10, no. 3 (1954): 51–53.

[95] Reid Dennis, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), p. 13.

banks, with 24 offices and 700 employees across the country, and pursued a more aggressive approach compared to its rival, focusing on unlisted securities and "special situations," including the "space-age" and electronics companies in which Charles R. Blyth was personally interested, serving on the board of directors of Hewlett-Packard.[96] Under his leadership, Blyth & Co. became one of the corporate sponsors of Stanford Research Institute, established in 1947.[97] Through his work at Blyth & Co., Bowes had "opportunities to consult with all kinds of corporate people up and down the coast," eventually becoming exposed to the local electronics industry and developing "close, but not intimate relationships" with the people running these companies: "Just as a part of looking for business for the firm, I was spending quite a bit of time in Silicon Valley, starting in about 1955 or so. [...] I got to know quite a few people that were in the companies," and it "seemed like it was going to be interesting."[98] At the same time, being with Blyth & Co., Bowes became a member of the "little exclusive club" of local financiers, getting to know Heller and Joseph McMicking.[99] In 1957, Paul M. Cook, a chemist trained at MIT working at the Stanford Research Institute (SRI), founded Raychem, a radiation chemistry company, as a spin-off from the SRI, together with James B. Meikle and Richard W. Muchmore. Bowes' classmate from Harvard Business School took a job in the newly established startup, suggesting him to invest. Bowes went on Raychem's board, which gave him "more reason to be down in the valley."[100] Moreover, it is likely that through Raychem, he met General Anderson, who, having moved to California after the war, was the second-largest investor of the company after Cook himself.[101] By the time DG&A was established, Bowes had enough of a reputation and expertise to be invited to consult the partners on their technological investments, evaluate their portfolio, and report on performance, thereby becoming part of a transregional investment network. During the following two decades, while working at the bank, he assumed the role of an independent venture investor, intermediating between

[96] Reiner, "The Transformation of Venture Capital: A History of Venture Capital Organizations in the United States," 226-227, 266-267; Sidney L. Schwartz, "Charles R. Blyth," *California Historical Society Quarterly* 38, no. 4 (1959): 360–61.

[97] See William R. Shurtleff, *The Shurtleff and Lawton Families: Genealogy and History* (Lafayette, CA: Pine Hill Press, 2005), 196; Chester Hartman, *City for Sale: The Transformation of San Francisco, Revised and Updated Edition* (Berkeley and Los Angeles, California: University of California Press, 2002), 8–9; Rebecca S. Lowen, *Creating the Cold War University: The Transformation of Stanford* (Berkeley: University of California Press, 1997). For example, Heller reputedly refused to make an investment decision until the afternoon, thinking he had better judgment after a couple of drinks at lunch. According to William Edwards, "They said what you did if you wanted money from Ed Heller—you would slide your proposal under his office door, and then he'd slide back five thousand dollars". See: William K. Bowes, Jr., "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2008 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), p. 11; William C. Edwards, "Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), p. 21. In the early 1960s, Heller, acting as a regent of UC Berkeley, financed Moshe Alafi's startup Physics International, making decision on the spot after a brief conversation. See also Moshe Alafi "Biotech Pioneer and Entrepreneur," conducted by Sally Hughes in 2003 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2013), pp. 18–19.

[98] William K. Bowes, Jr., "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2008 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), pp. 10, 78.

[99] Bowes, Jr., "Early Bay Area Venture Capitalists," pp. 11, 14.

[100] Bowes, Jr., "Early Bay Area Venture Capitalists," p. 11.

[101] Berlin, "The First Venture Capital Firm in the Silicon Valley: Draper, Gaither & Anderson."

the companies around Stanford University and the formal and informal pools of capital to which he had access through the Blyth & Co. network: finding the "situations worth doing" and "rounding up the money from various sources… in and out of an office here in the Bank of America building."[102]

In 1957, Bowes received a call from William Edwards, his friend from Stanford and Harvard, who had inherited considerable wealth from his father's oil company and began to invest privately while working for Standard Oil of California. Edwards was looking for a broker; Bowes recommended his colleague from Blyth & Co., John Bryan. Like Edwards, Bryan was a graduate of Stanford and attended Harvard Business School while training for his service as a Navy supply officer. After the war, Bryan worked for the retail company established by his great-grandfather in 1886, Maxwell Hardware Company, ultimately becoming a CEO and eventually liquidating the firm. In the late 1950s, he joined Bowes at Blyth & Co.[103] In 1959, Edwards quit Standard Oil and went to work for the local office of the New York money management firm, Lionel D. Edie, where he met Daniel J. MacGanney, Jr. Like the rest of "The Group" members, McGanney was a native Californian, a war veteran, and a Stanford graduate. In 1957 he opened the first West Coast office of Lionel D. Edie & Co., an investment consulting firm he directed until Merrill Lynch bought it in 1969. Like Heller and McMicking, in the 1950s, McGanney resided in Atherton, a wealthy elite incorporated town near Stanford University and the scientific companies like Raychem emerging around it.[104] McGanney, Edwards, and Bryan joined Bowes and Dennis, and by the late 1950s, "The Group" got together. As summarized by Dennis, "we just knew each other. We were all about the same age; we all worked in the financial district."[105]

While "The Group" operated informally, it relied heavily on the connections the members developed in their capacity of employees working in the local financial institutions. A group member would receive a call from a broker approached by an entrepreneur, who would then be invited to meet "The Group" for lunch and explain the project. As full-time employees, "The Group" members had to meet on weekends or holidays and restrict their scope of attention to the proposals coming from the local entrepreneurs. After the pitch, the entrepreneur was asked to wait outside of the restaurant until "The Group" arrived at a collegial decision, which was then explained to the entrepreneur by one of the members.[106] As affluent individuals, "The Group" could raise as much as $80,000 around the table, which was enough as a startup capital: it was possible to "start a company down here on the peninsula for

[102] William K. Bowes, Jr., "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2008 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), p. 12.

[103] "John Bryan Obituary," *San Francisco Chronicle*, April 2 to April 4, 2012, <https://www.legacy.com/obituaries/sfgate/obituary.aspx?n=john-bryan&pid=156839334>.

[104] Reiner, "The Transformation of Venture Capital: A History of Venture Capital Organizations in the United States," 217; "Daniel J. McGanney, Jr. - Obituary," *SF Gate*, July 4, 1995, <https://www.sfgate.com/news/article/OBITUARY-Daniel-McGanney-Jr-3029814.php>.

[105] Reid Dennis, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), p. 23.

[106] William C. Edwards, "Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), p. 48.

anywhere from $250,000 to $350,000."[107] During the next ten days, all five group members would raise the rest of the money by "going back to our offices" and calling "various hangers-on and camp-followers that worked in these brokerage firms," but also the partners of the recently established Draper, Gaither & Anderson. By Dennis' estimate, operating in this manner, over the period from the mid-1950s to mid-1960s, they backed 25 "little companies down the peninsula," 18 of which "were wildly successful," "a couple" returned the amount invested, and only three resulted into "big losses," creating a "very, very high success ratio" which "really made the venture capital business highly successful" and eventually prompted the members of "The Group" to engage into it full-time. While Dennis and Bowes stayed with their employers while investing informally until the 1970s, Bryan, Edwards, and McGanney formed separate organizations in the early 1960s.

Conclusion

By the end of the 1950s, the tides of innovation were rising not only in California. If "The Group" mediated between the emerging technological cluster centered around Stanford University and the financial institutions of San Francisco, people like Charles Lea and Peter Brooke assumed similar roles on the other side of the country, arranging financings for small technology companies around MIT On the other hand, Donald Lucas, before coming back to California to join Draper, Gaither & Anderson, became exposed to the nascent computer industry in Minnesota, while working at Smith and Barney, and Arthur Rock, in his capacity of a junior security analyst, was likewise following and visiting the small technological companies around New York and Midwest, thereby gaining the knowledge unavailable from the commanding heights of the capital market — by meeting and relating to the "scientists" running these firms. In the financial environment of the 1950s, such exposure could mean an important competitive advantage. William Hambrecht provides perhaps the best summary of the history reconstructed in this chapter:

> it was very clear that Wall Street didn't understand, really, what was happening. Nor did they particularly want to, because it was very small. These companies were half a dozen people getting together. Wall Street, particularly in the fifties, was quite conservative. The premium was always on the very large, established companies.[108]

Like Rock and Lea, Hambrecht, born in 1935 in New York in a "typical middle-class environment," did not inherit any considerable wealth that would provide a route into venture capital investing. He studied at Princeton on a football scholarship and, shortly after graduation, took a job at a small investment firm owned by a friend's uncle. Yet, crucially, the firm was based at Cape Canaveral, Florida, the Cape Canaveral Air Force Station location, one of the sites of

[107] According to Dennis, he would invest in the range between $10,000 and $15,000, while Bryan and Edwards, who had some inherited wealth, could invest twice as much "quite easily", and up to $40,000 if they liked the idea. See Reid Dennis, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), p. 26.

[108] William R. Hambrecht, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2010 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2011), p. 2-3.

development of the missile program that, by 1957, when Hambrecht arrived there, "was the start of the technology world."[109] During the next three years, Hambrecht was engaged in the IPO and private placements work, building a small portfolio of digital computing startups and, like Dennis in San Francisco and Rock in New York, developing "a reputation, in theory, of understanding the early computer business":

> I would be the first to admit I still don't understand the science, but I did make some wonderful friendships and contacts in Florida with some of the early scientific people that had developed the whole missile program. [...] I met some really interesting people. Several of them became real mentors, almost through my whole life, and I was just very fortunate to be exposed to that kind of program and those kinds of people [...] So it was probably inadvertent, but yes, I was there really to learn what the technology people were doing and then see if I could relate it to Wall Street and find them some money.[110]

In short, the "careerist" route to venture capital was to a large extent "inadvertent," as Hambrecht puts it: moving along the organizational hierarchies, they happened to be close to what Braudel describes as the "rising tides" of innovation. However, the process of opportunity recognition was not immediate but inscribed into the practices of knowledge generation and distribution and intra-organizational divisions of labor, adopted by their employers — large financial institutions. While knowledge of, and friendship with, people — "technology people" — could have been sufficient for the individual forays into high-technology investing, such an approach could hardly become what Max Weber called "permanent capitalistic enterprise," irreducible to a collection of of "purely occasional ventures" and "individual transactions."[111] Moreover, as the individual histories surveyed in this chapter suggest, for a "careerist" who, in the words of Petersmeyer, "may not be prepared to lose all of his money," the ability to tap into institutional resources was crucial, creating a challenge of translating one's conviction in the vitality and profitability of an investment into a small technological company around the corner into a proposition that would be intelligible for a financial institution. How "careerists" and others met this challenge is the topic explored in the following chapter.

[109] Hambrecht, "Early Bay Area Venture Capitalists," p. 1.
[110] Hambrecht, "Early Bay Area Venture Capitalists," pp. 2–3.
[111] Weber, *General Economic History*, 229.

Chapter IV. Financial Singularities

Our capitalist, we should not forget, stood at a certain level in social life and usually had before him the decisions, advice and wisdom of his peers. He judged things through this screen.

Fernand Braudel, *The Wheels of Commerce*

Introduction

In 1950, Shelby Cullom Davis, head of the New York-based investment firm Shelby Cullom Davis & Company, specializing in insurance securities, published a paper "Our Mid-20th Century Capitalists" in The Analysts Journal, the primary printed publication of the aspiring profession of securities analysts, established two years earlier. Davis offered the readers an updated summary of the findings, which resulted from the study prepared by his firm for the Judiciary Committee of the US Senate and the Committee on Joint Economic Report of the 81st US Congress. Presented publicly for the first time, the study analyzed, in a case-by-case manner, the largest life insurance firms of the country, the "ruling mid-20th century capitalists," as Davis put it.

> Though their size may be breathtaking compared with our "big money" investors of the '20s, their market forays are far more cautious. Their "plunges" in the stock market are as remote as the plunging neckline. They are neither bulls nor bears on stocks. They are, however, bears on money. They have seen its value decline and decline as their bonds have risen and risen in value.[1]

By 1949, 100 largest US life insurance companies had $43.6 billion in total assets and investing more than $2.5 million in real estate, mortgages, bonds, and stocks.[2] Having reviewed the "Big Seven" companies with assets over $2 billion, Davis concluded that an imaginary "foreign correspondent," unfamiliar with the ongoing changes in the US capital markets, might well wonder "who is holding the basket for whom — the life companies as our mid-20th century capitalists for the economy as a whole or the economy as a whole for our new ruling investor class."[3]

The growth of institutional investors, including insurance companies, pension funds, and mutual funds, was "perhaps the most significant development in the postwar period" of the American finance: these entities, having accumulated "enormous amounts of assets that had to be invested," eventually became one of the central elements of the country's financial system.[4] In the early 1950s, these developments did not escape the eye of their perhaps most observant public —

---

[1] Shelby Cullom Davis, "Our Mid-20th Century Capitalists," *Financial Analysts Journal* 6, no. 4 (1950): 15.

[2] Davis, "Our Mid-20th Century Capitalists," 15.

[3] Davis, "Our Mid-20th Century Capitalists," 19.

[4] Jerry W. Markham, *A Financial History of the United States: From J.P. Morgan to the Institutional Investor (1900-1970)* (Amonk, New York; London, England: M.E. Sharpe, 2002); Janette Rutterford and Leslie Hannah, "The Rise of Institutional Investors," in *Financial Market History: Reflections on the Past for Investors Today*, ed. David Chambers and Elroy Dimson (CFA Research Foundation and Cambridge Judge Business School, 2016), 242–64.

financial analysts. In 1968, Armand G. Erpf, one of the leading voices of the Wall Street's "knowledge industry," looking at the changes of the previous two decades, observed that the emergence and "tremendous growth" of the pension funds created a "new kind of "abstract" ownership of common stocks," acting on behalf of the anonymous masses of investors and beneficiaries, having concentrated the decision-making "in the hands of a relatively small number of managers" at the same time.[5] At the start of the 1950s, however, these processes elicited occasional criticisms. In 1950, The Analysts Journal published an anonymous article, offering "some self-criticism of institutional investing."[6] The criticism was targeted at the decision-making procedures adopted by institutional investors, whose policies were determined by the elected investment committees empowered to closely supervise the individual transactions. For Menippus, this situation appeared "anomalous," because

> An integral part of the business functioning of the institution, instead of being carried on by the presumably competent professional staff and officers, is being administered in detail by a part of the management which normally, in other respects, exercises only a supervision of general policies. [...] Where once it might reasonably have been assumed that a prudent man, familiar with business practices, would be competent to invest not only honestly but competently, large volumes of funds, only the former of these assumptions now appears valid.[7]

Menippus suggested further that the increasing complexity of financial regulation and a "frighteningly dynamic economy" have jointly rendered investments "a professional field in which the business or professional man untrained in this line finds himself quite out of his depth. Often, he does not realize this and, if he did, would be embarrassed to disqualify himself from occupying such a position of prestige and power."[8] The increasing decoupling of the decision-making authority from the skilled craft of "investment specialists" was potentially harmful, tending to encourage inaction and trigger preoccupation with "quality at any price" to the neglect of "value," the emphasis on which was "basic to good investment results."[9] Nevertheless, Menippus hoped that the same decoupling process could inadvertently increase the professional status of "investment analysts," whose competence, indispensable for the investment committees of large financial institutions, justified "their being treated more nearly on a parity with engineers, lawyers, and similar professional specialists than is currently the case."[10] He concluded by suggesting that the committees, legally endowed with responsibility for setting the institutional investment policies' broad objectives, should delegate their implementation to the "professional investment men" — portfolio managers, investment buyers, and security analysts. If institutional

---

[5] Louis Stone, "Wall Street's 'Knowledge Industry,'" in *The Anatomy of the Wall Street: A Guide for the Serious Investor*, ed. Charles James Rolo and George J. Nelson (Philadelphia and New York: J.B. Lippincott Company, 1968), 18–28; Armand G. Erpf, "The New American Capitalism," in *The Anatomy of the Wall Street: A Guide for the Serious Investor,* ed. Charles James Rolo and George J. Nelson (Philadelphia and New York: J.B. Lippincott Company, 1968), 256–57.

[6] Menippus, "Some Self-Criticism of Institutional Investing," *Financial Analysts Journal* 51, no. 1 (1995 [1955]): 21–24.

[7] Menippus, "Some Self-Criticism of Institutional Investing," 21.

[8] Menippus, "Some Self-Criticism of Institutional Investing," 21–22.

[9] Menippus, "Some Self-Criticism of Institutional Investing," 22.

[10] Menippus, "Some Self-Criticism of Institutional Investing," 24.

investors did indeed replace the pre-war "big money" capitalists, it fell on the "professional investment men" to guide their "more cautious market forays," navigating the markets on behalf of this "new ruling investor class."[11]

Menippus might have overestimated the opportunity for professionalization of investment analysis offered by the rise of institutional investing. However, he certainly spotted the emergence of an important pattern: the advent of the organized actors on the post-war American financial scene triggered an increasing bureaucratization of the financial industry, challenging "entrepreneurial and individualistic forms of competition based on personal and diffuse skills" that prevailed before the war.[12] At the same time, by inscribing these diffused skills and financial knowledge into organizational hierarchies and divisions of labor, it created opportunities for the aspiring "careerists" at the bottom level of large financial institutions, like Reid Dennis, Arthur Rock and other characters of the previous chapter, to capitalize on their proximity to the emerging technological companies, too small to be legible from the commanding heights of the capital market. On the other hand, as career employees of the large financial institutions, people like Dennis and Rock had to adopt the categories of their employers to be able to tap into the capital of these "mid-20th century capitalists." Acting on behalf of these organizations, they had to project organizational categories and classifications onto the people, technologies, and companies they found "in the field," and, conversely, the opportunities they recognized had to be rendered intelligible for the organizations. During the 1950s and the better part of the 1960s, when "venture capital" as practiced by Doriot and Whitney struggled to gain acceptance as a profit-making business in the East Coast, while being unknown in California, Dennis, Rock and others relied on a different set of categories, acting as an interface between organizational classifications and field observation.

In 1960, having spent eight years as a security analyst and investment officer at the Fireman's Fund Insurance Company while investing with "The Group" as a sideline activity, Reid Dennis managed to convince his boss, Fred H. Merrill, to let the fund invest in a privately held technological company, Recognition Equipment Corporation, that was developing a new optical character reader in Dallas, Texas. Dennis had to present the proposition to the Fireman's investment committee, which consisted of the six members of the board of directors. As predicted by Menippus, only one of the six had some exposure to investing: A. Crawford Greene, a leading San Francisco attorney, who was "very close to one of the big banks in New York."[13] According to Dennis' recollection,

---

[11] Davis, "Our Mid-20th Century Capitalists."

[12] Richard Whitley, "The Transformation of Business Finance into Financial Economics: The Roles of Academic Expansion and Changes in U.S. Capital Markets," *Accounting, Organizations and Society* 11, no. 2 (1986): 182–86.

[13] Reid Dennis, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), pp. 15–16. A. Crawford Greene (1885-1966) graduated from Yale in 1906 and studied at the Harvard Law School in 1907-1908. In 1909 he was admitted to the California bar and subsequently worked for a well-known San Francisco law firm McCutchen, Thomas, Matthew, Griffiths & Greene, being a trustee to many local financial and civic organizations. A short biographical note is available from the website of The Asia Foundation, of which he was a trustee: https://asiafoundation.org/people/a-crawford-greene/.

> He'd come down on the table, "Well, at the bank we're doing this," or that or something else. Well, by talking to the analysts at the lower levels in the bank, we would know damn well that the bank wasn't doing that at all! But nevertheless, the investment committee was a gentleman's club, and if they hadn't heard of—if you presented something to them and they had never heard the name before [...] A company, a company name, and they had never heard the name of this company before, it by definition became what was called "a special situation." And special situations were things that nobody knew anything about except maybe some of us at the lower level. And that is what eventually became known as venture capital [...] exception to the standard practice, because here was this fancy investment committee and none of them knew anything about it other than what they got from the junior analysts who were sitting around the table.[14]

Dennis' experience illustrates the point. In the 1950s, the category of "special situations" was the immediate predecessor of "venture capital," referring broadly to any exception to the standard practices of institutional investing. However, it is important to note that for Dennis, who acted in his capacity as a "junior analyst at the lower level," "special situations" served as a means of rendering his field observations intelligible for his superiors at Fireman's Fund. Having been authorized by his boss to visit small technology companies while on business trips for Fireman's, by 1960, Dennis had accumulated considerable experience observing and analyzing these companies as potential — and, for "The Group," also actual — investment outlets. However, to engage an organization in this type of investing, and to be able to tap into its capital, in effect syndicating the investment with his employer, Dennis had to rely on the classifications and categories that were understandable to the latter.

This chapter continues the argument of the previous one, switching the gears from social history to archaeology of financial knowledge in order to attend to the intellectual underpinnings of early venture capital — as practiced by the "careerists" like Dennis and Rock, rather than "patricians" and elites like Whitney and Doriot. Much like modern finance more generally, venture capital "emanated from a disparate range of practices, theories, and agendas and only gradually coalesced… into an identifiable set of activities and intuitions."[15] This chapter explores one site of such emergence — namely, financial analysis — by following the category of "special situations," which frequently occurs in the way early venture capitalists talked about themselves during the industry's formative decades. Entering the Wall Street professional vocabulary after the Great Depression, it survived to this day, although now being devoid of the venture capital related connotations. This chapter attempts to show that in the 1950s and 1960s, its vagueness and residual character proved to be an asset for an emerging industry of venture capital investment, allowing its current association with high technology to emerge. More specifically, this chapter argues that the open and inclusive character of this category allowed finance professionals and early venture capitalists to make the new technologies of the time — namely, the fledgling electronics industry and the Space Age

[14] Reid Dennis, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), p. 16.

[15] Brine and Poovey, *Finance in America : An Unfinished Story*, 1.

technologies more generally — to become recognizable, or "legible," for the institutional finance and formal stock market.

Market Categories and Legibility

Sociologists have recently argued that markets, like states, rely on specific forms and technologies of "vision" that allow to "make societies more legible," e.g., by categorizing individuals into quantified credit scores that generate, rather than simply reproduce, social inequalities.[16] Arguably, the analysis of such attempts to impose legibility can be extended beyond the later decades of the 19th century, when the credit scoring originated, and its focus expanded beyond the issues of access and closure.[17] Market actors themselves rely upon, create and reinterpret categories of goods, assets, firms, and investment opportunities, thereby reducing uncertainty and creating the possibility for calculation.[18] In financial markets, one group of actors is particularly powerful with regard to creation and (re)interpretation of market categories — financial analysts. Recent literature in the social studies of finance suggests that analysts can construct "calculative frames" and invent new categories that can redirect investment flows.[19] Thus, it was argued that purposeful positioning of the notion of "emerging markets" as more stable and predictable than the rival category of "developing economies," helped to attract the investors' attention to the BRICS countries in the early 2000s.[20] Arguably, in the decades before the increasing mathematization of finance spurred by the development of financial economics, analysts and their categories might have been even more consequential.[21]

In the 1950s and 1960s, two competing branches of market research were the dominant form of the stock market expertise: conducted by "qualitative practitioners (chartists and fundamental analysts)."[22] Technical analysis, or "chartism," having emerged in the latter decades of the 19th century with the introduction of the stock ticker that allowed for aggregation of dynamic price data,

---

[16] Fourcade and Healy, "Classification Situations: Life-Chances in the Neoliberal Era," 526; James C. Scott, *Seeing like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, Conn. ; London: Yale University Press, 1999); see also Marion Fourcade and Kieran Healy, "Seeing like a Market," *Socio-Economic Review* 15, no. 1 (2017): 9–29.

[17] Barry Cohen and Bruce G. Carruthers, "Credit, Classification and Cognition: Credit Raters in 19th-Century America," *SSRN Electronic Journal*, 2011, https://doi.org/10.2139/ssrn.1525626; Noam Maggor, "To Coddle and Caress These Great Capitalists: Eastern Money, Frontier Populism, and the Politics of Market-Making in the American West," *American Historical Review* 122, no. 1 (2017): 55–84.

[18] Beckert and Aspers, eds., *The Worth of Goods: Valuation and Pricing in the Economy*; Michel Callon and Fabian Muniesa, "Economic Markets as Calculative Collective Devices," *Organization Studies* 26, no. 8 (2005): 1229–50.

[19] Daniel Beunza and Raghu Garud, "Calculators, Lemmings or Frame-Makers? The Intermediary Role of Securities Analysts," *Sociological Review* 55, no. SUPPL. 2 (2007): 13–39; Martin Ruef and Kelly Patterson, "Credit and Classification: The Impact of Industry Boundaries in Nineteenth-Century America," *Administrative Science Quarterly* 54, no. 3 (2009): 486–520; Russell J. Funk and Daniel Hirschman, "Derivatives and Deregulation: Financial Innovation and the Demise of Glass–Steagall," *Administrative Science Quarterly* 59, no. 4 (2014): 669–704.

[20] Leon Wansleben, "'Dreaming with BRICs,'" *Journal of Cultural Economy* 6, no. 4 (2013): 453–71.

[21] On financial economics, see MacKenzie, *An Engine, Not a Camera : How Financial Models Shape Markets*; Whitley, "The Transformation of Business Finance into Financial Economics: The Roles of Academic Expansion and Changes in U.S. Capital Markets."

[22] Marion Fourcade and Rakesh Khurana, "The Social Trajectory of a Finance Professor and the Common Sense of Capital," *History of Political Economy* 49, no. 2 (2017): 359.

"concerned itself with price changes and trading volume."[23] Its more recent counterpart, the so-called fundamental analysis, whose emergence was facilitated by the requirement of disclosure of corporate information[24] stipulated in the Securities and Exchange Acts of 1933-4, is characterized by a form of "essentialism," emphasizing the necessity to look beyond the market price and investigate the "intrinsic value" of the stocks by a close analysis of the company.[25] For a fundamentalist, "reading" the market by following quantitative changes in trading volume and prices does not make much sense, at least unless a thorough consideration of the underlying "fundamentals" had been conducted. In words ascribed to Bernard Baruch, nobody can know whether the stock market is high or low at any given time — in terms of price, a fundamentalist would add, but not in terms of value. Thus, "the role of the analyst is to determine an intrinsic value, and then, it is hoped to predict a future market price."[26]

Fundamental analysis also differed from its counterparts by virtue of having an indisputable classic — Benjamin Graham and David Dodd's influential *Security Analysis* (1934), also known as the "Bible of the Wall Street," which first codified the practice of security analysts.[27] Since then, "security analysis" was roughly synonymous with fundamental analysis: "The study of past price action is what differentiates the market technician from *the security analyst or fundamentalist*. The latter is engaged in the analysis of various data concerning individual companies… earnings, dividends and finances along with products, prospects, changes in technology and so on."[28] As Brine and Poovey have argued, Graham and Dodd's approach was self-consciously commonsensical, a practical art, rather than a systematic body of knowledge.[29] Today it is also often described as a form of vocational expertise, almost by definition devoid of any trace of scientific exactitude.[30] Indeed, Graham and Dodd themselves say as much in the preface to their famous volume: "investment by its very nature is an exact science," but a field

[23] Charles J. Rolo and George J. Nelson, "Foreword," in *The Anatomy of the Wall Street: A Guide for the Serious Investor*, ed. Charles James Rolo and George J. Nelson (Philadelphia and New York: J.B. Lippincott Company, 1968), vi; on financial chartism, see also Alex Preda, "Where Do Analysts Come from? The Case of Financial Chartism," *Sociological Review* 55, no. SUPPL. 2 (2007): 40–64.

[24] As noted by Loise Stone, then the Economist at Hayden, Stone, "until the early 1900s, financial information of any kind was hard to come by. The prevailing attitude was that a public corporation was in fact a private club, with no obligation except to its own stockholders." See Stone, "Wall Street's 'Knowledge Industry,'" 18.

[25] See Leon Wansleben, "Financial Analysts," in *The Oxford Handbook of the Sociology of Finance*, Knorr-Cetina, K., & Preda, Alex, eds. (Oxford ; New York: Oxford University Press, 2012), 251–65; Karin D. Knorr-Cetina, "Financial Analysis: Epistemic Profile of an Evaluative Science," in *Social Knowledge in the Making*, ed. Charles Camic, Neil Gross, Michèle Lamont (Chicago, Ill.: University of Chicago Press, 2011), 405–42; Brine and Poovey, *Finance in America : An Unfinished Story*. On the "essentialism" of fundamental analysis, see Beunza and Garud, "Calculators, Lemmings or Frame-Makers? The Intermediary Role of Securities Analysts."

[26] Ralph A. Rotnem, "The Valuation of Common Stocks: The Fundamentalist's Approach," in *The Anatomy of the Wall Street: A Guide for the Serious Investor*, ed. Charles James Rolo and George J. Nelson (Philadelphia and New York: J.B. Lippincott Company, 1968), 147.

[27] Dennis Butler, "Benjamin Graham in Prespective," *Financial History* 86, no. Summer (2006): 24.

[28] Anthony W. Tabell, "Forecasting Stock Prices: The Technician's Approach," in *The Anatomy of the Wall Street: A Guide for the Serious Investor*, ed. Charles James Rolo and George J. Nelson (Philadelphia and New York: J.B. Lippincott Company, 1968), 158, original emphasis.

[29] Brine and Poovey, *Finance in America : An Unfinished Story*, 150.

[30] See, e.g., Georg Von Walwitz, *Odysseus Und Die Wiesel: Eine Fröhliche Einführung in Die Finanzmärkte* (Berlin: Berenberg Verlag GmbH, 2016).

similar to law and medicine, where "both individual skill (art) and chance are important,"[31] showing that "while not a science, [security analysis] could be systematized and taught."[32] Conceiving their version of stock market expertise in the late 1920s, Graham and Dodd did not intend to challenge any competing, more "scientific" body of expertise, nonexistent at that time — even in economics more broadly.[33] Hence, to view security analysis as a merely "pre-scientific" and purely descriptive stage in the linear development of modern financial theory is justified only with hindsight. The very persistence of Grahamian approach, now more often referred to as "value investing," to this day, suggests that it should better be characterized as an instance of "immature science" that passed the "threshold of epistemologization," but got stuck at the edge of "formalization."[34]

A Verbal Tradition

Indeed, in the 1960s, many of its practitioners embraced the same ongoing developments that brought about quantitative finance.[35] First, it was the ascendancy of "applied economics" and diffusion of the intellectual achievements of wartime intelligence and planning efforts into the academic realm that gained economic knowledge "increasing prestige and legitimacy within the academy and the business schools" during the 1950s.[36] Second, scope and quality of economic and financial data gathered by corporate and governmental bureaucracies kept increasing, in part thanks to the introduction of new technological solutions. For example, in 1964, the introduction of the electronic stock ticker, or of computerized Electronic Systems Center, enabled production of the half-hourly index of all common stock listed in the New York Stock Exchange Big Board.[37] Finally, the application of computer power to the calculative processes on the market was consequential not only for practice, but also for theory. MacKenzie observes that "by 1964, there was a sufficient body of work on the random character of stock-market prices to fill a 500-page collection of readings."[38] Still, two years later it was judged as "a view in conflict with views generally advanced by stock market theorist."[39] Moreover, analysts were appreciative of the latest developments in quantitative finance.[40] A distinguished

---

[31] Benjamin Graham and David Dodd, *Security Analysis*, 6th ed. (1934; New York: McGraw-Hill, 2000), 14.

[32] Brine and Poovey, *Finance in America : An Unfinished Story*, 147.

[33] Mary S. Morgan, "Economics," in *The Cambridge History of Science: The Modern Social Sciences*, ed. Theodore Porter and Dorothy Ross (Cambridge: Cambridge University Press, 2003), 275–305.

[34] See Michel Foucault, *The Archaeology of Knowledge* (London: Tavistock Publications, 1972), 186-189. On the "immature sciences," see Hacking, "Michel Foucault's Immature Science."

[35] See MacKenzie, *An Engine, Not a Camera : How Financial Models Shape Markets*.

[36] Miller, "Accounting Innovation beyond the Enterprise: Problematizing Investment Decisions and Programming Economic Growth in the U.K. in the 1960s," 743; Fourcade and Khurana, "From Social Control to Financial Economics: The Linked Ecologies of Economics and Business in Twentieth Century America."

[37] For a contemporary account, see Stone, "Wall Street's 'Knowledge Industry'"; see also Brine and Poovey, *Finance in America : An Unfinished Story*.

[38] MacKenzie, *An Engine, Not a Camera: How Financial Models Shape Markets,* 65. MacKenzie refers to the collection edited by Paul Cootner, see Paul H. Cootner, ed. *The Random Character of Stock Market Prices* (Cambridge, Mass.: MIT Press, 1964).

[39] Herman Cole, "Common Stocks and the Investor: GUIDES TO FINANCIAL SUCCESS," *RQ* 5, no. 3 (1966): 3–11.

[40] For example, *Money and Stock Prices* (1964), a book by a Chicago-trained economist and student of Milton Friedman, Beryl W. Sprinkel, advancing an explanation of the trends in equity prices based on the quantity theory of money was included in the series of the Institute of Chartered

member of the Institute of Chartered Financial Analysts wrote in a review of the recent work on the random character of stock prices:

> We believe that the central professional premises of financial analysis remain intact. […] for investors or speculators it is unimportant whether the traveling of stock prices towards the valuation area follows a path of chance or a systematic pattern. They are interested in practical results. They know that new opportunities are constantly created by the ceaseless stream of economic change. It offers a never ending flow for exercising the professional skills of competent financial analysts.[41]

Thus, modern finance theory did not simply supplant security analysis, and stock market research more generally, as pre-scientific forms of expertise; instead, it changed the configuration of the epistemic field of finance, and even these changes were only beginning to be felt in the 1960s.[42] Addressing the New York Society of Security Analysts in 1963, Benjamin Graham expressed confidence in the future of the profession and praised its growing numbers and influence: "Would it be an exaggeration to say that the greater part of security transactions today are based to some degree on work done by Financial Analysts?"[43] By the end of the decade, the "Wall Street research industry" flourished, praising the availability of new data and the growing sophistication of security analysts, increasingly trained in business schools, and was planning for the adoption of the new analytical techniques to be introduced by computer power, hailed as "a virtual revolution in the mechanics of handling transactions."[44] In a paper on the "new American capitalism," Armand G. Erpf, a partner with the New York-based brokerage firm, Carl M. Loeb, Rhoades & Co., wrote that "the American market… is broad, liquid, better documented than any other the world… and the economic data and statistics for the country as a whole are more precise and more up to date than those of any other economy."[45]

As noted by Knorr-Cetina, paradoxically, the security analysis profession is based not on the shortage, but on the abundance of information.[46] At the end of the 1960s, three decades after the New Deal disclosure regulation unleashed the stream of corporate information that could be studied, the analysts have found themselves amid a new "avalanche of printed numbers": the proliferation of statistical studies of prices and records of earnings and dividends that provided "more information about securities markets than we have ever had before".[47] Lois Stone of Hayden,

---

Financial Analysts and adopted for use in the CPA educational program. See, Beryl W. Sprinkel, *Money and Stock Prices* (Richard D. Irwin, Inc.: Homewood, Illinois, 1964).

[41] Nicholas Molodovsky, "Lessons from the Recent Past," *Financial Analysts Journal* 20, no. 1 (1964): 50–51.

[42] See Foucault, *The Archaeology of Knowledge*.

[43] Benjamin Graham, "The Future of Financial Analysis," *Financial Analysts Journal* 19, no. 3 (1963): 65.

[44] Stone, "Wall Street's 'Knowledge Industry,'" 16. See also Rotnem, "The Valuation of Common Stocks: The Fundamentalist's Approach"; Richard L. Geiger, "Investing in Science and Technology," in *The Anatomy of the Wall Street: A Guide for the Serious Investor*, ed. Charles James Rolo and George J. Nelson (Philadelphia and New York: J.B. Lippincott Company, 1968), 104–23.

[45] Erpf, "The New American Capitalism," 257.

[46] Knorr-Cetina, "Financial Analysis: Epistemic Profile of an Evaluative Science."

[47] Rotnem, "The Valuation of Common Stocks: The Fundamentalist's Approach," 146–47; the notion of the "avalanche of printed numbers" is of Ian Hacking's coinage, see Hacking, *The Taming of Chance*; Ian Hacking, "Biopower and the Avalanche of Printed Numbers," *Humanities in Society* 5 (1982): 279–95.

Stone, Inc., wrote in 1968 that over the last 30 years "the giant financial publishing industry had achieved most of its growth," coming "a long way from the time when corporate figures were the exclusive preserve of the "insiders."[48] Having their information-gathering activities "directed toward the whole… corporate and economic activity," the research departments of major Wall Street firms operated in a manner "not unlike… Intelligence in a military organization."[49] With the US government emerging as "the greatest data-collector in history," and having dozens of other sources of information at his disposal (including "market letters," corporate reports, trade press outlets and specialized subscription services), the analyst was supposed to "skip more or less lightly from one source to another" to gain an insight into the agendas of the market opinion-makers and pick up some "leads" to commence a more serious study of a particular company, group of stocks, or "situation."[50] The study would then involve collecting information from all available sources, including publicly available data from the Wall Street's "library without walls," interviews with financial and operating executives of the company of interest, attending board meetings or special meetings organized by the corporate officials for security analysts, forging sufficient personal contact with relevant regulators and "the corporation itself" by visiting it in person.[51] Combining his specialized knowledge of the industry and its economics, and applying "experience, insight, and flair," the analyst must be able "to interpret the events as they occur" and reach the correct conclusions of the company's capability and performance to make timely buy, hold or sell recommendations on their basis.[52] The largest research departments of the 1960s produced from 20 to 30 publications in a single day, ranging from the lists of recommended securities, summaries, and background papers to institutional reports (studies) devoted to specific firms or industries and their summary versions for individual clients.[53]

A desirable profile of a Wall Street analyst in the 1960s included a business school degree, along with a combination of analytical and sales-related skills, as well as a specialization in a particular industry that he had pursued long enough to establish a thorough familiarity with its "operations and economics: size of the market and traditional growth rate; prevailing profit margins in good years and bad; average return on invested capital; characteristic dividend payout; prospective growth in the years ahead," as well as with the relevant political and regulatory context.[54] Most important of all, however, was the analyst's capacity of judgment. Even though the profession looked forward to the new kinds of economic expertise coming out of the business schools, new streams of data and new calculative tools to make sense of them, this form of financial knowledge envisioned its purpose in a way that sidelined these developments and saved some room for the implicit entrepreneurialism of security analysis mentioned above. This entrepreneurial

---

[48] Stone, "Wall Street's 'Knowledge Industry,'" 18–20.

[49] Walter Maynard, "Inside the Research Department," in *The Anatomy of the Wall Street: A Guide for the Serious Investor*, ed. Charles James Rolo and George J. Nelson (Philadelphia and New York: J.B. Lippincott Company, 1968), 29; Rolo and Nelson, "Foreword," v–vii.

[50] Stone, "Wall Street's 'Knowledge Industry,'" 20–22.

[51] Rolo and Nelson, "Foreword," vi; Maynard, "Inside the Research Department"; Stone, "Wall Street's 'Knowledge Industry'"; Knorr-Cetina, "Financial Analysis: Epistemic Profile of an Evaluative Science."

[52] Maynard, "Inside the Research Department," 34–35.

[53] Maynard, "Inside the Research Department."

[54] Maynard, "Inside the Research Department," 30.

element is visible in the analysts' cautious embrace of the computing power. As noted by Charles J. Rolo, a senior analyst and account executive at H. Hentz & Co.:

> Security analysis, though it is emulating the scientific method, is forced to concern itself in part with the human factor and with major imponderables and to make certain judgments which are necessarily subjective. After all, you cannot put a stock in a test tube. And the staggering capabilities of the computer, though they can be helpful to investors, still fall far short of clairvoyance.[55]
>
> In my view it is unlikely that the computer will displace the informed judgment of the trained analyst, partly because of the crucial problem, alluded to earlier, of evaluating the personal qualities of the management team.[56]

In the late 1960s, computers were "coming into increasing use" in the research departments,[57] connoting a clear association with the fields of science and engineering,[58] even though their use was to a large extent confined to handling the record-keeping, dissemination of trading information and surveillance procedures.[59] Though useful, computers have been conceived as helpful only with dealing with "quantitative stuff,"[60] compiling comparative statistics and processing raw data, thus saving the analyst's time for "low-grade moron work."[61] Thus, at best, computers would be most helpful for the technical analysis, forecasting trading volume and prices,[62] but the analyst "cannot hope to be truly scientific because it is concerned with the qualitative as well as quantitative judgments, and it is forced to deal with portentous imponderables."[63] Hence the emphasis Maynard puts on what Knorr-Cetina calls "proxy ethnography"[64] conducted by fundamental analysts:

> Most importantly, he [the analyst] must have earned the confidence of a wide range of persons in the industry or industries in which he specializes. He achieves this relationship by visits to corporate executives in their offices, by attendance at industry conventions, by participating in group industry tours, and the like. A close personal relationship of this kind is desirable for two reasons. First, it is the soundest method of gaining insight into the qualities of management, which, after all, are a force even more important than economics in the success or failure of businesses.[65]

---

[55] Rolo, "Introduction: A Portrait of the Ideal Investor," 5–6.

[56] Maynard, "Inside the Research Department," 32.

[57] Maynard, "Inside the Research Department," 31.

[58] Geiger, "Investing in Science and Technology."

[59] Myron Kandel and Philip Greer, "'Inside the New York Stock Exchange,'" in *The Anatomy of the Wall Street: A Guide for the Serious Investor*, ed. Charles James Rolo and George J. Nelson (Philadelphia and New York: J.B. Lippincott Company, 1968), 16.

[60] Rotnem, "The Valuation of Common Stocks: The Fundamentalist's Approach," 146.

[61] Geiger, "Investing in Science and Technology," 108.

[62] Perhaps the best version of this argument is provided by a fable Merrill relates in his book: after the practical knowledge of "every famous investment adviser and noted analyst from the Street" has been installed into a giant computer, the best advise it could produce read "buy low… sell high." See Arthur C. Merrill, *Investing in the Scientific Revolution: A Serious Search for Growth Stocks in Advanced Technology* (Garden City, New York: Doubleday & Company, Inc, 1962), 115.

[63] Rotnem, "The Valuation of Common Stocks: The Fundamentalist's Approach," 145.

[64] Knorr-Cetina, "Financial Analysis: Epistemic Profile of an Evaluative Science."

[65] Maynard, "Inside the Research Department," 30.

Maynard's second point related to the opportunities of getting timely inside notices enabled by a personal contact with the company representatives, useful for anticipating the daily price movements (the primary concern of the technical analyst); however, the qualities of the company management — not in terms of its corporate governance structure,[66] but qua people — is the best proxy to the fundamental success or failure of businesses. "The security analyst is profoundly concerned with the human factor, a zone in which judgments must of necessity be highly subjective," preventing his working hypotheses from becoming "scientific."[67]

The abundance of data did not make the qualified judgment obsolete but necessitated it. No analyst or investor can keep up with the "flood of research studies that are available," often for free; hence what is valuable is the "research work" that justifies the high salaries of senior analysts and allows their clients to profit from timely recommendations:

> Because of the present-day size of institutional portfolios, a million-dollar shift from one stock to another is a fairly common occurrence… These research costs are still low in relation to the profit potential…The total amount of money spent on all these services, and on others less well known, must be tremendous, and nobody can say whether it is well spent or not. The right advice is worth a fortune on Wall Street, but there is no accepted measure of what is right and what is wrong.[68]

Finding out the "intrinsic value" is a process of discovery, "a perception of the future values and potentialities not discounted in present market prices,"[69] "this is the true function of entrepreneurship in every field — to deploy the artistic intuitions of the mind and knowledge gained from experience within a framework of hard fact."[70] The division of labor within research departments corresponded to this understanding of the essence and purposes of security research. Senior analysts were distinguished as capable of the right judgment, as well as of expressing it in compelling writing; junior analysts were supposed to do the routine communication and data processing work which can also be outsourced to econometricians, statisticians or experts on some particularly complex or novel industries (like drugs, electronics, or antitrust matters); junior analysts may also be charged "with the responsibility for following the smaller and less important companies in an industry."[71]

Notably, some of the leading analysts of the time described their profession as a species of literary career or journalism, emphasizing the editing and writing skills, creativity and imagination: "the research departments of the larger firms are, in effect, in the publishing business."[72] Similar to Graham, the "father" of security analysis, who resembled the image of a humanistic intellectual, rather than a narrowly professionalized expert, most of the contributors to the 1968 symposium

---

[66] Cf. Zhiyuan Simon Tan, "The Construction of Calculative Expertise: The Integration of Corporate Governance into Investment Analyses by Sell-Side Financial Analysts," *Accounting, Organizations and Society* 39, no. 5 (2014): 362–84.

[67] Rotnem, "The Valuation of Common Stocks: The Fundamentalist's Approach," 146.

[68] Stone, "Wall Street's 'Knowledge Industry,'" 23–25.

[69] Rotnem, "The Valuation of Common Stocks: The Fundamentalist's Approach," 147; Rolo, "Introduction: A Portrait of the Ideal Investor," 5.

[70] Erpf, "The New American Capitalism," 248.

[71] Maynard, "Inside the Research Department," 30–31.

[72] Maynard, "Inside the Research Department," 29–32.

of "top-flight Wall Street professionals"[73] were "financial men of letters," with much of their career (and sometimes also education) devoted to publishing, writing columns, editing, journalism, and similar activities.[74] A long enough experience of reading analytical publications — the Wall Street's research industry's main output — and trade press was considered a sufficient education in economics).[75] Even though many research departments employed economists in charge of making forecasts "of the overall course of the economy" and doing econometric studies, "the most notable part of the output of a research department is not its statistical calculations and recapitulations of the record, but its appraisals of the future, that is, its forecasts" concerning specific stocks.[76] The conventional wisdom held that formally trained economists are no better than anyone else in this respect; hence their training had no advantage.[77] Adopting Mary Morgan's distinction, security analysis of the time could be contrasted to quantitative finance as a "verbal tradition,"[78] and in a quite literal sense, since the primary form of the analysts' "insights" is verbal:

> Many people poke fun at Wall Street' so-called guessing game and consider the whole business of research reports and market letters just a "come-on" aimed at the sucker public. Nothing could be further from the truth in the present-day environment. […] The old days when Wall Street research was largely consigned to low-paid statistical hacks are long since gone. The opinions of today's leading industry specialists are not just market comment; they often are the stuff that makes markets. A well-researched

[73] Rolo and Nelson, "Foreword," v–viii.

[74] Among the disciples, Graham enjoys a reputation of a genius able "to pull together strands of thought from many different sources and weave them into a precious new fabric… blend[ing] insights from his mastery of mathematics, his decades of experience on Wall Street, his encyclopaedic knowledge of classic literature and philosophy, and his profound understanding of human psychology — combining all these forms of learning into an analysis of investing no one has ever surpassed before or since." (See Jason Zweig, "A Different Perspective on Graham," *Financial History* 86/Summer (2006): 27; Butler, "Benjamin Graham in Prespective," 27). Having completed his B.S. from Columbia in 1914, he had been offered teaching positions in philosophy, mathematics, and classics, but preferred to apply himself on the Wall Street, returning to the business school for lecturing in 1927, and assuming a guest professorship of finance in 1952. Besides security analysis, he also tried his hand as a playwright. See Jason Zweig, "A Note About Benjamin Graham," in Benjaming Graham, *The Intelligent Investor. A Book of Practical Counsel. Revised Edition*, ed. Jason Zweig (1949; New York: Harper Collins Publishers Inc., 1984), xi; Thurman W. Van Metre, *A History of the Graduate School of Business, Columbia University* (Columbia University, New York: Morningside Heights, 1954), 74.

[75] Stone, "Wall Street's 'Knowledge Industry.'"

[76] Maynard, "Inside the Research Department," 29, 31.

[77] As Bernard Baruch explained before the Congress in 1956: "After 1929, these businessmen and everybody […] had to go to a doctor. The only economic doctor is an economist and they go to him and say, "Professor, what about so and so?" And these men can take facts and figures and bring them together, but their predictions are not worth any more than ours. If they were, they would have all the money and we would not have anything […] if economists could predict what was going to happen in the future, I rather suspect — I do not know, but I rather suspect — that they all would speculate if they knew, and they could make a lot of money." See Baruch's testimony in U.S. Congress, *Hearings before the Committee on Banking and Currency, United States Senate, Eighty-Fourth Congress, First Session, on Factors Affecting the Buying and Selling of Equity Securities* (Washington, DC: United States Government Printing Office, 1956), 1002.

[78] Morgan, "Economics."

> buy and sell recommendation… may well influence the price of a particular stock for months to come.[79]

Arguably, during the 1950s and 1960s, it was this "verbal tradition" — with its emphasis on the importance of the qualitative judgment and the printed word, entrepreneurial operation and reliance on a loose, non-disciplinary skillset — that defined the stock market expertise, resisting the potentially destructive impact of the emerging quantitative, mathematical, academic body of financial knowledge. The challenge came from elsewhere.

Investing in Scientific Revolution

The 1950s-1960s period witnessed a renewed interest in the world of finance: the long "bull market" of 1954-1969 was the time when high-tech corporations began to jostle with the traditional "blue chips" of the Dow Jones, and "investment, Wall Street, the financial markets — in the 1960s, all these were once again interesting, even exciting."[80] Financial analysts found themselves at the intersection of the two major changes of the post-war American economy: on the one hand, the increasing recognition of the commercial possibilities of science and technology, on the other hand, a renewed interest in equity financing.[81] With the priorities of national economic policy shifting from the stabilization of the economy towards "acceleration of economic progress" as one of its central goals, the dramatic increases of both federal and private R&D spending spurred a "research revolution" that caught the eye of some leading economists.[82] At the same time, "long pent-up consumer demand and the development of new products by revolutionary technologies generated dreams of vast expansion for American business. In the 1950s and 1960s, these forces… helped to push stock prices to unprecedented heights, and activity soared on the NYSE."[83] By 1953, it could be said that while common stock investing "was once considered synonymous with gambling," it has become so respectable after the war that "the principal questions were not whether one should buy common stocks, but what and when to buy."[84] The authors of one of the first post-war studies of common stocks concluded that, provided the economy will grow and expand, "as we believe it will, common stocks may be expected to

---

[79] Stone, "Wall Street's 'Knowledge Industry,'" 24.

[80] MacKenzie, *An Engine, Not a Camera : How Financial Models Shape Markets,* 74. On the long "bull market," see Charles R. Geisst, *Wall Street: A History* (New York: Oxford University Press, 1997).

[81] Janice M. Traflet, *A Nation of Small Shareholders: Marketing Wall Street after World War II* (Baltimore, MD: Johns Hopkins University Press, 2013).

[82] U.S. Government, *Economic Report of the President Together with the Annual Report of the Council of Economic Advisors* (Washington, DC: United States Government Printing Office, 1962); see also Brine and Poovey, *Finance in America : An Unfinished Story*, 291–92. Thus, in 1962, the Harvard economist Wassily W. Leontief contributed a preface to the book devoted to this issue, writing: "not only the development of new products, but the methods employed to make these products depend more and more on the results of industrial research." See Wassily W. Leontieff, "Preface," in *The Research Revolution*, ed. Leonard S. Silk (New York, Toronto, London: McGraw-Hill Book Company, Inc., 1963), 6.

[83] Myron Kandel and Philip Greer, "Inside the New York Stock Exchange," in *The Anatomy of the Wall Street: A Guide for the Serious Investor*, ed. Charles James Rolo and George J. Nelson (New York: J.B. Lippincott Company, 1968), 12.

[84] Wilford J. Eiteman and Frank Percy Smith, *Common Stock Values and Yields; a Study of Common Stocks as Long-Term Investments with Particular Emphasis on Investment Yields (Michigan Business Studies ; v. 11, No. 3)* (Ann Arbor: Bureau of Business Research, School of Business Administration, University of Michigan, 1953), 7.

continue the upward trend they have followed for fifty or more years," having become "an integral part of our economic life."[85]

On the financial side of the economy, these developments pushed the "Wall Street firms and individual investors to discover the electronics industry in the mid-1950s, which led to a speculative boom in electronics stocks and to the emergence of a new literature on high-tech investing," including *Investing in the Scientific Revolution* by Arthur C. Merrill and *Science and Technology Stocks: An Investor's Guide* by Grant Jeffery.[86] When their books were published, both authors were finance professionals, and the books' immediate audience consisted mostly of their peers; both books were reviewed by the Financial Analysts Journal.[87] However, Merrill and Jeffery aspired to speak to a broader public, invoking the figure of the "small," unprofessional, individual investor that had been forged in the regulatory debates of the turn of the century but lost much of its appeal since the crash of 1929.[88] Moreover, departing from the conventions of the genre of "investment guidebooks," they focused less on how to profit in the stock market, offering broader speculations about the promises of the current scientific and technological developments instead.[89] However, Merrill's and Jeffery's focus was primarily on the stock markets, and beyond the financial circles, both books were regarded as expressing "the market's point of view" on the new technologies.[90] Writing in the aftermath of the electronics boom that ended by 1962, in part, they wanted to address the resulting "excesses of skepticism."[91]

The significance of this emerging literature on high-technology investing is beyond a mere attempt to restore the investors' confidence in one particular industry.[92] To express "the market's point of view" on the emerging technologies required a particular restructuring of the very categories used by the market — that is, by financial analysts who, as argued in the previous section, still dominated the field of financial market expertise. However, the new economic and investment environment demanded some change in their categories and tools. The essential features of Graham and Dodd's approach were tainted by the disastrous experience of the 1920s. First, it emphasized the analysis of the company's "fundamentals" — most importantly, the price to earnings ratio (P/E), subsuming "all the qualifying factors entering into the appraisal of common stocks — the whole gamut of security analysis, industry analysis, and evaluation," and understood as a proxy to the firm's "intrinsic value."[93] Second, it was also decisively risk-averse. The central task of the

---

[85] Eiteman and Smith, *Common Stock Values and Yields*, 35.

[86] See Lécuyer, *Making Silicon Valley: Innovation and the Growth of High Tech, 1930–1970*, 333; Merrill, *Investing in the Scientific Revolution: A Serious Search for Growth Stocks in Advanced Technology*; Grant Jeffery, *Science and Technology Stocks: An Investor's Guide* (Doubleday: Cleveland, 1961).

[87] Donald H. Randell, "Review," *Financial Analysts Journal* 18, no. 3 (1962): 117–18.

[88] See Julia Ott, *When Wall Street Met Main Street: The Quest for an Investors' Democracy* (Cambridge, Mass.: Harvard University Press, 2011).

[89] For a taste of the genre, see, e.g., Burton Crane, *The Sophisticated Investor. Revised and Expanded by Sylvia Crane Eisenlohr* (1959; New York: Simon and Shuster, 1964); Louis Engel and Brenden Boyd, *How to Buy Stocks* (1953; Boston: Little, Brown, 1982).

[90] See "Books of the Week," *The Science News-Letter* 80, no. 27 (1961): 434; "Books of the Week," *The Science News-Letter* 81, no. 11 (1962): 172.

[91] Jeffery, *Science and Technology Stocks: An Investor's Guide*.

[92] See also Geiger, "Investing in Science and Technology."

[93] Erpf, "The New American Capitalism," 245. One of the first articulations of the idea of a stock's intrinsic value dates back to the political economic debates of the seventeenth century which

analyst was to identify and buy undervalued securities ignored by the market — an explicit lesson from the 1920s speculation in "watered" (overvalued) stock — and hold them, waiting for the inevitable market "correction."[94] Such a strategy was considered more secure than a bet on the uncertain future growth: "it is manifest… that future changes are largely unpredictable, and that security analysis must ordinarily proceed on the assumption that the past record affords at least a rough guide to the future."[95] More importantly, Graham's approach offered a way of treating asset classes and risk "before these concepts were placed on a statistical basis."[96] Their conception of risk was neither opposed to nor confused with uncertainty: "they did not think about risk in statistical terms… did not measure risk in relation to an asset class, an investor's portfolio, or the market as a whole… risk had no statistical component," it was "like loss, absolute… unsurmountable and inevitable."[97] Essentially, Graham and Dodd's security analysis was a "vernacular" classification of assets (stocks and bonds), itself based on the fundamental distinction between an "investment" and "speculation": for the former, the future "is essentially something to be guarded against," while the latter "derives its basis and its justification from prospective developments that differ from past performance."[98] The analysis should be concerned "primarily with values which are supported by the facts and not those which depend largely upon expectations."[99]

In the midst of the electronics boom, many analysts felt that this classification was becoming increasingly obsolete — and Graham himself was among the first to acknowledge this. In 1958 he argued that the nature of the "speculative elements" of common stocks has changed: "in the past," the latter were related to the company itself, "due to uncertainties, or fluctuating elements, or downright weaknesses in the industry, or the corporation's individual set-up"; now these speculative elements have considerably diminished, opening the way for the "new speculation":

> ...a new and major element of speculation has been introduced into the common-stock arena from outside the companies. It comes from the attitude and viewpoint of the stock-buying public and their advisers-chiefly

"popularized and reconfigured" this "ancient ethical concept," later taken over in the didactic commercial literature that emerged around the South Sea company bubble. See William Deringer, "For What It's Worth: Historical Financial Bubbles and the Boundaries of Economic Rationality," *Isis* 106, no. 3 (2015): 652.

[94] This term originates in the early 20th century American accounting debates regarding the value of the new corporations that emerged in the Great Mergers Movement of the last decade of the 19th century. "Watering" refers to "any number of practices… thought to misrepresent the relationship between the corporation's legitimate assets and its total capitalization… a corporation could issue bonds to purchase securities declared necessary to expand its operations, and then sell the securities and distribute the income in dividends without retiring the underlying debt." See Brine and Poovey, *Finance in America : An Unfinished Story*, 33–34; Julia Ott, "What Was The Great Bull Market? Value, Valuation, and Financial History," in *American Capitalism: New Histories (Columbia Studies in the History of U.S. Capitalism),* ed. Christine Desan and Sven Beckert (New York: Columbia University Press, 2018), 63–85.

[95] Graham and Dodd, *Security Analysis,* 68–69.

[96] Brine and Poovey, *Finance in America: An Unfinished Story*, 147.

[97] Brine and Poovey, *Finance in America*, 152.

[98] Graham and Dodd, *Security Analysis*, 109.

[99] Graham and Dodd, *Security Analysis*, 38.

> us security analysts. This attitude may be described in a phrase: primary emphasis upon future expectations.[100]

In Graham's view, this new attention to future growth, necessarily based on uncertain assumptions, allowed to "justify… practically any value one wishes," hence "hence at times the market may conceivably value the growth component at a strikingly low figure."[101] Other analysts concurred, arguing that the distinction between "value" and "growth" investing no longer made sense: by the end of the decade, the consensus opinion held that since the investor's primary concern is the growing earning power, "whether that is represented in the dividend or retained earnings account makes no difference [...] income is a dollar bill, whether it comes in the form of a dividend check or appreciation and subsequent sale of all or a portion of a common stock holding."[102] Common stock investing simply was growth investing. The blurring lines between investment and speculation, income and growth, spurred a concern regarding the usefulness of the instruments of security analysis,[103] most sharply in the field of science and technology investing, since the companies operating there "are by their very nature strongly oriented toward the future. It would hardly be an exaggeration to say that they must grow or perish."[104] Hayden, Stone analysts summarized the challenge:

> As the perimeter of industrial technology is pushed further ahead by basic and applied research the investor and security analyst face problems that are temporarily unique and perhaps indeterminate of solution. Chief among these problems is the analysis of new product possibilities and the forecast of earning power that must be deduced from limited and even ephemeral data. The complexity of modern technology may, indeed, result in an intellectual barrier.[105]

The barrier could be resolved in two ways. A securities firm could hire scientists in the consulting capacity, or "set up yardsticks to measure and define… the attraction of companies that are investments on the perimeter"; however, these yardsticks could no longer be based simply on "an attempt to project past performance."[106] At the 1960s Financial Analysts Convention, one distinguished member of the profession addressed his colleagues, stating that "applied science companies" are the fields "where the earnings multiple is subordinated to the gamble on the ultimate breakthrough and where it must be recognized that little institutional support can be expected for these shares whenever the market breaks"; it was, therefore, one of the duties of the analyst to "be an investment counsellor in

---

[100] Benjamin Graham, "The New Speculation in Common Stocks," *Financial Analysts Journal* 14, no. 3 (1958): 17.

[101] Graham, "The New Speculation in Common Stocks," 17.

[102] Dan W. Lufkin, "Investing for Growth," in *The Anatomy of the Wall Street: A Guide for the Serious Investor*, ed. Charles James Rolo and George J. Nelson (Philadelphia and New York: J.B. Lippincott Company, 1968), 97.

[103] Leland E. Dake, "Are Analysts' Techniques Adequate for Growth Stocks?," *Financial Analysts Journal* 16, no. 6 (1960): 45.

[104] Geiger, "Investing in Science and Technology," 116.

[105] Morris Kronfeld and Arthur Rock, "Some Considerations of the Infinite," *The Analysts Journal* 14, no. 5 (1958): 87.

[106] Kronfeld and Rock, 87–88; see also Merrill, *Investing in the Scientific Revolution: A Serious Search for Growth Stocks in Advanced Technology*, 69–85.

a broad sense, and advocate that the investor have his resources allocated in a full spectrum from solid equities to the spices of fine adventure in space and science."[107]

Somewhat less cautious than the members of the craft, Merrill launched an explicit attack on Grahamian principles of security analysis, arguing that they are obsolete in the time of "scientific revolution." The Great Bull Market of 1920s has since 1929 become the familiar trope in the American discussions of "price, value, and valuation,"[108] to which Merrill did not fail to appeal in constructing his narrative. The scientific progress of the day ensured, for Merrill, a solid base for the stock market expansion, contrary to the trading in watered stocks of the late 1920s. First, according to him, the established metrics used by "traditionally trained financial analysts," such as price to earnings ratio, are no longer applicable, since in the case of "science companies," "often there are no earnings, merely prospects… successful early investor is not buying current earnings and dividends, but processes and patents — not plants and equipment, but brains and exclusive positions in new industries of the future."[109] The centrality of the "science companies" and the "science investor" in the Cold War economy necessitate the development of "new tools for an old job" with an emphasis on the future instead of the past.[110]

> Qualitative security analysis.... is a method of selecting securities which places primary emphasis on the potential of the product, the quality of the people, and the promise of the future — rather than solely on a rummage through the record, a review of the ratios, and the study of the statistical past.[111]

Finally, the universal applicability of new technologies (such as electronics) makes them difficult to classify and leads conventional industry categories to disintegrate: instead of a "stock market," the investor is dealing with "the market of stocks."[112] Modern technology "is a synthesis of numerous powerful techniques": for example, computer technology "serves all markets."[113] To make things worse, it is also not immediately clear which part of the new technology is innovative and which runs the risk of rapid obsolescence:

> A klystron and an X-ray tube are not T.V. tubes or radio tubes. On the other hand, are they fundamental departures? Will they result in a net addition to economic space in terms of new firms, markets, employment, and investment opportunities? Modern science has blurred any semblance of clairvoyance that we may have occasionally enjoyed in the analysis of standard industrial problems. Dependable statistical standards in the new fields simply do not exist.[114]

---

[107] Pierre R. Bretey and Warren Burns, "The 1960 Financial Analysts Convention," *Financial Analysts Journal* 16, no. 4 (1960): 88–89.

[108] Ott, "What Was The Great Bull Market? Value, Valuation, and Financial History," 64.

[109] Merrill, *Investing in the Scientific Revolution: A Serious Search for Growth Stocks in Advanced Technology*, 7.

[110] Merrill, *Investing in the Scientific Revolution*, 89.

[111] Merrill, *Investing in the Scientific Revolution*, 94.

[112] Merrill, *Investing in the Scientific Revolution*, 16, 32.

[113] Geiger, "Investing in Science and Technology," 105–6.

[114] Kronfeld and Rock, "Some Considerations of the Infinite," 87; Geiger, "Investing in Science and Technology," 120.

All these developments — the obsolescence of industry categories, merging of growth and value investing, inadequacy of P/E ratios and statistical record more generally, exacerbated in the case of science companies — warranted a new emphasis on the companies and their managers. "Management is of paramount importance," some argued, being the bearer of the "intellectual premium" that conventional P/E analysis is incapable of capturing.[115] When studying a science-based company — especially of a "venture" type — the investor should "not become so mesmerized by its exciting products or processes that you fail to look carefully into the caliber of management."[116] In the same way as one cannot "put a stock into a test tube," company management, too, "clearly, cannot be put into a test tube,"[117] hence the only feasible resort for a security analyst would be the ability to judge people.[118]

Financial Singularities

These developments, leading to a temporary disintegration of the central categories of security analysis — its "calculative frame" — were less destructive for its more marginal categories.[119] In fact, the Grahamian framework had a mechanism of dealing with the singularity of unique companies and "situations" that defied established industry categories and measurements, as was the case with science and technology companies. A prolific writer, Graham repeatedly revised his categories and the corresponding "patterns" (by which the new issues of securities could be classified as, e.g., "true bonds," even though the title of the issue failed to describe it "with accuracy"). Thus, in a 1946 article, he took stock of the market activity during 1939-42 and summarized it in the concept of "special situations," which, while distinct from speculation, did not "permit a clear-cut and final definition."[120] "A special situation in a broader sense" was defined as "one in which a particular development is counted upon to yield a satisfactory profit in the security even though the general market does not advance. In the narrow sense, you do not have a real "special situation" unless the particular development is already under way."[121] Such "developments" were further broken down into "classes," including arbitrages, reorganizations, cash payouts, litigation, public utility breakups, and the residual "Class F" for "everything we have not already classified."[122] Graham did not invent the term but tried to give it a more precise meaning; it was generally known in the financial community of the immediate post-war years.[123]

Subsequently, Graham briefly returned to "special situations" in his 1949 book *The Intelligent Investor*, where he emphasized their investment (non-speculative) character, since "the purchase is always predicated on a thoroughgoing

---

[115] Kronfeld and Rock, "Some Considerations of the Infinite," 90.

[116] Geiger, "Investing in Science and Technology," 118–19.

[117] Rotnem, "The Valuation of Common Stocks: The Fundamentalist's Approach," 145.

[118] Kronfeld and Rock, "Some Considerations of the Infinite"; Merrill, *Investing in the Scientific Revolution: A Serious Search for Growth Stocks in Advanced Technology*.

[119] On the notion of "calculative frames," see Beunza and Garud, "Calculators, Lemmings or Frame-Makers? The Intermediary Role of Securities Analysts."

[120] Benjamin Graham, "Special Situations." *The Analysts Journal* 2, no. 4 (1946): 31.

[121] Graham, "Special Situations," 31.

[122] Graham, "Special Situations," 37.

[123] See, e.g., H. William Knodel and M. C. Fergenson, "The 'Value Line' Method," *The Analysts Journal* 5, no. 2 (1949): 45–46; Stanley L. Kaufman, *Practical and Legal Manual for the Investor* (New York: Oceana Publications, 1956), 88; John H. Allan, "Brokers Hire More Analysts: See Growing Impact on the Market," *Financial Analysts Journal* 17, no. 5 (1961): 89.

analysis that promises a larger realization than the price paid" and the risk factors can be calculated and diversified away.[124] Investment in "special situations" was included in the list of common stock operations advisable for an "enterprising investor," along with buying in low markets and selling in high, choosing "growth stocks" and buying bargain issues.[125] "Special situations" remained a catch-all category and included liquidations, inter-security arbitrages, hedges, existing in the blurred "area where no true distinction exists between bonds and common stocks."[126] "Over many years," such investments could bring an annual return of "20% or better, with a minimum overall risk to those who knew their way around in this field."[127] Graham considered "special situations" a distinct "technical branch of investment" that required "a somewhat unusual mentality and equipment," suitable for only a few of the "enterprising investors," and did not discuss them in any further detail.[128] In 1956, when he was called upon to provide expert testimony on the stock market study to the Congressional Banking and Currency Committee, he explained that special situations belonged to a subclass of undervalued securities, "which upon study is believed to have a probability of increasing in value for reasons not related to the movement of stock prices in general, but related to some development in the company's affairs," and whose identification was a matter of judgment and experience.[129] In sum, "special situations" represented an alternative to Graham's primary approach of constructing a diversified portfolio of undervalued investments and, although intrigued him, seemed "of considerably less significance" because of their rarity and short-term character: "activities along these lines hardly seem appropriate for a general and continuing portfolio strategy."[130]

The intrigue had to be explored by someone else. Just a year before the Congressional Committee hearings, Graham's Wall Street colleague, Maurece Schiller of Newburger Loeb (Graham's former firm), published a book on special situations, to be followed by a series of sequels.[131] Schiller attempted to develop an investment strategy based on "special situations." The imprecise meaning of the term aroused skepticism of the analysts, who referred to "special situations" as a "currently stylish term"[132] or a "fetish catch phrase... often applied to any issue that,

---

[124] Benjamin Graham, *The Intelligent Investor: The Definitive Book on Value Investing. A Book of Practical Counsel (Revised Edition)*, ed. Jason Zweig, (1949; HarperCollins Publishers Inc.: New York, 1984), 522.

[125] Graham, *The Intelligent Investor*, 156.

[126] Graham, *The Intelligent Investor*, 155.

[127] Graham, *The Intelligent Investor*, 155.

[128] Graham, *The Intelligent Investor*, 175.

[129] US Congress, *Hearings before the Committee on Banking and Currency, United States Senate, Eighty-Fourth Congress, First Session, on Factors Affecting the Buying and Selling of Equity Securities*, 519.

[130] Douglas A. Hayes, "The Undervalued Issue Strategy," *Financial Analysts Journal* 23, no. 3 (1967): 122.

[131] See Maurece Schiller, *Special Situations in Stocks and Bonds* (New York: Research & Appraisal, 1955); Maurece Schiller, *Stock Market Profits through Special Situations* (Larchmont, N. Y.: American Research Council, 1964); Maurece Schiller, *Investor's Guide to Special Situations in the Stock Market* (American Research Council: Larchmont, N.Y, 1966). Little is known about Schiller's biography. Maurece Schiller (1901-1994) began his career in 1922 on the Wall Street, in 1930 he joined Graham's former firm, Newburger Loeb, and specialized in the research on investment risk. His archive was held at the New York Institute of Finance and did not survive the 9/11 attacks. More information can be found at: http://maureceschiller.com.

[132] Kaufman, *Practical and Legal Manual for the Investor*, 88.

in the opinion of the broker, will do "better than the market.""[133] Schiller acknowledged that, but argued that "true" "special situations" could be found as a result of "extensive research into a particular investment, combined with the application of some good "common sense," thus being perfectly compatible with the rationale of Grahamian security analysis.[134] Schiller defined a "special situation" as an investment in stocks and bonds that "are in the process of reflecting "corporate action" which occurs within the administrative scope of the corporation rather than at the business level of the company."[135] The basic prerequisite for recognizing a "special situation" was to distinguish between the business and the administrative sides of a corporation — the investor is not interested in the actual production of goods and services, focusing instead on

> ...the very existence of the company as distinguished from its products. Our corporate identity is responsible for the fundamental purpose of the corporation being in business. It is concerned with the finances that represent the money invested in the company, i.e., the capital structure. This part of the corporation also directs the policies effecting the nature of the company and administration of the corporation's functions as a unit.[136]

Schiller argued that such a focus allowed the investment to be "free" from the influence of the prevailing economic conditions and the stock market trend. Here Schiller was not original, following in the footsteps of other analysts: for some time "special situations" have been considered as the "flee from the "bear or bull market" approach to security purchases,"[137] a way for sophisticated investors to make money during the times when "the owning of stocks may be out of favor."[138] It was the "corporate action," not the market "level," that produced the profit potential; the profits could be realized upon its completion. Because the "corporate action" is self-liquidating in nature (hence all "special situations" are to an extent analogous to liquidations),[139] dividend policy was largely irrelevant, since it implied a continued existence of the company; the self-liquidating character of investments also freed the investor from the uncertainty as to the timing of purchasing and selling.[140] Initially, Schiller proposed four requirements for a situation to be considered "special": "a specific "corporate action" is in existence; the security is undervalued; the investment must be calculable; the security should be at a minimum risk level"; a combination of these elements in one security indicates a "special situation."[141] This definition was then repeated in the subsequent treatments of the issue.[142]

---

[133] Belmont Towbin, "Special Situations: A Discussion of Their Investment Characteristics," *The Analysts Journal* 9, no. 5 (1953): 85.

[134] Schiller, *Special Situations*, 3.

[135] Schiller, *Special Situations*, 5.

[136] Schiller, *Special Situations*, 7.

[137] Towbin, "Special Situations: A Discussion of Their Investment Characteristics," 85.

[138] E. George Schaefer, *How I Helped More Than 10,000 Investors To Profit In Stocks* (Prentice-Hall, Inc.: Englewood Cliffs, NJ, 1964), 209. According to Towbin, "the true "special situation" is one that will appreciate in market price because of factors inherent in the particular security, regardless of general business conditions or of the future level of the stock market." See Towbin, "Special Situations: A Discussion of Their Investment Characteristics," 85.

[139] Schiller, *Special Situations*, 59.

[140] Schiller, *Stock Market Profits through Special Situations*, 8.

[141] Schiller, *Special Situations*, 4.

[142] Schiller, *Stock Market Profits through Special Situations*; Schiller, *Investor's Guide to Special Situations in the Stock Market*.

What positively distinguished "special situations" from "ordinary investments" were "romance" or "windfall": "the glamour that the investor obtains without costs. It is an added attraction, unique in "special situations," in that it can have but one effect, and that is beneficial, whereas in the conventional investment or speculation the romance may be a decisive and costly element in the investment."[143] Clarifying these rosy metaphors later, Schiller referred to "unexpected additional values which frequently come to light in special situations" and "unexpected profit, hidden asset, culmination of latent values and the realization of great hopes and expectations," pointing to the somewhat blurred status "special situations," occupying the space between Grahamian alternatives of investment and speculation (although Graham acknowledged that no clear-cut distinction can be made).[144] The main difference between a "special situation" and speculation was outlined as follows:

> A "special situation" showing a capital gain of 10% on an annual basis should have a probability of nine to one in favor of success. While the percentage gain could be considerably higher in numerous instances, the risk probability should not increase in the same ratio. Should that occur, then the situation would be a speculation rather than a "special situation" investment.[145]

This distinction, as well as much of the other material unrelated to specific cases, would appear unchanged in his later volumes.[146] Importantly, Schiller insisted on the public availability of information necessary to recognize a "special situation": a focus on the "corporate action" did not imply access to restricted information; the investor was supposed to study trade press, company publications, and S.E.C. reports and obtain information from the company representatives: "special situations investments by their very nature eliminate guesswork… all information one needs can be obtained [...] the clues are there"[147]; "by definition, all information about them is publicly available."[148] Hence "the windfall factor would come into being as a result of a study of the case" and "the very act of recognizing a profit opportunity is the act of creating a special situation investment."[149]

In the 1964 sequel, Schiller sharpened the focus, defining "special situations" as "securities influenced by unusual specific circumstances" for capital appreciation and using the term interchangeably with "corporate actions."[150] Schiller The essential requirements remained the same — independence from the market trends, minimal risk, undervaluation, and availability of information; however, the investment purpose was now explicitly defined as capital gains. The list of categories of "special situations" now also included "Unique Action Situations," defined, predictably, as "the presence of corporate action combined with uniqueness," denoting rarity or dynamic management. The category included companies changing their "traditional arena of operations," developing unique relationships,

---

[143] Schiller, *Special Situations*, 5.
[144] See the Glossary in Schiller, *Stock Market Profits through Special Situations*.
[145] Schiller, *Special Situations*, 14.
[146] Schiller, *Stock Market Profits through Special Situations*, 10.
[147] Schiller, *Special Situations*, 16–17.
[148] Schiller, *Investor's Guide to Special Situations in the Stock Market*, 174.
[149] Schiller, *Special Situations*, 74, 104.
[150] Schiller, *Stock Market Profits through Special Situations*, 1.

e.g., with the local authorities, or diversifying as a result of the management ability to grasp "new ideas."[151]

However, the category of "Unique Action" situations was somewhat deviant within Schiller's framework: these situations were "unusual," unrelated to the core principle of the proposed classification: for "Unique Action" situations, "corporate action is not necessarily the catalyst. However, in its creation, some form of corporate action probably has taken place at an earlier time."[152] Unique Action situations included such cases as common stock issued by governmental organizations (like Federal National Mortgage Association), corporate bonds with protective provisions, tax ruling establishing new corporate structures, "something new in the concept of a business," "New Era companies," industrial development bonds, among other things: "Unique Action situations would not be numerous in any one aspect of singularity. In some respects, they are rather like a "lone wolf" ventures, making it necessary to follow the analysis of each circumstance in the "unique status."[153] In other words, these investments were true financial singularities: thus, the "New era products" included "innumerable developments of recent years" and compelled the investor to look "for the exceptional symbolized by oneness"; Unique Action categories are "singular… each unusual stock has unusual characteristics," thus "no typical trading methods are applicable, since each Unique Situation is by nature a singular circumstance. Basic principles of prudent investing would obtain."[154] Again, unlike "special situations" more generally, the termination of which was a foreseeable in the short term, "if the Unique Action ultimately terminates in the distant future, it would be prudent to let the investment incubate," rather than selling immediately upon the completion of the "corporate action."[155]

A subcategory within Unique Action situation was "Space Age Situations," the arena of "promise of developing Unique Situations rising from products and ways of doing things that have not yet been contemplated," companies whose products result from research and development and which are "born with dramatic growth prospects."[156] These cases included the scientific industries: electronics, nucleonics, chemicals, drugs, high energy fuels, semiconductors, electrical machinery, data processing, infrared, communications, and materials. For such situations, in addition to the "incubation" period of the investment, Schiller suggested the tactics of the early entry ("Entering a situation at an early point in development offers the investor greatest profit potentials (and of course attendant risks)") and diversification of holdings "at the early and usually low price stage" that "offers potential of dynamic development. Not all companies would be equally successful; nor would it be possible to predict the category with the greatest development."[157] Finally, for a Space Age situation, the management ability was crucial: "The management of a Space Age Company, like the company itself, may be young and unproven, but in matured and successful situations extreme capability is

[151] Schiller, *Stock Market Profits through Special Situations*, 9.
[152] Schiller, *Stock Market Profits through Special Situations*, 83.
[153] Schiller, *Stock Market Profits through Special Situations*, 84–85.
[154] Schiller, *Stock Market Profits through Special Situations*, 86–87.
[155] Schiller, *Stock Market Profits through Special Situations*, 87–88.
[156] Schiller, *Stock Market Profits through Special Situations*, 89.
[157] Schiller, *Stock Market Profits through Special Situations*, 90–91.

conspicuous. However, the capitalization of a company can be most revealing in respect to the character of controlling management."[158]

In his final analysis of the "special situations" investments, Schiller reiterated the basic definitions, but again changed the classification, adding a new group of situations labeled "internal development."[159] Now "special situations" included "new technological developments," such as computers or space technology.[160] Science companies did not exhaust, but firmly belonged to the range of possible "special situations," being included in the definition as members of the "internal development" class: "corporate existence in the fields of science and advanced technology is in itself a qualification for special situation interest."[161] More generally, "internal developments" were characterized by "something beyond routine growth" in the sense of "unexpected development" or "participation in a branch of industry that in itself is something special," with "capital gains potential not directly dependent upon movements of the general securities market."[162] Capital gains in this category were expected to develop in response to the successful development of the company's "special feature": products with markets broader than initially foreseen, or belonging to the "advanced scientific and technological developments," being deeply involved in research and development.[163] In line with his previous treatment of the Space Age Situations, Schiller suggested that the most critical factors in dealing with such cases are the fact that "time for development may be protracted" and "breakthroughs in discoveries can have an explosive impact on securities."[164] Here, while large companies do most of industrial research, smaller companies engaged in "a specific area of scientific/technological development" may offer greater capital gains and "more dynamic benefits."[165] The list of scientific fields reproduced the 1964 version, with the addition of drug and water pollution. Repeating his advice for diversification of holdings, Schiller insisted that the primary object of analysis in the case of "internal development" situations should be the very "special feature" that defines such a company, and that "personal contact is the best way" of getting the information necessary for the analysis.[166]

"Special situations" deviated from Graham's approach from the very beginning, since "No historical record of the stock will help in evaluating it for merger or dissolution."[167] In a 1955 paper on technical analysis, the author proposed a method of analyzing the price movements patterns, noting that it was, however, incapable of reflecting special situations.[168] While he explored the area at the margins of fundamental analysis, Schiller remained firmly within its framework, perhaps even pushing some of its aspects further to the extreme. He shared Graham and Dodd's emphasis on extensive research and the "absolute" conception of risk; however, the latter's focus on the "intrinsic value," temporary diverging from the

---

[158] Schiller, *Stock Market Profits through Special Situations*, 91.
[159] Schiller, *Investor's Guide to Special Situations in the Stock Market*, 172.
[160] Schiller, *Investor's Guide to Special Situations in the Stock Market*, 15.
[161] Schiller, *Investor's Guide to Special Situations in the Stock Market*, 174.
[162] Schiller, *Investor's Guide to Special Situations in the Stock Market*, 172.
[163] Schiller, *Investor's Guide to Special Situations in the Stock Market*, 173–74.
[164] Schiller, *Investor's Guide to Special Situations in the Stock Market*, 174.
[165] Schiller, *Investor's Guide to Special Situations in the Stock Market*, 174.
[166] Schiller, *Investor's Guide to Special Situations in the Stock Market*, 177.
[167] Knodel and Fergenson, "The 'Value Line' Method," 46.
[168] Morris Peckman, "A Means for Measuring Market Movements," *The Analysts Journal* 11, no. 5 (1955): 76.

market price, still defined the analysis in relation to the market, since the fundamental value of the company could be realized once the market "corrected" itself. On the contrary, Schiller suggested a more radical form of "fundamentalism," emphasizing a complete independence of "special situations" from the general market trend: "the idea of establishing a complete transaction comprised of a purchase and sale which contained an existing profit… was radically different from the familiar purchase and the ensuing wait and hope for a profit to develop."[169]

Moreover, such a shift in emphasis allowed Schiller to virtually ignore the principle of going concern — his "special situations" focused on changes in the very "existence" of the corporation, disregarding dividend policy and other considerations pertaining for a long-term holding of the stock in favor of short-term, foreseeable profits realizable upon completion of a "corporate action." If Graham and Dodd's *Security Analysis* was indeed concerned with "security" in the singular — treating it as a bundle of rights and liabilities in the context of a specific company,[170] its financial position, and timing of the issues of its securities, — Schiller first elevated the capital structure as the crucial concern, since it defined the possibilities for the desired "corporate action," taking into account the operational context (science and technology) of the company, and subsequently devoted great lengths to the "unique" and "singular" situations. Over the decade since his first book on "special situations" was published, Schiller kept his list expanding, adding new residual, open categories that explicitly deviated from the general principles of classification he tried to establish ("Unique Situations," "Space Age Situations," "internal development group"), leaving the analyst with little more than a family resemblance between the various types of the special "investment media." However, these very inconsistencies proved vital during the period when Grahamian analytical categories and instruments were misled by the market's reaction to the new technologies. The openness of "special situations" and the residual character of this category allowed analysts like Schiller considerable flexibility of interpretation at the same time as the core of Graham and Dodd's security analysis — the search for undervalued stocks through the analysis of the past record of the firms — was increasingly coming under attack from writers like Merrill and Jeffery.

Conclusion

On April 23, 1946, the *New York Times* reported that the Rockefeller siblings had formed a limited partnership in January of that year, with the purpose to "find, investigate and finance new, productive and constructive businesses and projects" to make permanent or long-term investments and manage and supervise" such investments. By the time of reporting, "it was learned that the partnership had investigated various "special situations" but had not yet made investment of its funds."[171] Eighteen years later, William Elfers, a former associate of Georges F. Doriot, the "father of venture capital" at American Research and Development Corporation, submitted a proposal to Sherman Fairchild to invest in Greylock, an investment firm newly created in Boston: "It is suggested that a partnership… be

[169] Schiller, *Special Situations*, 3.

[170] Brine and Poovey, *Finance in America : An Unfinished Story*, 149–50.

[171] "SIX ROCKEFELLERS TO INVEST JOINTLY: PARTNERSHIP WITH A CAPITAL OF $1,500,000 AIMS TO FIND AND FINANCE NEW BUSINESSES," *New York Times,* April 23, 1946, 24.

formed for the purpose of investing in special situations and ventures."[172] In the years to come, Greylock would become one of the most famous venture capital firms, endowed with a reputation of the ARD's spinoff.

Something happened between 1946 and 1964. The gradual disintegration of the "calculative frame"[173] of Grahamian security analysis helped to create a niche for venture capital investments in their modern form — professional, diversified, focused on capital gains from high-tech investment[174] — offered opportunities for some of the early venture capitalists to begin to build a professional identity. As Berlin observes, in the 1950s and 1960s, many venture capitalists were coming into the nascent industry from financial, rather than technological, backgrounds.[175] Arthur Rock, Charles Lea, Reid Dennis, Peter Bancroft, William Bowes, William Draper were trained or had a career as either securities or investment analysts; throughout the 1950s, they worked for investment companies and funds on Wall Street or elsewhere, performing the standard tasks of fundamental analysts, including the company visits. Thus, on the one hand, they had an opportunity to gain first-hand experience with young science companies, and on the other hand, they were able to draw on the existing vocabularies and categories to make sense of their engagements. Here, the open and flexible category of "special situations" appears to have found its vocation.

Before Reid Dennis managed to engage Fireman's Fund into investing in technological ventures in 1960, he spent eight years doing fieldwork — visiting small high-tech companies on behalf of the fund, and learning what they were doing; at the same time, Wall Street securities analysts, like Arthur Rock and Charles Lea, following the precepts of security analysis and the internal division of labor between the senior and junior analysts, were also visiting the emerging science companies across the country.[176] Draper, Gaither & Anderson, the first independent limited partnership V.C. firm on the West Coast, founded in 1959, adopted a similar language, describing their business as "special situations"[177]: "just looking for special situations, that was what it was called,"[178] and if it was high tech, it wasn't called that way:

---

[172] Ante, *Creative Capital: Georges Doriot and the Birth of Venture Capital*. See William Elfers, "A Program for Risk Capital Investment, for Sherman Fairchild and Walter Burke," 8 September 1964, Correspondence–Burke, Walter and Fairchild, Sherman, 1964-1997. William Elfers papers, Mss:784 1965-2003 E39. Box 1 Folder 9, Baker Library Special Collections, Harvard Business School, p. 5.

[173] Beunza and Garud, "Calculators, Lemmings or Frame-Makers? The Intermediary Role of Securities Analysts."

[174] Florida and Kenney, "Venture Capital and High Technology Entrepreneurship."

[175] Berlin, "The First Venture Capital Firm in the Silicon Valley: Draper, Gaither & Anderson."

[176] Arthur Rock, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2008 and 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), pp. 16–18; Charles L. Lea Jr., "Venture Capital Greats: A Conversation with Charles L. Lea," interviewed by Carole Kolker on October 10 and 11, 2008, in Easton, Maryland (National Venture Capital Association, Arlington, Virginia, 2009).

[177] "'Special situations' or 'private investments'... That's what we called them in those days". See: Paul Bancroft III, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2010 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010), pp. 21–23.

[178] William H. Draper, III, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," oral history conducted by Sally Smith Hughes in 2008 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), p. 21.

> [...] it was technology. It was people with a new idea. It was often called special situations. General Anderson, when he talked about our investments, he'd talk about special situations. Venture capital became more and more the common term as we progressed."[179]

In 1966, upon the death of General Anderson, the partnership was dissolved, falling short of bankruptcy by a small margin.[180] In the same year, Schiller published his final treatment of "special situations," and the term appeared on the pages of *Financial Analysts Journal* together with "venture capital," among the "less conventional practices" of creating "probabilities of a good investment performance": "Approaches such as especially emphasizing turn-arounds, liquidations, "values," *small special situations, or venture capital equivalents*, can be used to good advantage if the investor is properly equipped emotionally and analytically."[181]

In the early 1960s, writers like Merrill and Jeffery argued that misleading P/E values of the electronics companies — and scientific companies more generally — did not mean a return to the 1920s speculation, but that they reflected genuine potential inside the science companies that required "new tools for the old job." At the same time, analysts like Schiller — as well as young security analysts in charge of following the small "science companies," like Arthur Rock — exploited the flexibility and the residual character of "special situations" at the margins of more established ways of making sense of financial markets. Schiller's emphasis on independence from the market trend allowed to focus on the science and technology companies, while the more conventional analysts were perplexed by the market moves; expanding the temporal horizon of a "special situation" investment ("incubation period"), he nevertheless kept the ultimate "exit" for capital gains in sight, thus prefiguring later venture capital practices; his non-probabilistic principles of diversification were also adopted in the early days of venture capital when the performance benchmarks were nonexistent, and venture capitalists had to rely on "heuristics," rather than statistics[182]; finally, the blurred boundary between investment and speculation — the possibility of realizing "great hopes" combined with the foreseeability of risks — suggested that an investment in a science company could be something more than a gamble.

In other words, before the term "venture capital" was widely publicized, practices akin to its contemporary forms were emerging "interstitially" at the margins of corporate hierarchies, guided by the search procedures and categories borrowed from the field of security analysis, whose standards of practice were increasingly questioned.[183] "Special situations" thus, on the one hand, made the new "science companies" legible for the stock market; on the other hand, being embedded in an established professional repertoire, allowed early venture

---

[179] See William H. Draper, III, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," oral history conducted by Sally Smith Hughes in 2008 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), p. 28.

[180] Berlin, "The First Venture Capital Firm in the Silicon Valley: Draper, Gaither & Anderson."

[181] J. Parker Hall III, "Toward Effective Portfolio Management," *Financial Analysts Journal* 22, no. 1 (1966): 94. Emphasis added.

[182] Author's interview with Bill Sahlman, Harvard Business School (01.12.18).

[183] The concept of "interstitial emergence" is developed in the first chapter of Michael Mann, *The Sources of Social Power: Volume 1: A History of Power from the Beginning to AD 1760* (1986; Cambridge: Cambridge University Press, 2012).

capitalists to make sense of their investments and legitimize their sometimes exceptional character. It might have been much more difficult for something like contemporary venture capital to emerge at the time when the random-walk perspective on financial markets was gradually rising to prominence, without the emphasis on research and heuristics, independence from the market trends and the possibility of "breakthroughs" impacting the value of securities characteristic of "special situations" investment. On the other hand, the emerging shifts in the analytical focus from companies to people ("management") left some room for qualitative (and qualified) judgment. Like stocks, people cannot be "put into a test tube"; however, at the close of the 1960s, new techniques for developing a "people-based" heuristics started to emerge in the investment circles of Boston and Midwest, and a new concern with nurturing the "right" people — turning engineers to entrepreneurs — started gradually becoming visible. These developments are the topic of the following chapter.

Chapter V. Turning Engineers into Entrepreneurs

The progressive advance of this industrial system towards an all-inclusive mechanical balance of interlocking processes appears to be approaching a critical pass, beyond which it will no longer be practicable to leave its control in the hands of business men working at cross purposes for private gain, or to entrust its continued administration to others than suitably trained technological experts, production engineers without a commercial interest.

Thorstein Veblen, *Engineers and the Price System*

Introduction

In August 1955, The Analysts Journal published a paper on "Security Analysis in a Science-Oriented Society," an early example of the analysts' increasing reflexivity regarding the status and, more importantly, the tools and techniques of their craft, that ensued since the mid-1950s and peaked towards the middle of the next decade, with the publication of Merrill's Investing in the Scientific Revolution and other similar titles.[1] The author of the piece, in a characteristic mixture of "spontaneous sociology" and practitioner's reflections, argued that "our society has reached a point where it may now best be considered as a science-oriented society."[2] The crucial feature of this new social order, according to Morgner, consisted in the scale of "scientific discovery and practical invention," no longer practiced by "hundreds of widely scattered men guided by simple curiosity and unappreciated by the rest of society": instead, "the number of people engaged in science and practical research has increased to over a million, if we include the members of scientifically trained professions like medicine."[3] With the "advances in knowledge… now increasingly planned," he argued, it became vitally important to create and preserve a "social organization" conducive for the making, developing, and utilizing the "basic additions to knowledge."[4] For a security analyst, the advent of the "science-oriented society" necessitated a broadening of the conventional procedure of securities valuation: in addition to looking for "growth stocks," the analyst now was responsible for "a more thorough investigation of the research activities of businesses," "some evaluation of the character and quality of the research work done by firms," especially pure research "for its own sake."[5] Towards the end of the 1950s, American security analysts were becoming increasingly conscious of the necessity to attend to such matters by gaining first-hand knowledge of the companies beyond their hitherto accepted "calculative frame" centered on the price-to-earnings multiples, and thus blurring the vital distinction between an overvalued company whose stock was heavily "watered," and a promising "scientific company" whose research and development effort in the future would lead to commercial results worth any price in the present. Writing in 1955, Morgner anticipated much of this argumentation, but also went one step further, suggesting that "it is also very

[1] A. Morgner, "Security Analysis in a Science-Oriented Society," *The Analysts Journal* 11, no. 4 (1955): 59–61.

[2] Morgner, "Security Analysis in a Science-Oriented Society," 59.

[3] Morgner, "Security Analysis in a Science-Oriented Society," 59.

[4] Morgner, "Security Analysis in a Science-Oriented Society," 59.

[5] Morgner, "Security Analysis in a Science-Oriented Society," 60.

important to know something about the morale of a research department," elaborating on this thesis as follows:

> Significant creative work is a delicate flower that blooms only in an atmosphere that is most difficult to create. Genuine interest in the problem at hand, respect for one's fellow research associates, recognition for accomplishment, and the all-important feeling of being a part of creative organization are vital to an environment in which the creative mind can flourish. To date, universities have been far, far more successful than business in creating such environments. A wise business management will be concerned with these problems and may well seek the aid of social scientists in making studies of the conditions productive of effective research.[6]

One year after Morgner's paper appeared in The Analysts Journal, in September 1956, Harper Woodward, an associate of Laurance Rockefeller's venture capital organization, gave a talk before the Tenth Annual Conference on Administration of Research, a practical discipline — or, rather, an "immature science," in this respect not dissimilar to security analysis itself, — centrally concerned with creating and maintaining environments in which "creative work" could flourish.[7] Woodward, a graduate of Harvard College, where he served as a secretary to James B. Conant, and Harvard Law School, worked in Pentagon procurement during the war and joined Laurance Rockefeller in 1946.[8] Addressing the audience of research administrators in 1956, he was making a case for venture capital as a niche source of research funding, complementary to the established federal and corporate alternatives, building on his experience as an associate at Rockefeller's venture capital operation, which by then included a half-dozen projects in airborne instrumentation, aviation, and nuclear technologies.[9] Conceding that venture capital funding is no more than "a mere drop" in the sea of the federal investments in research, he suggested that it was more truthful to the "rather basic American heritage" of independent enterprise:

> This, stated simply, is the concept that the individual or group of individuals who think they have new and pioneering concepts that they want to develop and exploit (in the best sense of the word) will have a fair chance of achieving their objective without being "sold down the river" in the process.[10]

---

[6] Morgner, "Security Analysis in a Science-Oriented Society," 61.

[7] Harper Woodward, "Venture Capital Investment in Research," speech at the Tenth Annual Conference on Administration of Research, The Pennsylvania State University, September 7, 1956. Peter O. Crisp papers, Mss:784 1946-2008 C9325. Box 1 Folder 19. Baker Library Special Collections, Harvard Business School. On "immature sciences," see Hacking, "Michel Foucault's Immature Science."

[8] See Peter O. Crisp, "Venture Capital Greats: A Conversation with Peter O. Crisp," interviewed by Carole Kolker on October 21, 2008, in Mill Neck, New York, National Venture Capital Association, Arlington, Virginia, p. 8; see also Alfred E. Clark, "HARPER WOODWARD, LAWYER, IS DEAD," *New York Times*, April 17, 1981, 16.

[9] See Peter O. Crisp to Prof. Robin W. Winks, "Selected Venture Investments. LSR and Family/Venrock Associates," February 4, 1997. Peter O. Crisp papers, Mss:784 1946-2008 C932. Box 1 Folder 3, Baker Library Special Collections, Harvard Business School.

[10] Woodward, "Venture Capital Investment in Research," p. 2.

Echoing Vannevar Bush's (1945) metaphor of "science, the endless frontier," Woodward compared the "individual with pioneering concepts" to a twentieth-century analog of Daniel Boone, the American folk hero-frontiersman, and offered a generalization about the relevant type of the person: "he is a type of individualist who is occasionally not quite as good as he thinks, but who is far too restless to be content as part of a large corporation's happy, but sometimes over-administered family of R&D people."[11] Woodward also mentioned such qualities as optimism, salesmanship, and creative talent, warning that, although this "should not be construed as a criticism of the large corporation," the "slow tortoise," "the turtle soup is not for those who like rabbit stew": "Hence, the need for recognition of the brilliant, individualistic person, who wants to do something on his own, who wants to be a proprietor, and who wants to "leave his mark" on the product or result of his effort."[12] "The American tradition of opportunity" invoked by Woodward was immediately coupled with a more specific set of aspirations and desires of the "creative people," by whom he meant "scientists and engineers." These people wanted, in Woodward's view, "the logic and facts — rather than the "power of ownership" — [to] dominate corporate decisions," and for a reason: "Some creative people, like boys or girls in different school environments, are more effective and more creative in an environment that is partially of their own creation," rather than "in one into which they are compelled."[13] Woodward's larger point was to suggest that this set of aspirations can, and should, be realized in practice. Addressing research administrators, he argued that, with the non-dominating and helpful presence of a venture capitalist, scientists and engineers are quite capable of running successful businesses based on their research and development work:

> There are people who believe that any company in which the creative people own even a substantial minority interest is headed for trouble. We have not found this to be true. In one of our most successful electronics ventures, the original technical group holds about 40% of the equity.[14]

Despite the contemporary prejudice, an engineer can make a good executive, argued Woodward, citing the experience of Laurance Rockefeller venture capital operation: only two out of eight engineers-founders retired because of their failure "to retain the confidence of the company directors that they were qualified to act as chief executives," only to be succeeded by other engineers.[15] Therefore, what was needed was a certain process of nurturing the "creative people" to become proper businesspersons without compromising their sense of independence. To reconcile these two needs, Woodward suggested a financial solution — namely, the ownership incentives "native" to the small business with its "sense of proprietorship":

> To the people with whom we have worked in the past ten years, it has been a real and strong stimulus. It has meant an opportunity, by stock option plans or otherwise, for the management of these companies to have a

[11] Woodward, "Venture Capital Investment in Research," p. 2. See also Vannevar Bush, *Science: The Endless Frontier* (Washington, D.C.: U.S. Government Printing Office, 1945).

[12] Woodward, "Venture Capital Investment in Research," p. 3.

[13] Woodward, "Venture Capital Investment in Research," pp. 3–4.

[14] Woodward, "Venture Capital Investment in Research," p. 7.

[15] Woodward, "Venture Capital Investment in Research," p. 7.

> substantial share and stake in the ownership, growth, and appreciation of value of the business for which they are so largely responsible.[16]

Woodward was cautious enough not to launch a fully-fledged criticism of the large corporation, suggesting, instead, that small size was more conducive for innovation because it allowed more freedom and independence for the "creative people" capable of producing new ideas, products, or services. He argued that the small firm does not compete but complements the large one by being more effective at innovation, thereby also creating a niche for venture capital investing. However, Woodward also added that "new ventures need not always grow by the bootstrap method":

> Many creative people, dedicated to independence and going-it-on-their-own, find it desirable with growth and success to re-appraise their own positions. They find that, although the sort of independence they wanted may have been the best climate for early growth, it may at some point be desirable to grow stronger faster, either by joining another group of comparable size or by becoming part of a much larger company.[17]

Thus, "the idea of growth by merger or affiliation is not at all inconsistent with the concept of promoting small, independent development groups," Woodward concluded. He envisioned a symbiotic relationship between the world of corporate giants and venture capital-backed small innovative companies, perhaps formed through what would a decade later be called "spin-offs," by a team of "creative specialists" leaving a larger organization. Venture capitalists' role in this scheme was to re-socialize the "creative people," turning them into the proper businessmen by offering financial and managerial incentives that would fulfill their sense of independence and bring them back to the corporate world.

Woodward's arguments paralleled the thinking of securities analysts surveyed in the previous chapter. Witnessing the electronics boom of the late 1950s, they developed the notion of "management" understood as the key variable in evaluating small companies based on advanced science and technology. In so doing, they somewhat deviated from, and somewhat extended the precepts of conventional security analysis, codified by such practitioners as Benjamin Graham and others, as the "human factor" was rapidly acquiring the central importance in evaluating companies. Thus, the room for a new body of knowledge concerned with "people" was created or, rather, emerged spontaneously as the analysts struggled to repair their accepted cognitive architecture, –fundamental security analysis centered around the price-to-earnings ratio, — applying marginal strategies like "special situations" investing, previously outflanked to the fringes of their conceptual apparatus. Moreover, in the immediate aftermath of the boom, some of the early venture capitalists, like Woodward and Arthur Rock, joined forces with the "fortune-tellers" like Arthur Merrill and Grant Jeffery, arguing that investing in what they called the "scientific revolution" was more than a speculation — there was indeed a fundamental economic dynamic behind the fancy stock market moves. During the latter half of the 1950s and the early 1960s, they were traveling across the US and addressing different audiences, from electronic manufacturers to business schools' alumni societies, in an attempt to clarify the meaning of venture capital investing as

[16] Woodward, "Venture Capital Investment in Research," p. 8.
[17] Woodward, "Venture Capital Investment in Research," p. 8.

they practiced it, and to legitimize these activities by drawing a boundary between speculating in science and technology stocks, and the calculated bets on the "long shots" they were advocating. Engaging in this "boundary work," they were offering some tentative generalizations about the kind of people who ran the "scientific companies," thus joining a broader intellectual movement to forge a new "positivity" for the knowledge of "management."[18] Following the developments in security analysis, they were moving the notion of "management" from a residual that remains after all the formal metrics have been (unsatisfactorily) analyzed to a category with some positive content.

The Problem of Research Administration

Sharing his observations on "technically creative people" at a conference of research administrators, Woodward was literally speaking the latter's language. The problem of research administration, or research management, emerged in the immediate aftermath of World War II, with researchers and government officials becoming increasingly concerned with the changing "social organization" of research activity, as Morgner put it in his paper on the "science-oriented society." The wartime growth of government-sponsored research, continued after the war and transformed into "self-conscious promot[ion], not just of technological change but of perpetual technological revolution" after the USSR's launch of the Sputnik satellite in 1957, spurred a growing recognition of its increasingly collective, "teamwork," character, as well of the managerial challenges resulting therefrom, both by the researchers in social and natural sciences, and by research administrators, who were often recruited from the ranks of the former.[19] The initial articulation of the problem of research management followed from President Truman's Executive Order of October 1947, commissioning a survey of administrative procedures in government agencies, by the time absorbing over a half of the national $1,160 million research and development budget.[20] Directed by John R. Steelman, Chairman of the President's Scientific Board, the study yielded a three-volume report and a strong argument for a coordinated national science policy.[21] One volume of the report, favorably received by the research community, was specifically devoted to the issue of research administration, acknowledging that, "by the nature of things," scientists must be "much less subject to the usual controls and regulations" of administrative character, and have the opportunities for "interesting and valuable work," professional recognition, and freedom, as far as

[18] On "boundary work," see Gieryn, "Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists."

[19] See Walter A. McDougall, "Technocracy and Statecraft in the Space Age--Toward the History of a Saltation," *The American Historical Review* 87, no. 4 (1982): 1011; see also Fred Block, "Swimming against the Current: The Rise of a Hidden Developmental State in the United States," *Politics and Society* 36, no. 2 (2008): 169–206; Weiss, *America Inc.? Innovation and Enterprise in the National Security State*; on the Sputnik Effect, see Robert A. Divine, *The Sputnik Challenge* (Oxford: Oxford University Press, 1993).

[20] Charles V. Kidd, "The Federal Government and the Shortage of Scientific Personnel," *Science* 105, no. 2717 (1947): 84–88; W. V. Lambert, "The Administration of Federal Research," *Science* 107, no. 2773 (1948): 179–83; Dael Wolfle, "The Government and Research," *Public Administration Review* 8, no. 1 (1948): 71–74.

[21] John R. Steelman, *Administration for Research: Volume Three of Science and Public Policy. A Report to the President* (Washington, DC: US Government Printing Office, 1948); John R. Steelman, "'Science and Public Policy,'" *Bulletin of the Atomic Scientists* 4, no. 1 (1948): 23–31.

possible, from nonscientific work. Accordingly, research administrators' key task was to "provide a favorable climate in which the scientific staff can work."[22]

The reflections on the administrative problems of research in the late 1940s were primarily driven by the government officials themselves (the "administrators"). They revolved around the issues of managing large (governmental) organizations employing scientists and engineers, the latter's motivation, professional status, individualism, and creativity as potential obstacles in the management of such an organization, as well as the broader problem of coordination of the national scientific effort. In the words of a research administrator from the Department of Agriculture, the managerial challenge was to deal with "highly specialized personnel who, by their training and experience, are inclined to be more individualistic in their thinking than most members of society," and hence critical of "the supposed limited opportunities for advancement, even for brilliant and original research workers, and the lack of freedom in choosing projects to be undertaken."[23] Similar issues were reported in relation to the employment of scientists in the War and the Navy Departments: "petty, but irritating discrimination" regarding budgetary allowances for travel and accommodation, the fact that top-level scientists are forbidden to sign the research reports over their signatures, thus being devoid of professional recognition, salary levels evaluation in terms of administrative, rather than scientific, responsibilities, and the "more basic problem" of "the supervision of the work of highly competent scientists by officers who do not have a full understanding of the work for which they are responsible."[24] Thus, it was argued that research administrators should make "every effort… to insure that the working conditions are appropriate to research. These mean freedom in performance of research and freedom to publish and to exchange information with colleagues."[25] Social scientists occasionally contributed to this thinking, reflecting on their experience of working in the military agencies during the war: wartime research effort was recognized as distinct in its interdisciplinarity, group character (as opposed to the individual work), and the organizational environment in which it took place — "practically the empirical polar type of bureaucratic social organization. All the definitive characteristics of bureaucracy reach an especially high level of development in a modern Army, and in the Department, which has official jurisdiction over the Army."[26] Such an experience opened up new possibilities and new challenges, it was argued: firstly, "team research is feasible and productive to a degree which would not have been generally acknowledged as possible in many academic circles a few years ago," that is, before the war; however, it also "introduces important *new* problems of organization, motivation, and of research standards and ultimate purposes."[27]

---

[22] Wolfle, "The Government and Research," 71; Walter J. Murphy, "'More Steelman Reports,'" *Chemical & Engineering News* 25, no. 42 (1947): 3067.

[23] Lambert, "The Administration of Federal Research," 179.

[24] Kidd, "The Federal Government and the Shortage of Scientific Personnel," 87.

[25] Alan T. Waterman, "Government Support of Research," *Science* 110, no. 2870 (1949): 706.

[26] Robin M. Williams, "Some Observations on Sociological Research in Government During World War II," *American Sociological Review* 11, no. 5 (1946): 573; Ralph H. Turner, "The Navy Disbursing Officer as a Bureaucrat," *American Sociological Review* 12, no. 3 (1947): 342; Robert K. Merton, "Role of the Intellectual in Public Bureaucracy," *Social Forces* 23, no. 4 (1945): 405–415.

[27] Williams, "Some Observations on Sociological Research in Government During World War II," 574, original emphasis.

These reflections, framed in terms of the tension between bureaucracy and teamwork on the one hand, and the researchers' creativity and individualism on the other hand, also appealed to research administrators from private institutions, thereby spurring a recognition that the challenge of managing "creative workers" employed in public bureaucracies was rather similar to that encountered by the administrators of corporate research laboratories and industrial research organizations. Similar to the 1940s' argument that wartime research effort put the scientist into a new, impersonal and bureaucratic, organizational environment, thus marking a departure from the previous, artisanal and individualistic regime of work based on the smooth face-to-face communication, private industrial research was recognized as "mainly teamwork, whereas academic research is individualistic."[28] One contributor to the debate on the pages of The Scientific Monthly was Raymond Stevens, vice president of Arthur D. Little: speaking as someone who "has been engaged in industrial research since 1920," he argued that as a "creative worker" similar to the type usually found in the arts and philosophy, "the researcher in science will fall under many of the general rules for [this] type. He presents, however, a problem peculiar to the management of a research organization or to the executive of the research department of a company."[29] And, just like the governmental research administrators before them,[30] managers of the private research laboratories began to recognize the "less tangible" aspects of management of the "creative people," inviting management consultants and psychologists to help overcome the challenges of this process: "A good research man seems to need energy, drive, and an urge to create something not currently existing or to develop or improve existing things. Our experience tells us he also needs to "get along."[31]

By the mid-1950s, these reflections, resulting from the wartime experience of large-scale, organized research, as well as from the Federal Government's data-gathering efforts under the framework of a "national accounting for R&D,"[32] turned increasingly specialized and sophisticated, while at the same time bifurcating intellectually. In his history of the "industrial scientist" as a form of life, Steven Shapin has documented the dynamics of different discourses that laid competing truth-claims over the condition of industrial research workers employed by the large US corporations.[33] The intellectual underpinning of the academic commentary "from the Ivory Tower," according to Shapin, was the structural-functionalist tradition in sociology, stressing the (allegedly unsurmountable) differences

---

[28] Raymond L. Randall, "The Dynamics of Research Administration," *Public Administration Review* 12, no. 4 (1952): 288; Paul Talmey and Gregoire Gutzeit, "Research in a Highly Diversified Corporation," *The Analysts Journal* 10, no. 3 (1954): 137; Robert W. Lamson, "The Present Strains between Science and Government," *Social Forces* 33, no. 4 (1955): 363–64.

[29] Raymond Stevens, "Viewpoint of the Research Administrator," *The Scientific Monthly* 72, no. 6 (1951): 364.

[30]-See W. H. Sebrell and C. V. Kidd, "Administration of Research in the National Institutes of Health," *The Scientific Monthly* 74, no. 3 (1952): 152–61.

[31] J. E. Caldwell and Charlotte Panimon, "Projective Testing in an Industrial Research Organization: One Experience," *The Journal of Business* 28, no. 1 (1955): 67.

[32] Benoît Godin, "Research and Development: How the 'D' Got into R&D," *Science and Public Policy* 33, no. 1 (2006): 59–76.

[33] Steven Shapin, "Who Is the Industrial Scientist? Commentary from Academic Sociology and from the Shop-Floor in the United States, ca. 1900-ca. 1970," in *The Science–Industry Nexus: History, Policy, Implications: Nobel Symposium 123*, ed. Karl Grandin, Nina Wormbs, and Sven Widmalm (Sagamore Beach, MA: Science History Publications, 2004), 337–63; Shapin, *The Scientific Life : A Moral History of a Late Modern Vocation*, 93–164.

between the institutional values of academic and industrial cultures. Because of the Cold War era-anxieties of the university-based social scientists and humanists, especially their concern with the autonomy of science, this "Ivory Tower commentary" tended to focus on the "unhappy industrial scientists" and "in large part (not wholly) deduced its objects from theory," neglecting the empirical data, more faithfully communicated by the "Shop-Floor commentary" of R&D managers in charge of corporate research laboratories.[34] Committed neither to theory-building, nor to the idea of institutional value differences between industry and academia, the latter had a firmer empirical grip over industrial science as a form of life, observing, against the predictions of academic theorists, that "newly recruited academic scientists became too quickly and too totally accepting of the values and research agendas of what they took to be corporate, as opposed to academic, culture."[35] More generally, in contrast to "the academic commentary on research management, shop-floor writing displayed no interest whatever in making points of general sociological interest, in using passages of research management as "case-studies" for any other purpose than coming to some more-or-less robust findings about recurrent problems in and about the industrial laboratory."[36]

However, the intellectual bifurcation documented by Shapin and marked by the roughly contemporaneous founding of the two commentaries' major publication venues — *Administrative Science Quarterly* (ASQ) by the Graduate School of Business and Public Administration at Cornell University in 1956, and *Research Management* (RM) by the Industrial Research Institute, Inc. in 1958, — did not prevent intellectual exchanges between the more systematic and theory-driven academic discourse, and the more ad-hoc and practice-oriented reflections of corporate research administrators.[37] Despite the differences in emphasis and orientation, both "Ivory Tower" and "Shop-Floor" commentaries shared several important assumptions regarding the nature of the scientific work and the organizational settings most conducive for it, inherited from the post-war problematization of research administration, as well as from the longer cultural history of the "men of science."[38] Thus, while the academics' suspicions of the potentially corruptive influences of industrial research culture on the virtues of science, as well as their emphasis on the values split between the university and the corporation might have been exaggerated, to some degree, research management discourse was permeable for the academic concerns and, conversely, in some instances, academic sociologists and management scholars seem to have voiced succinctly the issues research administrators were grappling with on the shop floor. For the present purposes at least, it is important to stress continuities and mutual

[34] Shapin, "Who Is the Industrial Scientist? Commentary from Academic Sociology and from the Shop-Floor in the United States, ca. 1900-ca. 1970," 353–54; Michael Aaron Dennis, "Our Monsters, Ourselves: Reimagining the Problem of Knowledge in Cold War America," in *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*, ed. Sheila Jasanoff and Sang-Hyun Kim (Chicago and London: University of Chicago Press. Pp, 2015), 56–78.

[35] Shapin, "Who Is the Industrial Scientist? Commentary from Academic Sociology and from the Shop-Floor in the United States, ca. 1900-ca. 1970," 350.

[36] Shapin, 342; Shapin, *The Scientific Life : A Moral History of a Late Modern Vocation*, 130–31.

[37] Shapin, *The Scientific Life : A Moral History of a Late Modern Vocation*, 117–20.

[38] Steven Shapin, "The Man of Science," in *The Cambridge History of Science: Early Modern Science*, ed. Lorraine Daston and Katharine Park, vol. 3 (Cambridge: Cambridge University Press, 2006), 179–91.

influences, rather than differences, between the discourses of academics from universities and business schools, and practicing research managers, as expressed in their leading trade publication, *Research Management* (RM).

Research Management magazine was founded in 1958 by the Industrial Research Institute, Inc. (IRI). Based in Arlington, Virginia, the IRI was established in 1938 as the National Industrial Research Laboratories Institute by the Industrial Research Division of the National Research Council in order to expand the analytical effort devoted to the problems of research and development and technological innovation that began during World War I and became an independent non-profit organization in 1945.[39] Following the 1957 Fall Meeting of the IRI Board, the Quo Vadis Committee established earlier that year recommended to organize a series of conferences on research administration issues. These conferences were supposed to serve as a means of systematic collection, reporting and disseminating of the "up-to-date, diversified, and multilevel fund of information related to all the areas, phases, and processes of research administration" possessed by IRI membership, and were based on the study group approach.[40] In 1958, the topic of research administration loomed large across industrial and governmental research communities, provoking an "intense interest" rooted in research administrators' "pressing daily problems."[41] The IRI assumed leadership in the industrialists' debate of these issues. In a 1959 contribution, Vice President of Research at the US Industrial Chemicals Company wrote that "this subject of research administration, as you know, is one of the cornerstones of the Industrial Research Institute."[42] The study groups gathered from the late 1950s through the 1970s, discussing various issues of importance for the corporate research managers, and becoming increasingly receptive to the academic inputs from the mid-1960s onwards. However, even at the time of its founding, RM contributors, representing research managers and directors from various industries, defined their managerial problems in a way not dissimilar to how it was framed in the academic debates.

Organizing Creativity

Two such debates were particularly relevant for the thinking of research administrators in the late 1950s and the early 1960s. On the one hand, sociologists and political scientists, especially those committed to the project of creating a general theory of administration and administrative behavior, tended to view research administration as a particular case within this more general framework.[43] Thus, the third issue of the *ASQ* was entirely devoted to the challenges of research administration, addressing such issues "teamwork and creativity in research," based on the assumption that "traditional methods of administration are frequently inappropriate when applied to a scientific enterprise"[44]; arguing for the

[39] Godin, "Research and Development: How the 'D' Got into R&D."

[40] Thomas H. Vaughn, "The Research Management Study Group Program of the Industrial Research Institute," *Research Management* 3, no. 2 (1960): 93.

[41] Ralph R. Richardson, "Research Toward Specific Goals: Development of the Light-Weight, Two-Cycle Diesel," *Research Management* 1, no. 2 (1958): 85.

[42] Stuart Schott, "Are Research Administrators Getting Lazy," *Research Management* 2, no. 3 (1959): 139.

[43] Edward H. Litchfield, "Notes on a General Theory of Administration," *Administrative Science Quarterly* 1, no. 1 (1956): 3.

[44] George P. Bush and Lowell H. Hattery, "Teamwork and Creativity in Research," *Administrative Science Quarterly* 1, no. 3 (1956): 361.

improvement of communications between researchers and administrators as a way to address recurrent problems of managing a "research corporation"[45]; and suggesting that the scientists employed in a governmental medical research organization "tend to perform more acceptably" when given the opportunity to work closely with colleagues coming from a variety of backgrounds, as well as when "supervisors provide frequent stimulation combined with autonomy of action."[46]

These tensions between research creativity and its organizational environment were articulated in a slightly different manner in the discussions of industrial relations and management scholars, who focused on the condition of the "professional employee" in industrial organizations.[47] Relying on psychological projective tests and standardized attitude surveys, these studies focused on the generalized figure of the "professional," often explicitly modeled on the scientists and engineers working in industrial research laboratories.[48] However, different from the sociological inquiries, industrial relations scholars argued that the increasing importance of the work of "professionals" and "technical specialists" in the industry necessitated changes in organizational and societal hierarchies, drawing on the humanistic traditions of management thought of Elton Mayo and Mary Follett.[49]

> With the growing importance of technical activities in industry, one might expect that engineers and other professional employees would find considerable satisfaction in their work. Under such circumstances it would seem that the technical "brains" of the nation would derive more than average satisfaction from their key position in society. The evidence, however, appears to be quite to the contrary. The technical experts, engineers, and other professionals in industry seem to be far more frustrated than satisfied.[50]

In turn, these observations from the shop floor of industrial research laboratories fed back into the mainstream of managerial theorizing.[51] For the practicing research managers who participated in the IRI Study Groups and contributed to RM, the theoretical concepts of "creativity" and "professionalism" were also valuable, at least as a means of framing their operational problems. On the one hand, they shared the idea of the rising importance of industrial research which, having moved from the "old engineering department," became an independent activity within the structure of the firm, increasingly approaching academic

---

[45] John L. Kennedy and G. H. Putt, "Administration of Research in a Research Corporation," *Administrative Science Quarterly* 1, no. 3 (1956): 326.

[46] Donald C. Pelz, "Some Social Factors Related to Performance in a Research Organization," *Administrative Science Quarterly* 1, no. 3 (1956): 310.

[47] Harold J. Leavitt, "Small Groups in Large Organizations," *The Journal of Business* 28, no. 1 (1955): 8–17; David G. Moore and Richard Renck, "The Professional Employee in Industry," *The Journal of Business* 28, no. 1 (1955): 58–66.

[48] Caldwell and Panimon, "Projective Testing in an Industrial Research Organization: One Experience"; Moore and Renck, "The Professional Employee in Industry."

[49] Waring, *Taylorism Transformed: Scientific Management Theory since 1945*.

[50] Moore and Renck, "The Professional Employee in Industry," 58.

[51] Peter F. Drucker, "Management and the Professional Employee," *Harvard Business Review* 30, no. 3 (1952): 84–90; Peter Drucker, "Twelve Fables of Research Management," *Harvard Business Review* 35, no. 6 (1963): 46–50.

research in terms of its fundamentality.[52] On the other hand, the management of researchers — variously referred to as "creative specialists," "technical people," "scientific personnel," and "professionals"[53] — had to be conducted in light of the recognition of their "creativity" and professional status.

In turn, this concern with "creativity" spilled over into such mundane aspects of management, as allocation of free time, performance appraisal and salary administration, conceived of as a process of finding "the optimum means of stimulating, recognizing, and rewarding the creative and productive effort."[54] More generally, "creativity" had to be encouraged and promoted, as well as sustained against the "organizational pressures,"[55] while the researchers had to be afforded the opportunity for growth of their "technical ability" by means of creating a "favorable growth environment."[56] These concerns are also visible in the topics discussed by the IRI study groups. Coordinated by James A. Bralley, Director of Chemical Research at A.E. Staley Manufacturing Company, the groups began to meet regularly at the IRI offices in New York since February 1959. The first meeting was devoted to the discussion of psychological, organizational, and fiscal factors, "which appear to influence a creative environment."[57] With creativity and the environment necessary to spur and sustain it being the central items on the agenda, the members of the IRI also discussed "job status" as an element of the reward system, as well as selection and placement of "research personnel."[58] In other words, while less interested in the grand theoretical concerns,[59] research administrators adopted the language of "creativity" elaborated by the academics and used it to frame the problems of hiring, selection, and performance appraisal of "research personnel," as well of managing the laboratory labor process.

One of the most urgent problems faced by research managers concerned the promotion of the "outstanding scientists." In RM's third issue, it was succinctly analyzed by Herbert A. Shepard, who framed it in terms of the "dual hierarchy"

---

[52] Leslie E. Simon, "A Continuum of Applied Science in the Corporation," *Research Management* 2, no. 4 (1959): 251–59; Schott, "Are Research Administrators Getting Lazy"; J.F. Downie Smith, "Academic and Industrial Research," *Research Management* 5, no. 4 (1962): 257–75.

[53] Bruce F. Gordon and Ian C. Ross, "Professionals and the Corporation," *Research Management* 5, no. 6 (1962): 493.

[54] George L. Royer, "Salary Administration of Research Personnel," *Research Management* 1, no. 2 (1958): 113–28; R. P. Dinsmore, "Improving the Professional Environment of Research People: Human Relations Are Important," *Research Management* 1, no. 2 (1958): 101–12; Robert F. Goddu, "FREEDOM: Promoter of New Ideas," *Research Management* 1, no. 4 (1958): 218–20; Gilbert Kelton, "The Evaluation of Scientific Personnel," *Research Management* 2, no. 3 (1959): 185–98.

[55] R. G. Chollar, G. J. Wilson, and B. K. Green, "Creativity Techniques in Action," *Research Management* 1, no. 1 (1958): 5–21; Harold Gershinowitz, "Sustaining Creativity Against Organizational Pressures," *Research Management* 3, no. 1 (1960): 49–56.

[56] John D. Floyd, "Training: Catalyst for Growth," *Research Management* 1, no. 4 (1958): 215–18.

[57] James A. Bralley, "Proceedings of Industrial Research Institute Study Group Meetings, Number 1. The Environment for Creativity," *Research Management* 3, no. 3 (1960): 175–95.

[58] James A. Bralley, "Proceedings of Industrial Research Institute Study Group Meetings. 2. Job Status as an Award for Scientific and Administrative Accomplishment," *Research Management* 3, no. 4 (1960): 227–38; Industrial Research Institute, "Proceedings of Industrial Research Institute Study Group Meetings. Number 3. Selection and Placement of Research Personnel," *Research Management* 4, no. 1 (1961): 43–56.

[59] Shapin, *The Scientific Life : A Moral History of a Late Modern Vocation*.

problem.[60] Shepard was a prominent figure in both the academic and the practitioners' discussions of research management. An MIT-trained scholar of industrial relations, he began his career as a student of democratic control in labor unions,[61] gradually becoming engaged in the sociological debate on the university/industry culture clash, as well as in the managerial discussion of "professional employees" and their mixed fortunes in industrial organizations.[62] Shepard's argument on the "dual hierarchy" was explicitly framed in the managerial idiom and based on his previous work on the division of authority between "superiors and subordinates in research" that appeared in the special issue of The Journal of Business devoted to the "human aspects of management."[63] In his RM paper, Shepard argued that the growth of industrial laboratories leads to the development of a "managerial class" that is hierarchically differentiated from the scientists and engineers, and yet is responsible for controlling their work:

> Since its responsibility entails control over the activities of scientists and engineers, it is logical that technical competence be one criterion for entry into the class. However, entering the managerial class removes the technical man from direct participation in technical work, and he comes to devote himself to many matters not recognized as technical. When a good scientist is made a manager, a good scientist is lost. Yet, promotion to management is the reward for competence in scientific work. Hence, the laboratory becomes a school for making nonscientists of its scientists.[64]

Shepard went on to review the two most popular techniques adopted by research managers to solve the problem, concluding that neither was satisfactory. Thus, introducing the position of the technical director would likely result in new challenges, including the necessity to select the people on the basis of unquantifiable "leadership skills" to become technical directors; a more severe hindrance, however, was that even the most qualified technical director would be "inevitably inferior to the combined resources of his scientific staff" to be efficient.[65] The "dual hierarchy" was another such technique, based on the creation of two parallel career ladders for the promotion of "technical men": scientists and engineers reluctant to be promoted to managerial positions could move up the "technical ladder," rather than joining the ranks of research administrators. Because of the value of research freedom inscribed in the "scientific mythology," Shepard argued, the introduction of the "technical ladder" was likely to produce unintended effects: being seen as a reward, rather than opportunity, it would hinder further professional development of a

---

[60] Herbert A. Shepard, "The Dual Hierarchy in Research," *Research Management* 1, no. 3 (1958): 177–87.

[61] Herbert A. Shepard, "Democratic Control in a Labor Union," *American Journal of Sociology* 54, no. 4 (1949): 311–16.

[62] Steven Shapin singles him out as the key mediator between Mertonian sociology of science and research management; however, Shepard's contributions to the latter are no less illustrative. As a participant of both the academic and the practitioner's discussion during the late 1950s, having published in *AQS*, *RM*, and the University of Chicago's *The Journal of Business*, on whose pages much of the managerial discussion of the "professionals" took place, during the 1960s, Shepard helped introduce the emerging critique of industrial bureaucracy into the discourse of research administrators. See Shapin, *The Scientific Life : A Moral History of a Late Modern Vocation*, 118–122.

[63] Herbert A. Shepard, "Superiors and Subordinates in Research," *The Journal of Business* 29, no. 4 (1956): 261.

[64] Shepard, "The Dual Hierarchy in Research," 178–79.

[65] Shepard, "The Dual Hierarchy in Research," 180–81.

"technical man" after promotion; worse, it could become a "shelf" position or "a proof of inadequacy." More generally, the "dual hierarchy" approach was undesirable due to its ambiguity with respect to the self-image of the scientists and engineers: "the technical ladder "is usually reserved for competent and brilliant scientists who are regarded as lacking in managerial potential. In our society, leadership skills and leadership positions are highly valued. The technical ladder incumbent is only half a man."[66]

Shepard's analysis was very much in accord with the concerns expressed by other contributors to RM in the late 1950s and the early 1960s. For example, in 1959, the Personnel Director of Bell Labs argued that "professional ladders" for "nonsupervisory engineers and scientists," providing them with status symbols and financial rewards parallel to those of their colleagues climbing the "administrative ladder," would constitute "a broad system of classifying people engaged in creative engineering and science" and have "many advantages over a system which divides such people into a series of named vertical merit or performance cells."[67] While such a system created an alternative to the "paradoxical" reward system based on administrative promotion to supervisory roles which counted little for the "creative specialists," the companies were judged to be overemphasizing the equivalence of the two ladders, creating further disruptions and "undue attention to the "status symbols.""[68] Likewise, at least some "research people," although not frequently heard in the trade publication of their superiors, voiced a concern with the problem of promotion and a desire to keep their identity of "creative specialists," rather than managers or salespeople.[69] Another worry was the allowance for free time: although required for "creative work," it was viewed as "time off" which "cannot be properly charged to an appropriate, profitable account" by the management, especially those removed from research.[70] Further, it was "observed that present-day performance evaluations, for the most part, are arbitrary, inadequate, and unreliable, resulting in "market value" appraisals" inappropriate for "technical personnel."[71] Grappling with these challenges, research administrators gradually became engaged in informal theorizing about scientists and engineers as a kind of people, endorsing parts of the academic vocabulary: as different from the rest of the organization, "technical men" were thought of as "intrinsically highly intelligent and logical" and perhaps "more self-conscious about their intelligence," having "more regard for thought per se."[72] Hence, they tend to "forget that better mousetraps do fail to generate wide paths to the laboratory unless they are sold" and, consequently, must be trained to become "research salesmen" to communicate effectively with the

[66] Shepard, "The Dual Hierarchy in Research," 184.

[67] Frank D. Leamer, "Professional and Administrative Ladder: The Advantages of Broad Job Classification in a Research Organization," *Research Management* 2, no. 1 (1959): 52.

[68] Frank H. Healey, "Job Status for the Research Scientist," *Research Management* 3, no. 4 (1960): 239–44.

[69] "We all came to work for the company with at least the potential of being able to do industrial research. Most of us wanted and still want a career in this type of research because it allows us to follow our inclination toward scientific investigation, and, at the same time, receive an adequate financial reward for it. If we had wanted to be salesmen or merchandizers, we would have chosen a different discipline for our training." See Floyd, "Training: Catalyst for Growth," 215.

[70] Goddu, "FREEDOM: Promoter of New Ideas," 218.

[71] Kelton, "The Evaluation of Scientific Personnel," 185.

[72] Horace A. Secrist, "Motivating the Industrial Research Scientist," *Research Management* 3, no. 1 (1960): 57.

management,[73] which would be otherwise concerned with "return-on-investment and other such things calculated to warm the cockles of the technologically uneducated business man's heart."[74]

However, beyond the superficial similarity, Shepard was skeptical about what he called the "scientific mythology," arguing for the need to acknowledge the power relationships obtained in the laboratories despite the reluctance of "research people" to admit their existence. Accordingly, Shepard framed the challenge of research management in terms of the shifts in organizational power: because of the industry's increasing dependence on research and technological innovation as instruments of competition, power within firms increasingly accrues "to those who possess the skills most needed for survival and growth," passing from manufacturing to sales and, finally, to research and development.[75] The problem, then, lay in the predominance of what he called the "staff-line organizational ideology," "a tribute to the preeminence of manufacturing" that obscured the realities of research-intensive industrial development by considering R&D a mere advisory service. However, the attempts to indoctrinate research administrators in the human relations management theory, supposedly more appropriate for managing "creative specialists," were met with the latter's resistance: "ironically," as Shepard put it, scientists and engineers seemed to prefer "traditional management" by which he meant the Taylorist doctrine of scientific management, which was "at odds with scientific ideals at almost any point."[76] The irony lied in the fact that this model of research administration turned out to be more agreeable for the scientists and engineers who, according to Shepard, disregarded the "humanistic" emphasis on interpersonal relations and small group dynamics as incompatible with the image of a lonely scientist: "reverence for an organizational myth combined with acceptance of an alien organizational structure."[77]

Nevertheless, the root cause of the problem was not the "new management theory" as such, but the contradictory situation in which the concerns about the meaning of professionalism, scientific freedom, creativity and adequacy of promotion and rewards systems were expressed "without questioning the traditional structure of authority, responsibility, and supervision."[78] In short, the managerial problems of corporate research laboratories did not question the validity of human relations management but presented "dramatic evidence" against its opposite: "bureaucratic methods of adaptation to a changing environment."[79] Not coincidentally, by the end of the 1960s, Shepard was among those social scientists who introduced the critique of industrial bureaucracies to research management discourse.

"People are everything"

When Woodward was speaking to research administrators in 1956, arguing that venture capital could be a source of funding for some "creative people," not

[73] Frank R. Fisher, "Scientists Can Be Research Salesmen," *Research Management* 5, no. 2 (1962): 95.

[74] Nisson A. Finkelstein, "Evaluating the Product of Technical Programs," *Research Management* 6, no. 3 (1963): 223–30.

[75] Shepard, "The Dual Hierarchy in Research," 177.

[76] Shepard, "Superiors and Subordinates in Research," 261.

[77] Shepard, "Superiors and Subordinates in Research," 267.

[78] Shepard, "Superiors and Subordinates in Research," 264.

[79] Shepard, "Superiors and Subordinates in Research," 264, 267.

quite happy in the large corporation's "sometimes over-administered family of R&D people," he was much less radical than Shepard, cautiously avoiding a full-fledged critique of industrial bureaucracy. While endorsing the idea of "creativity," Woodward nevertheless suggested, referring to his experience with Laurance Rockefeller's venture capital operation, that "an engineer can make a good executive."[80] Still, being no more than a "mere drop" in the stream of the federal and corporate "R&D dollars," venture capital was hardly an obvious option even for such special characters to whom Woodward referred as the "twentieth-century Daniel Boone."

By the end of the 1950s, however, the attractiveness of the kind of investing Woodward advocated in 1956 significantly increased as a result of the speculative boom in electronics stocks that erupted between 1959 and 1962.[81] In October 1962, in the immediate aftermath of the boom, Woodward appeared before the Harvard Business School Club of Atlanta with an address called "Venture Capital in a New Climate." He argued that the "dramatic de-glamourization" of the stocks of the "glamour companies" at the start of the 1960s, despite the market's tumultuous moves, signaled that venture capital business was not "a mere house of cards."[82] Instead, it was based on "what had been clearly identified as the third great revolution of mankind, the scientific revolution"[83], rivaling the previous two — the agricultural and the industrial — during and after World War II. For Woodward, like for securities analysts and corporate research administrators, this "scientific revolution" most immediately referred to the commercialization of the wartime technologies like nuclear energy, electronics, jet propulsion, and the like, representing a real opportunity that did not shatter after the electronics boom burst. Gesturing towards Doriot's American Research & Development as a notable exception, Woodward suggested that before 1950 there was little interest in risky ventures on the part of the investment banking community. However, as the decade was coming to a close, "the capital shortage… became a capital glut":

> Wall Street began to show more interest in some of the ventures that had been privately financed in the '46 to '50 period and were beginning to look attractive for further growth. Small public holdings in some of these companies developed. Over-the-counter markets began, and the great boom was slowly taking form. As the general market moved up, people turned more and more to the special situation, glamour type investment, many of which had been exclusively the realm of specialized venture capital investing. Price-earnings ratios began to move up from 5 to 1, to 10, 20, 30, 50, 100 and finally, of course, to infinity.[84]

The boom made the investing public interested in "placing unjustifiable high values on many of these securities," while the "disclosures of company business prospects and reported financial data seemed only to whet the appetite of the

[80] Woodward, "Venture Capital Investment in Research," p. 2.

[81] Burton Gordon Malkiel, *A Random Walk Down Wall Street, Including a Life-Cycle Guide to Personal Investing* (1973; New York and London: W.W. Norton & Company, 1999), 58–59.

[82] Harper Woodward, "Venture Capital in a New Climate," Speech before the Harvard Business School Club of Atlanta, October 3, 1962. Peter O. Crisp papers, Mss:784 1946-2008 C932. Box 1 Folder 22, Baker Library Special Collections, Harvard Business School, p. 1.

[83] Woodward, "Venture Capital in a New Climate," p. 1.

[84] Woodward, "Venture Capital in a New Climate," p. 2.

investor for more of the same at higher prices."[85] After the electronics bubble burst and the abundance of capital to finance "anything that sounded glamorous on almost any terms" dried up, Woodward observed that "the outlook for venture capital in many ways has never been better."[86] If there was anyone to blame, it was the speculative investors' inflated hope: in the words of a contemporary observer, there was "a wave of hyperenthusiasm for science-based shares in 1960-1961, followed by disillusion in 1962-1963 — disillusion not with the companies' performance, but with the investors' own hopes."[87] Speaking as an experienced practitioner of venture capital investing, Woodward suggested that patience proved to be the key to survival in the speculative boom. The specialized investors — instead of "venture capitalists," Woodward used the phrase "scientific-management group" — were able to assume the noble posture of ignoring the market moves, focusing instead on the constructive task of building companies.

> …founders and managers of ventures that have been through the last two years are happily worrying less about the day-to-day or month-to-month market movements of their stock and sensibly focusing their attention on the continuing growth and development of their business in technical competence and management skills. The management of a successful growth business need not worry about stock prices. This will take care of itself in time.[88]

Woodward did not speak explicitly about the right ways of managing the kind of people who run these "venture companies," although he alluded to the importance of stock ownership as a motivational tool in small business, and also spoke unfavorably about "a new group of scientist-engineers become capitalists — investment and market experts," who "shifted too much interest to the Wall Street Journal from the technical journal."[89] Besides his reconstruction of the events that created a new climate for venture capital, and brief mentions of the importance of management and technical skill, Woodward's discussion paralleled the thinking of the security analysis profession, perhaps most strikingly in his appeal to the metaphor of infinity. Behind the superficial infinity of price-earnings ratios, there was a real infinity of technological progress: "If our assumptions are right, the new technology barrel is far from empty — in fact, never will be," so that the blue chips of 1975 will include "many of the yet unidentified glamour and growth stocks of the 50's and the 60's."[90]

One of the security analysis practitioners who participated in the professional discussion about the importance of management in the evaluation of "scientific" companies was Arthur Rock, who co-authored the 1958 paper in The Analysts Journal, suggestively titled "Some Considerations of the Infinite."[91] Written while he was still affiliated with Hayden, Stone, the paper advanced a critique of the excessive reliance on the formal "yardsticks" in evaluating "scientific companies." By 1958, Rock was keenly aware of this subject matter, having participated in the

---

[85] Woodward, "Venture Capital in a New Climate," p. 2.

[86] Woodward, "Venture Capital in a New Climate," p. 3.

[87] Nigel Calder, "Technology and the Investor," *Bulletin of Atomic Scientists. A Journal of Science and Public Affairs* XX, no. 4 (1964): 47.

[88] Woodward, "Venture Capital in a New Climate," p. 1.

[89] Woodward, "Venture Capital in a New Climate," p. 1.

[90] Woodward, "Venture Capital in a New Climate," p. 4.

[91] Kronfeld and Rock, "Some Considerations of the Infinite."

launching of General Transistor Corporation and Fairchild Semiconductor. Becoming a frequent visitor to California, eventually, Rock met Thomas Davis, Jr., a lawyer and vice-president of the Kern County Land company, with whom they formed a venture capital limited partnership in 1961. Moreover, between 1957 and 1961, Rock participated in the founding of several other electronics, computer and semiconductor companies in the San Francisco Bay Area, including Watkins-Johnson Company, Leventhol Electronic Products, Vidar Systems Corporation and, most notably, Teledyne, Inc. and Scientific Data Systems.[92]

In 1962, Rock appeared before his alma mater's alumni society, the Harvard Business School Club in San-Francisco, in his new capacity of a venture capitalist, to give a talk in which he reinforced the points made in the 1958 paper. Rock started out saying that an investor "gotta have faith" in the prospects of the economy and the particular industry of interest; however, moving to the more tangible "yardsticks" valuable in this business, he began to talk about management: "The single most important factor in the long run for any company is, of course, management; however, I believe that in the applied science industry this is especially true."[93] For Rock, the applied science industry was characterized by "generally higher" ratios of stock prices to book values, and he referred to the concept coined in the 1958 paper to illustrate this, talking about "the intellectual book value" ("intellectual premium" in the original paper). Price-to-earnings ratio was dismissed as "another ratio that is of little help for the analyst" in such a fast-moving industry as "applied science":

> Earnings that are here today may be gone tomorrow and so I would rather pay an almost infinite price-earnings ratio or even a price-loss ratio for a company that has a research and development program that could lead to something, than a low price-earnings ratio for a company with no future. Again the emphasis is on management and its ability to run an R&D program, because certainly I am not equipped to go into the laboratory and decide whether the work being done is liable to give forth profitable sales.[94]

Here, having moved on from the management as an essential but intangible variable in the long-run fate of any business, and referring to his experience as a security analyst that suggested a new importance to "management" that no ratio was able to capture, Rock formulated the key heuristic that guided his investment activity — almost 50 years later he reckoned that: "I'm not a scientist, so I don't understand all of the science they're talking about, so I've got to decide on some method of making evaluations, so it occurred to me that I'd do that based on people."[95] Rock's partner, Thomas V. Davis, Jr., expressed this heuristic strategy even more forcefully: in 1966, speaking before the Western Electronic Manufacturers Association in Palo Alto on "how to pick winners" in the electronics industry, Davis formulated it as "The Principle" consisting of four words: "back the right people":

---

[92] Arthur Rock, interview by David C. Brock San Francisco, California, 9 October 2002 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript #0265), pp. 10–11.

[93] Arthur Rock, Speech delivered to the Harvard Business School Club of San Francisco, January 31, 1962. Peter O. Crisp papers, Mss:784 1946-2008 C932. Box 3 Folder 3, Baker Library Special Collections, Harvard Business School, p. 1.

[94] Rock, Speech delivered to the Harvard Business School Club of San Francisco, p. 1.

[95] Arthur Rock, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2008 and 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009), p. 18.

> People are everything. People make products; products don't make people. People direct machines; machines do not yet direct people, although under the direction of people they can assist people in selecting directions. Machines can be made to practically identical to one another. Each person is, on the other hand, unique. This is fundamental to my philosophy of investment. Another fundamental for me is that only a tine percentage of people possess the managerial and motivational capabilities to build truly extraordinary growth companies.[96]

And yet, it was not merely "people" in the abstract; like Woodward and security analysts before him, Rock attempted to characterize the people who run companies engaged in the applied science industry. First of all, "The management of these companies are generally quite young, and inexperienced, and thus you have no record to judge them by. Some of the more successful companies are started by people who are fresh out of school either as students or professors."[97] The second important consideration was "proper motivation." Referring to the contemporary best-sellers on stock market investing, *You Only Have to Get Rich Once* by Walter Gutman,[98] an art critic and security analyst of Grahamian generation, Rock suggested that, unlike the people Gutman was writing about, "entrepreneurs in the applied science industry" did in fact "like the process of getting rich," not only its result:

> It is also important to find properly motivated management and by properly motivated I do not mean "get rich quick." Entrepreneurs in this industry are less motivated by material wealth than any place I know. They seem to enjoy the intellectual stimulation of doing a good job and money is only the way to keep score.[99]

This characterization was plainly both descriptive, derived from Rock's personal experience with the science companies, and normative, cast in terms of the "proper motivation" required to succeed in this business — a distant parallel to Woodward's dissatisfaction with the scientists-engineers-turned-capitalists, too quickly abandoning their native ethos for the greedy ways of the Wall Street sharks. Finally, Rock suggested a further ingredient for a promising management "team": since the "applied science" industry is moving too fast, they ought to be able to develop products that would survive the pace of technological progress. Hence the emphasis should be not on the specific technical skills and knowledge, but on something less tangible:

> You can't buy the present in this industry, but rather you have to ask yourself, is the management who produced this product which is now selling well at a profit capable of producing the new products which will be

---

[96] Thomas V. Davis, Jr. "How to Pick a Winner in the Electronics Industry," Text of an address to the Western Electronic Manufacturers Association, Palo Alto, September 15, 1966. Peter O. Crisp papers, Mss:784 1946-2008 C932. Box 3 Folder 1, Baker Library Special Collections, Harvard Business School, p. 2.

[97] Rock, Speech delivered to the Harvard Business School Club of San Francisco, p. 1.

[98] Walter K. Gutman, *You Only Have to Get Rich Once* (New York: E.P. Dutton & Company, 1961).

[99] Rock, Speech delivered to the Harvard Business School Club of San Francisco, pp. 1–2.

> required tomorrow? Incidentally, it is quite easy to check out products by calling on contacts at either the competition or customers.[100]

Thus, the infinite potential of the scientific revolution ultimately depended on the potential of the people, each of them unique and, as the security analysts would later say, not fit to be put into a test tube. In Rock's formulation, this meant that the venture capital business was much more analysis-intensive than conventional forms of investment.[101] However, this analysis would center on people — or rather the kinds of people — that run scientific companies. Rock's most important positive contribution to this nascent knowledge of people concerned "proper motivation." In his analysis, it referred loosely to the scientists and engineers' relative disinterestedness in the material wealth and quick enrichment, combined with a sense of independence unfulfilled within the bureaucratic hierarchies of corporate research laboratories. In his 1962 speech, Rock expressed this conjuncture as follows:

> Since book value in conventional terms is not a necessity to build a better mousetrap, properly motivated engineers and scientists will continue to leave the companies they work for to form their own companies and some of them will be highly successful. It is our job to help the ones who have the potential of being successful to realize their goals.[102]

Having participated in the founding — and funding — of Fairchild Semiconductor, Teledyne, and Scientific Data Systems, by 1962, Rock could offer the audience some tentative generalizations regarding these processes. In the address to the Harvard Business School Club of San Francisco, he linked his observations on the "proper motivation" and non-pecuniary interest of the scientists and engineers with the desire to leave their employers to start-up on their own. Within five years since the founding of Fairchild Semiconductor (1957), the trend took shape, so that Rock could refer to the possibility that it would continue. And yet, when he was referring to the "properly motivated scientists and engineers" leaving their companies to start-up on their own as "entrepreneurs," Rock was making a rather risky conjecture. As evidenced by his own experience with Fairchild Semiconductor, such a trajectory was still "extremely unusual" for the scientists and engineers.[103] Moreover, by the early 1960s, there was no proper description for this kind of action.[104]

Besides, the term "entrepreneur," to which Rock alluded, was also moving. Having been introduced to the American economic thought at the turn of the twentieth century, after the seminal contributions of Frank H. Knight (1921) and Joseph A. Schumpeter (1934) and the post-war consolidation of the neoclassical paradigm, it vanished from the mainstream economic theorizing, being relegated to the field of economic and business history.[105] In the everyday language it could refer

---

[100] Rock, Speech delivered to the Harvard Business School Club of San Francisco, p. 2.

[101] Rock, Speech delivered to the Harvard Business School Club of San Francisco, p. 2.

[102] Rock, Speech delivered to the Harvard Business School Club of San Francisco, p. 4.

[103] Arthur Rock, interview by David C. Brock San Francisco, California, 9 October 2002 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript #0265), p. 5.

[104] Hacking, "Making Up People."

[105] See Knight, *Risk, Uncertainty and Profit*; Joseph A. Schumpeter, *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, and the Business Cycle* (New Brunswick (USA) and London (UK): Transaction Publishers, 1934). On the history of theorizing entrepreneurship in economics, see William J. Baumol, "Entrepreneurship in Economic Theory," *The American Economic*

to the "entrepreneurs" in the top management of the big business, as well as to the owners of the corner grocery store, but there was no established tradition, except metaphorically, of speaking about "entrepreneurs" in the "applied science industry," also a term of recent coinage.[106] In the early 1960s, however, entrepreneurship reemerged in a different context, as a topic of psychological and sociological research, exemplified by such works as *The Achieving Society* (1961) by David McClelland and *The Enterprising Man* (1964) by Orvis Collins and David Moore.[107] Instead of theorizing in terms of the generic "entrepreneurial function," these studies focused on the "actually existing entrepreneurs," analyzing their psychological traits, motivations, and personal biographies, and stressed the psychological "desire for independence,"[108] as well as the "need for achievement" arising from the environmental influences.[109] Although the idea of looking at the psychology of the entrepreneur was not new, having been anticipated by the more practically-oriented genre of "entrepreneurial guidebooks" published by the US Bureau of Foreign and Domestic Commerce and the Small Business Administration since 1945,[110] the studies by Collins and Moore and McClelland yielded a series of testable hypotheses that could be explored on the basis of different data. In 1965, shortly after Rock offered his on the characteristics of "entrepreneurs in the applied science industry," Harvard Business Review published a paper on the "profile of a successful R&D entrepreneur."[111] Based on the findings of the author's study conducted as an MIT Sloan Fellow, the paper analyzed a random sample of 22 executives of the "R&D companies," that is, companies "based on a new technology," in terms of the psychological theories of entrepreneurship developed by McClelland and Collins and Moore.[112]

For Schrage, the crucial issue was whether some "three physicists leaving their positions with a large corporation or leading university to establish their own company" should run the company themselves or instead hire a professional business manager. In other words, the key question was: "what qualities should the man chosen possess to maximize the chance of being successful?" Addressing this issue, Schrage hypothesized that the "R&D entrepreneur" should be capable of

---

Review 58, no. 2 (1968): 64–71; Morgan, "Economics"; Hélène Vérin, "Entrepreneur," in *Dictionary of Untranslatables: A Philosophical Lexicon,* ed. Barbara Cassin (Princeton: Princeton University Press, 2014), 265–68.

[106] On the contemporary everyday uses of "entrepreneurship" and their evolution, see Giraudeau, "Remembering the Future: Entrepreneurship Guidebooks in the US, from Meditation to Method (1945-1975)"; Jerome A. Katz, "The Chronology and Intellectual Trajectory of American Entrepreneurship Education, 1876-1999," *Journal of Business Venturing* 18, no. 2 (2003): 283–300.

[107] David C. McClelland, *The Achieving Society* (Princeton, NJ: Van Nostrand, 1961); Orvis F. Collins and David G. Moore, *The Enterprising Man* (Graduate School of Business Administration, Michigan State University: Bureau of Business and Economic Research, 1964); Giraudeau, "Remembering the Future: Entrepreneurship Guidebooks in the US, from Meditation to Method (1945-1975)"; Elizabeth Chell, *The Entrepreneurial Personality: A Social Construction: Second Edition* (Hove ; New York: Routledge, 2008), 81–11; Howard H. Stevenson and J. Carlos Jarillo, "A Paradigm of Entrepreneurship: Entrepreneurial Management," *Strategic Management Journal* 11, no. SP ISS (1990): 17-27.

[108] Collins and Moore, *The Enterprising Man*.

[109] McClelland, *The Achieving Society*.

[110] Giraudeau, "Remembering the Future: Entrepreneurship Guidebooks in the US, from Meditation to Method (1945-1975)," 51–53.

[111] Harry Schrage, "The R&D Entrepreneur: Profile of Success," *Harvard Business Review* 43, no. 6 (1965): 56–69.

[112] Schrage, "The R&D Entrepreneur: Profile of Success," 56.

perceiving the relevant environment "veridically," "recognizing people, things, or situations as they truthfully are, rather than attributing to them qualities which are the products of one's emotions or imagination."[113] Having conducted a series of tests measuring the personality traits of the "R&D entrepreneurs" in his sample, Schrage concluded that "the most successful individual is high in achievement motivation, low in power motivation, and high in awareness of self, the market, and his employees."[114] Moreover, as different from the received image of the "perfect entrepreneur" codified by McClelland, Collins, and Moore, Schrage observed that "today's R&D success" did not require aggressive independence and insensitiveness to other people's feelings; on the contrary, the heads of the R&D companies in the sample expressed "a very human quality," readily admitted "to their weaknesses, to uncertainty about their work, to many things they have failed to do," and displayed curiosity "about science and its progress, about business affairs, about people."[115] The HBR editors warned the readers that these results were surprising and counter-intuitive.[116] Unlike the "enterprising men" described by the psychology of the entrepreneur, the "R&D entrepreneur" was resembling the kind of character Rock and Woodward referred to — "veridically" perceptive, acutely aware of himself and his weaknesses, and relatively uninterested in "getting rich quick." By articulating the profile of the "R&D entrepreneur" in terms of the established genre of entrepreneurial psychology, Schrage's paper contributed to a description of this emerging human kind. However, like the observations offered by Rock, Davis and Woodward, it applied only to those "creative people" who did actually become "applied science entrepreneurs," thus lacking in generality to be appealing for, and applied to, a wider audience. The "people-based" heuristics derived from ad hoc observations of early venture capitalists, having been linked to the more formal discourse of entrepreneurial psychology, had to be accommodated by these "people" themselves.

From "Creativity" to "Productivity"

From the mid-1960s onwards, the discourse of research administration underwent a shift in emphasis, while at the same time becoming more open to the inputs from its academic counterpart. By 1963, the RM contributors became increasingly concerned with "productivity" of scientists and engineers — almost as much as with their "creativity" and the environment most conducive to it. Accordingly, "productivity" accompanies "creativity" in the discussions of the motivation of the "technical people" and the particular approaches needed to make them "more productive and creative."[117] Scientists and engineers, or simply "professional people," are still regarded as a unique management challenge; the management techniques that applied to them are still held to be different from the ones to be used in more conventional business environments; the "work climate" is still of paramount importance; however, the concern with "maximum research productivity" becomes much more pronounced and visible:

[113] Schrage, "The R&D Entrepreneur: Profile of Success," 57.
[114] Schrage, "The R&D Entrepreneur: Profile of Success," 64.
[115] Schrage, "The R&D Entrepreneur: Profile of Success," 64–65.
[116] Schrage, "The R&D Entrepreneur: Profile of Success," 57.
[117] James N. Farr, "Motivating an Industrial Research Group," *Research Management* 6, no. 2 (1963): 109–24; Henry L. Cox, "The Personal Approach in Dealing with Technical People," *Research Management* 6, no. 2 (1963): 153–61.

> Managing scientists and engineers in a research and development laboratory presents problems unique to the industrial management field. Professional people hired into applied or basic research must be selected, and their performance is judged by criteria different from those used in selecting and evaluating production or sales personnel. Also, the work climate required for maximum research productivity is different from that in the rest of an industrial complex.[118]

At the same time, research administrators become increasingly more conscious of the financial costs of extensive research and development and decreasing returns from the application of "creativity techniques," especially in the field of basic research that is inherently difficult to control in terms of return on invested capital.[119] One contributor warned about the "danger of being run down by our research and development programs," stating that "a point of indigestion in research and development work" has been reached: unlike "in the old days," under conditions of its declining productivity, R&D work could no longer be considered "a leisurely sort of thing."[120] As different from the wartime and immediate post-war years, when "many companies rushed to establish or to expand research and development programs," by the mid-1960s it was considered difficult to assume that science is "self-directing with a rigor and accuracy and productivity not normally observed in other human affairs."[121] Accordingly, the IRI Study Groups began to put more emphasis on the issues of the cost control in research and development, rather than on creating and sustaining an environment conducive for "creativity," inviting contributions from the accounting profession, as well as financial controllers and "risk-capital investment advisors."[122] These issues, amplified by an increasing interest from the external publics,[123] made research administrators appreciative of the latest developments of the social sciences of organization and management, including, notably, a stream of contributions by the scholars from the recently established (1964) Sloan School of Management at MIT.[124] In turn, this new

---

[118] D. J. Jenkins et al., "Studies in Managing Research and Development Personnel," *Research Management* 7, no. 5 (1964): 349.

[119] Robert M. Bowie, "The Direction and Control of Research and Development," *Research Management* 6, no. 4 (1963): 277–88; Lawrence R. Hafstad, "Making Research Pay: One Corporation's Approach," *Research Management* 8, no. 5 (1965): 331–41.

[120] Charles Allen Thomas, "Research and Development: A Challenge for Management," *Research Management* 6, no. 4 (1963): 305.

[121] Karl R. Van Tassel, "Managing Research and Development," *Research Management* 8, no. 3 (1965): 145.

[122] Industrial Research Institute, "Proceedings of Industrial Research Institute Study Group Meetings. Number 8. Control of Research and Development," *Research Management* 6, no. 6 (1963): 435–49; Arthur P. Contas and Hoyt Ecker, "A Window on New Technologies: Minority Investments as an Avenue of Corporate Development," *Research Management* 8, no. 5 (1965): 273–92.

[123] Including, notably, the operations research community, see Helen S. Milton, "Cost-Of-Research Index, 1920-1965," *Operations Research* 14, no. 6 (1966): 977–91.

[124] See, e.g., Chris Argyris, "Interpersonal Competence, Organizational Milieu, and Innovation," *Research Management* 9, no. 2 (1966): 71–99; Jay W. Forrester, "Social Structure and Motivation for Reducing Research Costs," *Research Management* 9, no. 1 (1966): 45–60; Paul Hersey and Kenneth H. Blanchard, "Managing Research and Development Personnel: An Application of Leadership Theory," *Research Management* 12, no. 5 (1969): 331–38; Philip Adler and Thomas W. Jackson, "Motivating Research Technicians: How Behavioral Science Theory Can Be Applied in a Research and Development Organization," *Research Management* 11, no. 3 (1968): 183–91. Established in 1914 as part of the Department of Economics and Statistics at MIT, the School became a separate department in 1952, and in 1964 was renamed in honor of Alfred P. Sloan.

openness to the social sciences' contributions triggered an intellectual bifurcation that becomes visible towards the mid-1960s. Thus, in 1965, Jay W. Forrester, Professor of Industrial Management at MIT, attended the Spring IRI conference in Florida, and addressed the audience with the following statement:

> I find that the area of professional motivation, the exercise of self-discipline by research people, and the efficiency of the research process are among your greatest concerns. Because of your sensitivity to the growing inefficiency in research, you have acknowledged being under pressure from top management, directors, and stockholders who wonder if today's research is producing results keeping with the cost. [...] How many of you feel that motivation of the research men and instilling self-discipline to accomplish the most from the available resources is one of your paramount concerns and responsibilities?[125]

The group reacted to Forrester's question by showing overwhelming approval (80% per sent showed hands).[126] On the one hand, some research administrators called for more attention to the findings of behavioral research, arguing that stringent financial controls and overall formalization were at odds with the nature of "creative" R&D work, while some of their colleagues were increasingly looking to the methods and tools of post-war "management science" and operations research as promising solutions for the "financial difficulties" of R&D. As summarized by one of the participants of this controversy:

> Some advanced thinkers are testing the idea of using professional managers to manage research while the less radical are trying to convert research scientists to managers. Trailing behind is a long and vocal group who still maintain that all the research scientist needs is an administrator to help him with the paper work.[127]

"Management is on the prowl! It is searching for a better return on its research and development investment. R&D costs are continually rising, yet profitability seems to be decreasing."[128] For some research administrators, the growing inefficiency of research was seen as a result of the use of "historical or rule of thumb procedures in budgeting and planning": "in many instances, funds are appropriated on a lump-sum basis, and even in those cases where the appropriation is by projects, no attempt is made to support the requests by detailed estimates of the various expense items to be incurred on each project."[129] Instead of ad hoc procedures and historical conventions, some contributors suggested more "scientific" approaches to research management, to be applied by the hired professional managers possessing the required skills:

> Fads, fancies, and experimentation are "big business" in American industry today! […] Today the emphasis is being placed on evaluation, monitoring, scheduling, and control… one common approach is often referred to as the

---

[125] Forrester, "Social Structure and Motivation for Reducing Research Costs," 45.

[126] Forrester, "Social Structure and Motivation for Reducing Research Costs," 45–46.

[127] G. S. Sanders, "Training of Management in Research," *Research Management* 9, no. 6 (1966): 365. See also Finkelstein, "Evaluating the Product of Technical Programs."

[128] Alfred L. Miller, "Management and the Natural Sciences," *Research Management* 10, no. 5 (1967): 309.

[129] George T. Gmitter, "Towards a Better Understanding of Industrial R&D and Cost Control," *Research Management* 8, no. 4 (1965): 229.

> Integrated Management Information System (IMIS), and the Program Evaluation Review Technique (PERT) stands out as one of its major techniques… represents an important facet of modern systems management.[130]

In other words, during the 1960s RM was increasingly becoming an arena of the largely implicit polemic between competing schools of management thought, in some respects going back to the earlier controversy between the Taylorist doctrine of "scientific management" and the "human relations" school of Mayo and Follett.[131] As different from the promoters of the more systematic and "scientific" approaches to research management, a vocal group of research administrators argued for "better integration of the informal with the formal organization": "the processes of internal administration — planning and control, in particular, have tended to reinforce bureaucratic patterns. Increasing formalism plus the conflicting ethos of its researchers provide an organizational climate unfavorable for maximum effectiveness in R&D."[132] Other authors sympathizing with behavioralist approaches argued that too great an emphasis on cost effectiveness in R&D administration frequently results in failures,[133] which could, however, be foreseen by applying organization theory.[134] In matters of performance appraisal, instead of endorsing the "machine age mentality" of the advocates of PERT techniques who "equated men to machines," it was argued, research managers of the "science age" had to be able to judge the "potential" of the individual and "facilitate" it, rather than blindly follow performance measurement procedures that originated in the non-creative parts of the organization.[135]

Finally, the idea of bringing professional managers to be in charge of the R&D laboratories, rather than promoting researchers to become managers, received a mixed reaction,[136] triggering the reemergence of the old problem of "developing managers out of creative specialists," long recognized as "more difficult than development of managerial personnel from those engaged in the older activities such as manufacturing and finance."[137] "Most research directors are scientists-turned-administrators, and such men usually do not find the dual role an easy one

---

[130] Gilbert Kelton, "PERT and Automation Philosophy," *Research Management* 7, no. 1 (1964): 55; Richard F. Moore, "Ways to Meet the Increasing Pressure on R&D Organizations," *Research Management* 12, no. 1 (1969): 25–36; Barnard E. Smith, "Decision Analysis in Research and Development," *Research Management* 12, no. 6 (1969): 417–24.

[131] See Waring, *Taylorism Transformed: Scientific Management Theory since 1945*; Gilman, "The Prophet of Post-Fordism: Peter Drucker and the Legitimation of the Corporation"; Knafo et al., "The Managerial Lineages of Neoliberalism."

[132] George T. Gmitter, "The Industrial R&D Scientist and His Environment," *Research Management* 9, no. 2 (1966): 15.

[133] Robert L. Hershey, "Finance and Productivity in Industrial Research and Development," *Research Management* 9, no. 4 (1966): 261–69.

[134] George P. Huber, "Implications of Organization Theory for Research Management," *Research Management* 10, no. 5 (1967): 301.

[135] Richard Van Fleet, "Salary Administration for Scientific and Engineering People," *Research Management* 10, no. 6 (1967): 371–83; Lauren B. Hitchcock, "Problems of First-Line Supervisors," *Research Management* 10, no. 6 (1967): 385–97; Maurice S. Newman, "The Return on Investment in Research and Development," *Research Management* 10, no. 1 (1967): 41–50; R.F. Moore, "Appraisal at Its Apogee," *Research Management* 10, no. 1 (1967): 61–72.

[136] Finkelstein, "Evaluating the Product of Technical Programs."

[137] Stephen R. Michael, "Developing Managers Out of Creative Specialists," *Research Management* 4, no. 2 (1961): 119.

to resolve… highly educated and intelligent scientists frequently generate more loyalty to their professions than to their employers."[138] In other words, research administrators' increasing receptiveness to the competing school of management and organization theory allowed to reframe the perennial "dual hierarchy" problem in terms of the opposition between "management science" and "machine-age" bureaucracy on the one hand, and the renewed emphasis on researchers' "creativity," this time backed by a variety of behavioral approaches to organization. This conjuncture allowed the idea of entrepreneurship to be introduced in the research management discourse by the end of the 1960s.

The "Ideal Entrepreneur"

The controversy between research administrators who promoted "management science" and their colleagues who argued in favor of the "behavioral" approaches was not settled in the 1960s. However, by making them more open to the social scientists' inputs, it created an opening for the emerging critique of industrial bureaucracy that was being forged by the US management consultants and social scientists from the mid-1960s onwards. This critique, to some extent engaging with the classic writings of Schumpeter and Weber, was largely based on the empirical analyses of corporate research laboratories and, more importantly, of the "professional employee," often also modeled on the scientists and engineers working in industrial research.[139] While Shepard was instrumental in translating some of its arguments into the discourse of professional research administrators, its most vocal academic proponents were Warren G. Bennis, an organization and leadership scholar and the chairman of the Organization Studies Department at MIT, and the political scientist Victor A. Thompson.[140] Being rooted in the "humanistic" tradition of management thought, this critique assumed particularly virulent forms in its reaction to the diffusion of the wartime mathematical approaches to management in the American corporate world.[141] Having established an ideal type of the large corporation as a kind of Weberian rational bureaucracy, Thompson and his followers interpreted the management science of the 1960s as the return of Taylorism in a new form, referring in particular to the "Whiz Kids," a group of Air Force operations researchers who joined Ford Motors after the war and attracted publicity for implementing sophisticated management control systems.[142] For Thompson, however, a large bureaucratic organization facilitated by the expertise of this "new elite" was positioned as a singularly discouraging environment for

---

[138] M. R. Feinberg, "Fourteen Suggestions for Managing Scientific Creativity: The Pervading Problem of Research Executives Is How Best to Manage and Motivate Creative People. Here Are Some Psychologically Derived Guidelines," *Research Management* 11, no. 2 (1968): 83.

[139] Moore and Renck, "The Professional Employee in Industry"; Drucker, "Management and the Professional Employee."

[140] Victor A. Thompson, "How Scientific Management Thwarts Innovation," *Trans-Action* 5, no. 7 (1968): 51–55; Victor A. Thompson, "Bureaucracy and Innovation," *Administrative Science Quarterly* 10, no. 1 (1965): 1–20; Warren Bennis, "Beyond Bureaucracy," *Trans-Action* 2, no. 5 (1965): 31–35; Warren Bennis, *Beyond Bureaucracy: Essays on the Development and Evolution of Human Organization* (San Francisco: Jossey-Bass, 1966). See also Fred Block and Matthew R. Keller, "Where Do Innovations Come from? Transformations in the US Economy, 1970–2006," *Knowledge Governance: Reasserting the Public Interest* 7, no. 3 (2011): 81–104.

[141] Mirowski, *Machine Dreams : Economics Becomes a Cyborg Science*; MacKenzie, *An Engine, Not a Camera : How Financial Models Shape Markets*; Brine and Poovey, *Finance in America : An Unfinished Story*.

[142] See John A. Byrne, *The Whiz Kids: The Founding Fathers of American Business–and the Legacy They Left Us* (New York: Doubleday & Co, 1993).

scientific and technological innovation — as well as innovation in general. Referring to the Whiz Kids, and Robert S. McNamara in particular, Thompson called them "econologicians": "They are econological rather than sociological. To them, the scientific study of administration must end up as the scientific administration of things, including people."[143]

> Thompson wrote extensively on the topic of "bureaucracy and innovation," elevating the contrast between a rationally managed bureaucracy with its focus on efficiency, control, and hierarchy, and the less hierarchic and controlled organizational environments conducive for innovation, by which he almost invariably meant "individual creativity."[144]

Bureaucracy was not "bad," having established a good record in handling the tasks involving "machine-like predictability and cost reduction"; it was just not optimal for other kinds of tasks, such as innovation, and it was innovation that America needed, in Thompson's view, at the end of the difficult decade of the 1960s. In a 1968 paper published in *Trans-action* and thus aimed at the concerned public beyond his fellow academics, and echoing the similar rhetorical tropes appearing in *Research Management* at the same time, Thompson launched a fully-fledged attack on scientific management and its harmful influence on the decision-making processes in business and government:

> Today there is a resurgence of the scientific-management mystique. This mystique sees the firm as a system based entirely upon economic rationality. The model posits a single, overriding goal for the organization and requires managers to spend their time constantly canvassing all available choices, adopting those that add more to the firm's goal than they cost and discarding any that cost more than they add. This model requires a totally hierarchical organization. It tries to avoid human vagaries by mechanizing and programming every possible activity and attempts to eliminate all overlap or duplication as a waste of resources.[145]

From Thompson's point of view, as different from the Progressive era, when the implementation of Taylorism was kept in check by labor militancy, in the post-war American capitalism nothing could stop the influence of the various Whiz Kids who, in their attempts to eliminate "slack" and "overlaps" in activities, were effectively killing any possibility to innovate.[146] In a less academic context of the Personnel journal, a trade magazine of the American Management Association, Robert Kirk Mueller, a management consultant with Arthur D. Little, cast this opposition in terms of the contrast between the two kinds of managers — the "traditionalists" and the "scientists," the latter being Thompson's "econologicians."[147] Defining scientific management as "quantified common sense," a purposeful invention of the "calculus of decision," mainly based on the techniques of operations research, Mueller, like Thompson and Shepard, argued that these tools were inappropriate for innovation — a largely nonrational process and, by

[143] Thompson, "How Scientific Management Thwarts Innovation," 53–54.
[144] Thompson, "Bureaucracy and Innovation," 1.
[145] Thompson, "How Scientific Management Thwarts Innovation," 33.
[146] Thompson, "How Scientific Management Thwarts Innovation."
[147] Robert K. Mueller, "The Managerial Gap: Traditionalists vs. 'Scientists,'" *Personnel, November-December* 1969 (1969): 3–21.

definition, not well defined by the past experience.[148] In other words, in so far as modern bureaucracy was coupled with scientific management, it was destined to fail at innovation — that is, at exploiting internally occurring inventions. "Econologicians" had their interests vested in preserving corporate hierarchy and centralization, with their tools geared to enforce top-down control throughout the organization.[149] Likewise, Shepard argued that an "innovation-resisting" organization "is not resistant to innovations issuing from the top of its authority structure,"[150] expanding on his 1950s' conclusion that the attempts to restructure industrial research organizations following the principles of "human relations" management failed, because they left unchallenged the traditional, bureaucratic "structure of authority, responsibility, and supervision."[151] Instead of a directed, top-down reform, "innovation-resisting" organizations had to be transformed into "innovation-producing" ones by means of the "personal and interpersonal reeducation" aimed at developing the qualities of the "ideal innovator" in the "good soldiers" of formal hierarchical order, namely: independence, autonomy, and willingness to take risks.[152] For the "ideal innovator," argued Shepard, the "risk of not innovating" was far greater than the risk of job insecurity.[153]

Thus, by the end of the 1960s, social scientists like Shepard, Bennis, and Thompson developed an elaborate critique of bureaucracy, in many ways prefiguring what Boltanski and Chiapello described as the "new spirit of capitalism" in the 1990s.[154] Theorizing innovation and the role of the "innovator" within organizations, these scholars were generalizing from observations of the work of corporate research laboratories, while their emphasis on the increasing role of science, technology, and innovation in the societal evolution echoed an earlier generation of similar theories of the "new class."[155] By the end of the 1960s, for Thompson and Shepard, the very possibility of "bureaucratic innovation" was increasingly seen as an oxymoron.[156] At the same time, the argument completed a full circle: being primarily based on the empirical studies of corporate research management, the critique of bureaucracy and management science was brought back to the practitioners' discourse, particularly through the writings of Shepard.

In 1967, the IRI held a symposium on "What Needs Improvement in R&D," inviting management consultants and investment advisors to speak.[157] Notably, however, the contribution from the member of their own profession stressed not financial controls or decision analysis, but "zest" and "audacity" of the "American entrepreneur," possessing the "traits that have spelled individuality in the midst of

---

[148] Thompson, "How Scientific Management Thwarts Innovation."

[149] Thompson, "Bureaucracy and Innovation."

[150] Herbert A. Shepard, "Innovation-Resisting and Innovation-Producing Organizations," *The Journal of Business* 40, no. 4 (1967): 470.

[151] Shepard, "Superiors and Subordinates in Research," 264.

[152] Shepard, "Innovation-Resisting and Innovation-Producing Organizations," 472–77.

[153] Shepard, "Innovation-Resisting and Innovation-Producing Organizations," 472.

[154] Boltanski and Chiapello, *The New Spirit of Capitalism*.

[155] King and Szelényi, *Theories of the New Class : Intellectuals and Power*; Block and Keller, "Where Do Innovations Come from? Transformations in the US Economy, 1970–2006."

[156] Charles C. Arcand, "Bureaucratic Innovation," *CHEMTECH, December* 1975 (1975): 710–14.

[157] E. D. Reeves, "What Needs Improving At R&D–The Consultant's Viewpoint," *Research Management* 10, no. 1 (1967): 33–40; George B. Palmer, "What Needs Improving at R&D–The Security Analyst's Viewpoint," *Research Management* 10, no. 1 (1967): 13–31.

creeping standardization and rigid organizational structure."[158] The author of the address, William F. May, himself a chemical engineer by training, worked his way up from laboratory technician to the CEO of the American Can Company, having been affiliated with it for 30 years by the time of his address.[159] Voicing the "chief executive viewpoint" on what needed improvement in R&D, May argued that "the individual entrepreneur" is "fast becoming extinct":

> The rapid growth of organized laboratories is displacing the individual scientist and inventor: the Einsteins, the Edisons, and the Carruthers. The resulting mass application of segmented brain power and creative talent to R&D has not always brought forth the ultimate in creativity. In some cases it proved to be a deterrent to breaching the scientific barrier of given projects.[160]

No longer an attribute of the "research men" in general, "creativity" was now primarily a trait of the "individualistic, inventive, "entrepreneurial" scientist," rather than of his "educated, technically capable, conforming" colleagues.[161] May referred to the "entrepreneurial scientist" largely metaphorically, endowing this figure with the qualities that Shepard previously identified as constitutive elements of the "scientific mythology": this creative non-conformist was "sometimes abrasive in his association with others and... distasteful to his more organized colleagues"; "he is generally a total loss as an administrator"; and yet, "his positive contributions to the project far outweigh the negative factors."[162] However, even as a metaphor, the "entrepreneurial scientist" exemplified the major traits of the "creative specialist" from the debates of the late 1950s: creative, unsociable, and individualistic person incapable of becoming a manager or administrator.

A year later, Shepard, in his contribution to the IRI Symposium devoted to "Research on Research," made the decisive step of rendering the metaphor of "entrepreneurial scientist" literal. Drawing on Schrage's 1965 study of the "R&D entrepreneurs," he argued that "the successful R&D entrepreneur's awareness of his own anxiety as a source of distortion, and his openness to and curiosity about himself, other people, and the rest of the relevant environment" make his profile "strikingly similar to the set of motivations of the "ideal" scientist."[163] Elaborating on this conclusion, Shepard mobilized the findings from his own previous research, as well as the anti-bureaucratic arguments developed by his co-authors Bennis and Thompson: instead of searching "for more inventions like dual ladders or campus-like environments to make the mechanistic structure more bearable," a research manager had to become a "manager of innovation," which was increasingly replacing "R&D."[164] Moreover, Shepard suggested that "bureaucratic, mechanistic

---

[158] William F. May, "What Needs Improving at R&D–The Chief Executive's Viewpoint," *Research Management* 10, no. 1 (1967): 5.

[159] May, "What Needs Improving at R&D–The Chief Executive's Viewpoint," 10.

[160] May, "What Needs Improving at R&D–The Chief Executive's Viewpoint," 5–6. Original emphasis.

[161] May, "What Needs Improving at R&D–The Chief Executive's Viewpoint," 6–7.

[162] May, "What Needs Improving at R&D–The Chief Executive's Viewpoint," 6.

[163] Herbert A. Shepard, "Applied Behavioral Science and R&D Effectiveness," *Research Management* 11, no. 5 (1968): 305.

[164] Shepard, "Applied Behavioral Science and R&D Effectiveness," 307–8; on the history of this process, see Benoît Godin, "Innovation: A Study in the Rehabilitation of a Concept," *Contributions to the History of Concepts* 10, no. 1 (2015): 45–68; Benoît Godin, "Technological Innovation: On the Origins and Development of an Inclusive Concept," *Technology and Culture* 57, no. 3 (2016): 527–56.

organizations and practices" were unfit for the emerging "organic" era, drawing on the familiar contrast between the organic and the mechanic realms — an "entrepreneurial" metaphor par excellence.[165] Stressing Schrage's finding about the R&D entrepreneur's moderate need for power, Shepard argued that the "skills of being a docile subordinate or a controlling superior," native for a bureaucratic setting, were becoming increasingly obsolete.[166] Instead, the "increasing complexity of our technology and society" required the qualities he previously identified with the "innovation-producing organization": "autonomous interdependence," "innovative spirit" and "learning capacity."[167]

Following Shepard and others, the discussion on the pages of RM increasingly turned to entrepreneurship towards the end of the 1960s. The job of the "modern research manager" was identified with "business orientation, a commitment to communications and entrepreneurial concepts."[168] The "creative specialist" of the 1950s was now referred to as a "scientifically oriented individual," characterized by his "prize [of] his independence and self-sufficiency" and unwelcome attitude to "any inquiry into his activities or a discussion of these activities."[169] Like any other "innovator," he was presented as a "rugged individualist committed to the worth of his idea and is dedicated to its success," ready to

> prove its utility if there is a way to do so… the innovator whose idea is technically based… is a man who is intelligent, usually possessing a technical education, but not necessarily to the graduate degree level. He is creative but is much more interested in getting things done than in scholarly achievement. He has great knowledge about his area of special interest and a healthy imagination.[170]

The IRI Study Group "Motivation, Incentives, and Rewards for R&D Personnel" that met in New York in January 1969 arrived at similar conclusions: a typical well-motivated "technical man" was described as "an enthusiastic achiever oriented toward specific goals and objectives. He is relatively independent in his thinking and his work. He has a desire to accomplish and tends to be persistent without being stubborn. He has curiosity with vision."[171] The participants of the discussion expressed a feeling that "motivation theory" no longer applied to the young generation of "technical men" with their strong desire for self-determination, responsibility and recognition, as well as the joy of the "work itself": "individual

---

[165] See Metin M. Coşgel, "Metaphors, Stories, and the Entrepreneur in Economics," *History of Political Economy* 28, no. 1 (1996): 56–76.

[166] Herbert A. Shepard, "Applied Behavioral Science and R&D Effectiveness," *Research Management* 11, no. 5 (1968): 315.

[167] Shepard, "Applied Behavioral Science and R&D Effectiveness," 320; Shepard, "Innovation-Resisting and Innovation-Producing Organizations."

[168] W. E. Bradley, "The Job of the Modern Research Manager: Effective Management Requires Business Orientation, a Commitment to Communications and to Entrepreneurial Concepts," *Research Management* 11, no. 3 (1968): 167–75.

[169] Edward R. Frank, "Motivation by Objectives—A Case Study," *Research Management* 12, no. 6 (1969): 391–400.

[170] Willard M. Bright, "Are Innovators Born or Made?," *Research Management* 12, no. 3 (1969): 173.

[171] Industrial Research Institute, "Motivation, Incentives, and Rewards for R&D Personnel," *Research Management* 12, no. 3 (1969): 169–71.

participation in his goal setting and evaluating is a key to successful management."[172]

On the other hand, students of innovation, coming, inter alia, from the recently organized research program at the MIT Sloan School of Management, were increasingly suggesting that innovation process — the "translation of science and technology into use" — was a "personally based technical process."[173] The recognition of the similarities between the "ideal scientist" and the "ideal entrepreneur" allowed to see the empirical studies of technology transfer and innovation management in a new light: the "human problems" of research management could now be recast in terms of personality traits of the innovators, incompatible with the bureaucratic structure of large centralized organizations.[174] Moreover, this recognition implied the presence of "internal entrepreneurs" within the corporate R&D laboratories.[175]

At the same time, as the academic and managerial critique of industrial bureaucracy was reaching wider audiences, the representatives of its very object — large electronics corporations, largely living off the defense contracting, including the Radio Corporation of America (RCA), Lockheed, and IBM — were increasingly turning their attention to the notion of entrepreneurship. In 1968, the IEEE Transactions on Engineering Management, a professional publication of electrical engineers, held a symposium on "The Venture Activities in the Large Corporation."[176] The contributors raised the same problem that preoccupied research managers during the late 1950s and much of the 1960s: how to reconcile the "business face of the corporation" with the "face of high scientific endeavor," embodied by "creative scientists and development people, all of whom must understand their roles and the major objectives, as well as the general trends affecting the corporation."[177] Even in the presence of a decentralized and diversified corporate structure only "the most minor innovations" could be implemented, it was argued, and for precisely the reason as suggested by Thompson, Mueller, and Shepard:

> The division manager… will not tolerate any risk of disturbing his present business… The good division manager has different characteristics from the entrepreneurial innovator. In other words, the fellow who is running a division today and is running it well is quite often not the man who took the risks of establishing it in the beginning.[178]

In other words, like research managers before them, engineers in the electronics companies, increasingly conscious about the limitations of centralized

---

[172] Industrial Research Institute, "Motivation, Incentives, and Rewards for R&D Personnel," 169.

[173] Edward B. Roberts, "A Basic Study of Innovators; How to Keep and Capitalize on Their Talents," *Research Management* 11, no. 4 (1968): 249–66.

[174] Rayond M. Hainer, Sherman Kingsbury, and David B. Gleicher, *Uncertainty in Research, Management, and New Product Development* (New York; Amsterdam; London: Reinhold Publishing Corporation, 1967).

[175] Roberts, "A Basic Study of Innovators; How to Keep and Capitalize on Their Talents," 250.

[176] James Hillier, "Venture Activities in the Large Corporation," *IEEE Transactions on Engineering Management* 15, no. 2 (1968).

[177] Hillier, "Venture Activities in the Large Corporation," 66.

[178] Newton A. Teixeira, "The Latent Entrepreneur: Industry's Unused Asset," *IEEE Transactions on Aerospace and Electronic Systems* 7, no. 5 (1971): 777–80.

organizational forms, began to look for entrepreneurs within their ranks, thus encountering almost the same problem of "knowing the people" as the one that confronted security analysts and early venture capitalists: the entrepreneurs had to be "picked out" and given "opportunities to develop," even though some contributors insisted that the "real entrepreneurial manager is born."[179] Thus, by the beginning of the 1970s, the task of "picking out" the entrepreneurs was redefined as the one of recognizing the "latent entrepreneur," that "special combination of management and engineering talents," held "captive" or "buried" within his parent organization.[180] Likewise, anticipating the later notion of "intrapreneuring,"[181] the editors of RM, in their introduction to the paper by Roberts, commented that since "major innovations are often the developments of individuals who are imbued with extraordinary entrepreneurial spirit," "to capitalize on such entrepreneurial instincts… demands special insights, recognition of individual characteristics, and derivative managerial action."[182]

This conclusion was a culmination of several intellectual developments that have been occurring since the electronics stock market boom of the late 1950s, prompting security analysts to look "beyond" their formal valuation devices and thus creating a room for the knowledge of "the people" running new "scientific companies." Early venture capitalists, like Woodward, Davis, and Rock, offering their tentative generalizations from the experience of working with these people, provided this knowledge with some positive content, stressing "proper motivation" and "creativity." However, the key discursive shift that made possible the translation of "creativity" of scientists and engineers working in the corporate R & D laboratories into their latent propensity for entrepreneurship occurred within research administrators' discourse. Becoming increasingly open to the inputs from the social sciences by the mid-1960s, this discourse created an opening for the academic critiques of industrial bureaucracy, as well as for the emerging psychology of the entrepreneur, resulting in the recognition of the identity between the "ideal scientist" and the "ideal entrepreneur" in terms of their psychological profile, and the corresponding realization of the possibility of being a "latent entrepreneur." Once the latent presence of this kind of character was recognized, the question turned increasingly technical, becoming concerned with how to help a new firm's birth.

Conclusion

In May 1969, Boston College School of Management organized a two-day symposium called "New Business: The Art of Joining Innovative Technology, Management, and Capital," supported by the US Department of Commerce's Office of State Technical Services, devoted to the management of technology transfer, and the six New England Technical Services Agencies.[183] Attracting more than 250 businessmen, financiers, entrepreneurs and "technical men," the event featured contributions from some of the key actors of the region's emerging venture capital

[179] Hillier, "Venture Activities in the Large Corporation," 70.

[180] Teixeira, "The Latent Entrepreneur: Industry's Unused Asset."

[181] See Gifford Pinchot, "Intrapreneuring Revisited," *European Management Journal* 4, no. 2 (1986): 89–94.

[182] Editorial, "About This Issue," *Research Management* 11, no. 4 (1968): 105.

[183] Albert J. Kelley, "Introduction," in *New Business: The Art of Joining Innovative Technology, Management and Capital. Proceedings, May 22-23, Boston College School of Management.* (Chestnut Hill, MA: Boston College Press, 1969), 5–6.

scene, including venture capitalists Charles Waite, Peter Brooke, and Charles Lea; David Kosowsky, a physicist-turned-entrepreneur and president of Damon Engineering Corporation, founded in 1961 and backed by Lea and Brooke; Peter Rossmassler, vice-president of Hayden, Stone, representing the investment banking community; Edward B. Roberts, a professor at the MIT Sloan School of Management specializing in the analysis of technical entrepreneurship; and, finally, Georges F. Doriot, featuring as a distinguished expert on "entrepreneurial development." Albert J. Kelly, Dean of the Boston College School of Management and the symposium chairman, explained the meeting's purpose:

> The purpose of our meeting was to take a look at all the elements and levels of the technological management process, from the lawyer to the financier to the entrepreneur. Venture capital and emerging technology business ventures have certain elements of a black art to them. Even the people deeply involved will tell you they do not understand all the ingredients themselves. […] The purpose was to search for common threads and patterns of success.[184]

This symposium was emblematic in several ways. On the one hand, it was the first public meeting organized with the explicit purpose of promoting venture capital in a non-instrumental way: by accumulating and sharing the available knowledge about this "black art," rather than lobbying or creating an industry organization. On the other hand, it positioned venture capital as an important part of a broader process of "technological management," ascribing it a definite economic function. Most importantly, however, for the first time, it connected venture capital investing with the recently codified category of "technical entrepreneurship," solidifying the connection between the early venture capitalists' informal heuristics centered on "people" and the challenge of managing young technological enterprises. Thus, Peter Rossmassler, in his luncheon address devoted to Hayden, Stone's experience with providing investment banking services to Teledyne, Inc. and Scientific Data Systems, both of which had been backed by Arthur Rock at an earlier stage in their development, described his selection criteria as follows: "What does the banker look for in selecting the companies that he will bet his money and his reputation on? It can be summed up in one word: people."[185] The contributions of Peter Brooke and Charles Waite, as well as other participants, fully endorsed this emphasis, not to mention Doriot's traditional emphasis on the importance of "men" and their "ideas," inseparable from each other.[186] However, as different from the heuristic generalizations deployed by Rock, Woodward and other early venture

---

[184] Kelley, "Introduction," 5.

[185] Peter Rossmassler, "Luncheon Address," in *New Business: The Art of Joining Innovative Technology, Management and Capital. Proceedings, May 22-23, Boston College School of Management.* (Chestnut Hill, MA: Boston College Press, 1969), 36.

[186] Peter A. Brooke, "Panel: Financing New Ventures," in *New Business: The Art of Joining Innovative Technology, Management and Capital. Proceedings, May 22-23, Boston College School of Management.* (Chestnut Hill, MA: Boston College Press, 1969), 81–82; Charles P. Waite, "Panel: Financing New Ventures," in *New Business: The Art of Joining Innovative Technology, Management and Capital. Proceedings, May 22-23, Boston College School of Management* (Chestnut Hill, MA: Boston College Press, 1969), 83–86; Georges F. Doriot, "Entrepreneurial Development Initiatives," in *New Business: The Art of Joining Innovative Technology, Management and Capital. Proceedings, May 22-23, Boston College School of Management.* (Chestnut Hill, MA: Boston College Press, 1969), 117–123; on Doriot, see Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)."

capitalists, by 1969 the "people," previously referred to as "creative," "technically trained," "properly motivated" or "veridically perceptive," were clearly recognized as a distinct category or, rather, as a human kind.[187] In the presentation of Edward B. Roberts, whose 1968 paper introduced the readership of RM to the notion of "internal entrepreneurship," this kind of person was referred to as "scientifically trained entrepreneur," "technological businessman," or simply "technical entrepreneur."[188] Roberts began his speech with a sarcastic remark that the symposium "pounds a nail in the coffin of Galbraith's idea," referring to John K. Galbraith's argument about the death of entrepreneurship:

> The age of entrepreneurship is not dead. It is now. In fact, I suspect that over the next several years this period will become identified in American industrial life as an important period for the growth and re-birth of entrepreneurship, particularly in the technical area. I suspect that with the passage of time we are going to look back at the rebels on the university campus and identify them as part of the entrepreneurial spirit of today.[189]

In Roberts' analysis, the "technical entrepreneur" was defined rather narrow, as the "man who starts a technical company."[190] In his description of the latter's personal characteristics, Roberts reiterated some of the earlier findings of Schrage's (1965) study of the successful "R&D entrepreneurs," citing, in particular, the high need for achievement and the moderate need for power.[191] More importantly, however, Roberts made a point on the relationship between the "technical entrepreneur" and the venture capitalist that could not have been stated with equal force and clarity at the beginning of the decade:

> The good venture capitalist is the one who seeks and is willing to bet on good venture capital opportunities. *Young technical entrepreneurs, who have the motivation and the general managerial outlook and orientation, are a good bet.* Indeed, the role of venture capitalist is to provide something very venturesome where the risk taken by the investor is high, and the rewards are appropriate.[192]

No longer a "special situation," or a "worthwhile" expenditure of a wealthy "patrician," venture capital was now clearly defined as a bet on people — yet, unlike in the informal heuristics of Arthur Rock or Harper Woodward, or indeed their "patrician" predecessors, it was not simply "people" one knew and trusted personally, but rather a specific kind of person, described in terms of the well-established tradition of psychological research. The psychological portrait of the "technical entrepreneur" inherited some of the traits of its predecessor, the figure "creative scientist" forged in the research management discourse of the 1950s. From 1969 onwards, it began to circulate in the more practically-oriented literature — sourcebooks on how to obtain venture capital that contained the information on the

---

[187] Hacking, "Kinds of People: Moving Targets"; Hacking, "Making Up People."

[188] Edward B. Roberts, "Successful Technical Entrepreneurship," in *New Business: The Art of Joining Innovative Technology, Management and Capital. Proceedings, May 22-23, Boston College School of Management* (Chestnut Hill, MA: Boston College Press, 1969), 43–52.

[189] Roberts, "Successful Technical Entrepreneurship," 43.

[190] Roberts, "Successful Technical Entrepreneurship," 46.

[191] Roberts, "Successful Technical Entrepreneurship," 48. See also Schrage, "The R&D Entrepreneur: Profile of Success."

[192] Roberts, "Successful Technical Entrepreneurship," 50. Emphasis added.

personality traits of the prospective seeker of capital.[193] Nevertheless, at the turn of the 1960s, when the symposium on "New Venture Management" gathered at Boston College, the crucial transformation was already completed: venture capital, defined as the "people business,"[194] acquired a very specific target audience — "technical entrepreneurs." As this chapter attempted to show, "technical entrepreneurs" were a novel human kind that emerged during the 1960s through a complex chain of translations and mediations: from the "creative people" running "scientific companies," to the equation of "scientific creativity" with entrepreneurship, and, finally, to the stabilization of the psychological portrait of "technical entrepreneurs."

[193] Arnold C. Cooper and John L. Komives, *Technical Entrepreneurship: A Symposium; Papers Presented at the Symposium on Technical Entrepreneurship. Purdue University, October 7 and 8, 1970* (Milwaukee, Wisconsin: Center for Venture Management, 1972); Leroy W. Sinclair, *VENTURE CAPITAL* (New York: Technimetrics, Inc, 1971); New England Regional Commission, *Venture Capital: A Guidebook for New Enterprises. Prepared by the Management Institute, School of Management, Boston College* (Washington, D.C.: U.S. Government Printing Office, 1972).

[194] Stanley M. Rubel and Edward G. Novotny, *How to Raise and Invest Venture Capital* (New York, New York: Presidents Publishing House, Inc, 1972).

General Conclusion

Venture capitalism first emerged as a project of capitalization focused on "people." Most influentially, it has been articulated by Georges F. Doriot, a pioneering venture capitalist and a teacher at Harvard Business School, the only early VC who could combine these two capacities, developing his business philosophy in and out of the classroom. Doriot's "imaginary" was based on a vitalist metaphysics and used evolutionary metaphors to anticipate the future of the combinations of "men" and "ideas."[1] In class, this teaching was operationalized through a series of techniques of the self that focused on the practice of self-improvement and required students to imagine themselves as bundles of assets and liabilities reflecting the changes in their "potentialities." [2]

The first venture capital organizations were founded in the aftermath of World War II in New York and Boston by the heirs of the wealthy family dynasties acting out of a sense of social responsibility, as well as influential administrators of the post-war military-industrial complex, concerned with regional economic recovery. However, neither were immediately recognized as profit-making business enterprises capable of reproducing capital. During the first decade and a half of their existence, pioneering venture capital organizations struggled to distinguish themselves from speculative gambling, on the one hand, and from non-pecuniary, philanthropic pursuit, on the other hand. During this period of uncertainty that lasted until the end of the 1950s, a different group of people discovered investing in young technological companies while working as career employees in formal financial institutions. These "careerists" did not inherit considerable wealth and could not exercise a "patrician" approach characteristic of the pioneering VC organizations capable of tolerating total losses in at least some of their investments. On the contrary, the "careerists" became exposed to intermediation opportunities between the emerging technology companies and institutional pools of financial capital while moving along the organizational hierarchies. In order to pursue these opportunities, they had to adopt some of the categories of institutional finance, like "special situations," to make these opportunities intelligible for the providers of capital. When "venture capital" meant an elite and exclusive business practice, these people categorized it under the name of "special situations."

Between 1959 and 1962, the US stock markets witnessed a speculative boom in the shares of companies engaged in research and development effort for the federal government, especially the so-called "electronics" companies. This event posed a novel cognitive challenge for the aspiring profession of securities analysis, whose "calculative frame" appeared increasingly deficient and incapable of accounting for the small technological companies without a long statistical history to judge their value. As "investments" became increasingly indistinguishable from "speculation," the categorical apparatus of security analysis underwent a significant transformation, making previously marginal, residual categories like "special situations" increasingly central to making sense of financial markets. During the electronics boom, the residual category of "special situations" became the proxy for

---

[1] Giraudeau, "Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73)."

[2] See Michel Foucault, "Technologies of the Self," in *Technologies of the Self. A Seminar with Michel Foucault*, ed. Luther H. Martin, Huck Gutman, and Patrick H. Hutton (London: Tavistock, 1988), 16–49.

a young, technologically based company, assuming the role of an early equivalent of "venture capital." Because of the unique character of each "special situations," moreover, investing in them put a premium on the practice of field trips, which stood relatively low in the division of labor of security analysis profession. As security analysts struggled to determine whether the electronics boom had a basis in economic fundamentals — in particular, in the ongoing "scientific" or "research revolution," — they increasingly required a new set of heuristics to judge the "special situations" companies. In turn, this created a new emphasis on first-hand knowledge of the "management" of these "scientific companies."

In the aftermath of the electronic boom, venture capitalists and others deployed a set of heuristics to render the knowledge of "management" positive, moving it from a residual category of securities analysis to the central factor in valuation and capitalization of companies. In so doing, they drew on the discourse of research administration that emerged in the aftermath of World War II as a practical reflection of the challenges of managing large-scale research institutions, first governmental wartime laboratories, and then corporate R&D divisions. Natural and social scientists reflected on their experience of "teamwork" during the war, conceptualizing organized research settings as "bureaucratic." The rise of administrative science in the mid-1950s rendered public and private bureaucracies equivalent as proxies for any large-scale organization, thus opening the way for a reflection on the conditions of scientific work in large corporations. During the 1960s, research managers debated the ways and approaches of increasing the creativity and productivity of the scientists and engineers employed in the corporate R&D laboratories, as well as approaches to promoting and rewarding these "creative specialists." By the end of the decade, amidst mounting concerns about declining R&D profitability, research managers increasingly recognized the impossibility of turning scientists and engineers into administrators and turned to social scientists for help. Researchers trained in human relations brought into research management discourse the emerging critique of industrial bureaucracy and, by the end of the 1960s, concluded that the psychological traits of "creative specialists," scientists and engineers, were identical to the psychological profile of the "ideal entrepreneur." This recognition led to the emergence of the notion of the "latent entrepreneur," "buried" within the parent organization without access to capital for starting-up an independent business, thereby translating the managerial problem of corporate R&D into the problem of venture finance. This conclusion allowed scientists and engineers to be included within the ranks of (potential) "technical entrepreneurs" who, just like many other members of the "achieving society," needed financial and managerial assistance to effect the transition to the world of private enterprise. Defining themselves as being "in the people business," venture capitalists have found their professional niche in mediating this process — turning engineers into entrepreneurs by "nurturing" them together with their firms.

Appendix. Patricians and Engineers: A Prosopography of the Early US Venture Capitalists, 1952-1970

Chapter III suggested that "careerists" played an important role in the emergence of venture capital as a form of investing: without much concern for the social responsibility of business or any other similarly noble pursuits, their trajectory into what eventually became venture capital was contingent on their employment in formal financial institutions, as well as "careerist" socialization that generally discourages risk-taking, as implied by Mann.[1] The "careerist" route into venture capital was enabled by the "rising tides" of innovation that created opportunities to mediate between the emerging technological companies and the established institutional pools of financial capital. Characteristically, most of these "careerists" entered venture capital business from non-technological backgrounds, which was in fact typical of all early venture capitalists in the US.[2] Nevertheless, by the mid-1960s the "social origins" of American venture capitalists shifted in the opposite direction.

By the late 1960s, venture capital community became more diverse, attracting people with technical or engineering, rather than financial, background. If in 1952 Reid Dennis was virtually the only person in San Francisco financial industry who had an engineering degree, the rise of Silicon Valley's semiconductor cluster created a "different formation" of venture capitalists, to adopt Donald Valentine's term.[3] Paul Wythes, having graduated from Princeton with a mechanical engineering degree, and with an MBA from Stanford, began his career in "scientific sales," first at Honeywell, and later at Beckman Instruments, the major electronics companies. Through a business school connection, he became involved with the establishment of the venture capital arm of Sutter Hill, a Californian real estate company, in 1964, where he was joined by William Draper.[4] Thomas Perkins, being the first member of his family to have a college education, studied engineering at MIT and with Doriot at Harvard Business School, going to work for Hewlett-Packard thereafter, through which he established ties with the venture capital community, and launched Kleiner and Perkins limited partnership in 1972, together with Eugene Kleiner, one of the founders of Fairchild Semiconductor.[5] Gibson Myers, an engineering graduate of Dartmouth College and a Stanford MBA, worked in the division led by Perkins at Hewlett-Packard, joining the newly established venture capital firm Mayfield via a Stanford connection in 1969.[6] Likewise, Donald Valentine's venture capital career was launched by his experience in marketing at

---

[1] Mann, *The Sources of Social Power: Volume 2: The Rise of Classes and Nation-States, 1760-1914*.

[2] Berlin, "The First Venture Capital Firm in the Silicon Valley: Draper, Gaither & Anderson."

[3] Donald T. Valentine, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010), p. 24.

[4] Paul Wythes, "Venture Capital Greats: A Conversation with Paul Wythes," an interview conducted and edited by Mauree Jane Perry, May 8, 2006, in Palo Alto, California (National Venture Capital Association, Arlington, Virginia, 2009).

[5] Thomas J. Perkins, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010).

[6] Gibson S. Myers, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2008 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009).

Sylvania, Fairchild Semiconductor, and then National Semiconductor, leading to the formation of Sequoia Capital in 1972.[7] J. Burgess Jamieson, after graduating from MIT with a degree in electrical engineering in 1952, worked in Grumman Aircraft Corporation and Honeywell, assuming a project engineer position in the Cambridge-based Adage, Inc., backed by American Research and Development Corporation, through which he met Doriot and William Elfers. Leaving Adage in 1963, Jamieson managed the development of the world's first 16-bit minicomputer at the Massachusetts-based Computer Control Company until 1968, when he became a general manager and participated in the private venture capital pool of the company's top officers. Shifting towards more venture-capital oriented career, in 1974 Jamieson co-founded Institutional Venture Associates.[8] Burton McMurtry, having received his PhD in electrical engineering from Stanford, began his career at the Mountain View-based research laboratory of Sylvania; through his meeting with Jack Melchor, a physics PhD who also worked at Sylvania before McMurtry, and backed several technology companies in California in the mid-1950s through the late 1960s. In 1974, together with Reid Dennis, McMurtry founded Intuitional Venture Associates.[9]

At the same time, from the late 1960s onwards, Wall Street became interested in computing and high technology more generally, creating an opening for people with scientific backgrounds to become consultants and intermediaries between emerging technologies and financial markets. Thus, James Swartz, having studied engineering at Harvard and industrial administration at Carnegie Mellon, after a brief stint in consulting, joined the newly organized venture capital firm Data Science Ventures at Princeton, founded by a Princeton PhD chemical engineer Morton Collins, in 1968.[10] Family-based venture capital organizations also began searching for specialized expertise: thus, Venrock, a venture capital firm established in 1969 by the Rockefeller family, hired Anthony Evnin, an MIT PhD in chemistry, to explore biotechnology field;[11] in 1972, Charles Lea, then at White, Wield & Co., hired James Blair, an engineering PhD graduate of the University of Pennsylvania, after his brief stint as a security analyst at F.S. Smithers, to oversee the firm's technology investments.[12]

Nevertheless, several partly overlapping "formations" of early American VCs are discernible, whose trajectories, while partly overlapping (e.g., at the key

[7] Donald T. Valentine, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010).

[8] J. Burgess Jamieson, "Bay Area Venture Capitalists: Shaping the Business and Economic Landscape," conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010).

[9] Burton J. McMurtry, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009).

[10] James R. Swartz, "Venture Capital Greats: A Conversation with James R. Swartz," interview conducted and edited by Mauree Jane Perry, July 19, 2006 (National Venture Capital Association, Arlington, Virginia, 2009).

[11] Anthony B. Evnin, "Venture Capital Greats: A Conversation with Anthony B. Evnin," interview conducted by Carole Kolker, June 30, 2009 (New York City, National Venture Capital Association, Arlington, Virginia, 2009).

[12] James C. Blair, "Venture Capital Greats: A Conversation with James C. Blair," interview conducted by Carole Kolker, June 17, 2009 (National Venture Capital Association, Arlington, Virginia, 2009).

institutions like Harvard Business School or the first VC organizations), are nevertheless distinct. These trajectories are summarized in the Table below. Based on the oral histories and additional biographical sources, it presents a stylized prosopography of early US venture capitalists, built around the temporal axis — namely, the date or the period of the first exposure to or the transition to venture capital. The table includes 34 individuals who did not participate in the founding of the first venture capital organizations after World War II but were drawn into VC investing by some other route, between the early 1950s and the early 1970s, i.e. roughly covering the historical period of this thesis. The Table reads as follows:

- **Name:** identifies the individual and refers to the corresponding oral history listed in the Primary Sources;
- **Family Background:** provides some stylized facts about the individual's social location at birth, operationalized, so far as possible, in a conventional sociological way with reference to father's occupation;
- **School:** provides additional stylized facts concerning the individual's social location;
- **Education:** higher education (university, college, business school), level attained, specialization/subject;
- **Military Service:** war experience and military career;
- **Career Before VC:** this column contains information about the individual's affiliation/position immediately prior to or contemporaneous with his first exposure/transition to VC;
- **Entry Time:** exact year or period of time during which the individual was exposed to/began transition into VC;
- **VC Entry:** specific episodes and/or organizational affiliation of the individual at the time of transition;
- **Later Career:** later career in the VC, if applicable;
- **Category:** CAR — "careerists"; EL — "elites"; ENG — "engineers."

Categories in the Table are stylized generalizations of the typical paths to venture capital between the early 1950s and the early 1970s. The "careerist" profile is described in the Chapter II: this category refers to those VCs whose careers were launched through their work in formal financial institutions, who did not possess any considerable hereditary wealth, and, for the most part, did not have a background in technology or engineering. "Engineers" include those VCs whose careers were launched through their participation in the founding or operation of technology-intensive businesses, or whose transition into VC was contingent on their expertise in science, technology, or engineering. "Elites" include VCs coming from the established backgrounds comparable to those of the founders of J.H. Whitney & Co., or at least belonging to the same social circles. On the other hand, for the purposes of simplicity, this same category also includes those VCs whose careers started with one of the original VC firms: J.H. Whitney & Co., American Research & Development Corp., Draper, Gaither & Anderson. The data on 34 individuals presented in the Table is obviously limited in so far as it is not a statistical sample, but a prosopography constructed by "snowballing" on the basis of the oral history interviews. Moreover, with a few exceptions, it does not include a potentially large group of VCs who began their careers after the passage of the Small Business Investment Company Act of 1958 by forming SBICs. Nevertheless, however limited,

it does afford a few insights into the evolution of the VC investing during the relevant period.

Firstly, as noted above, by the mid-1960s, the presence of the "careerists" becomes somewhat less visible, as more people with engineering/scientific backgrounds are being drawn into the business (Paul Wythes, Bruce Everett, James Swartz, Richard Petritz). Secondly, the original VC organizations experience a generational change and admit new, unrelated partners (Peter Crisp, John Shane, Charles Waite). Thirdly, another group of VCs begin their careers as a result of extensive operational experience in the established technological companies, some of them backed by the VCs of the previous generation (e.g., Fairchild Semiconductor or National Semiconductor). Today's famous VCs Thomas Perkins and Donald Valentine belong to the latter category.

Finally, the Table provides some stylized illustrations to the claims and the narrative developed in the Chapter III.

Table 1. **Patricians and Careerists: A Stylized Prosopography of Early US Venture Capitalists**

Name	Family Background	School	Education	Military Service	Career Before VC	Entry Year	VC Entry	Later Career	Category
Reid Dennis (b. 1926)	Father engineer, grandfather major regional dealer of Ford Motor, San Francisco	Thatcher (private)	Stanford (1950), electrical engineering; SGSB (1952)	US Navy (1944-1946)	Fireman's Fund (1952-1978), security analyst	1952	Fireman's Fund (1952) and informally with "The Group"	Institutional Venture Associates (1974) and Institutional Venture Partners (1980), founder	CAR
William Bowes (b. 1926)	Father investment professional, San Francisco	Lowell High School (public)	Stanford (1950), economics; HBS (1952)	US Army infantry (1944-1946), South Pacific and Japan	Blyth & Co. (1953-1978), analyst, later IPO and private placements	1953	Blyth & Co. (1953) and informally with "The Group"	US Venture Partners (1980)	CAR
Daniel MacGanney (b. 1925)	Wealthy Californian family, CA	Bellermine College Preparatory	Stanford	US Army, Pacific Theatre of operations	Lionel D. Edie (1959-1962), head of San Francisco office	Mid-1950s	Lionel D. Edie (1959-1962) and informally with "The Group" (late 1950s)	P.M. Investment Company (1962)	CAR
Peter Brooke (b. 1929)	Father doctor, Worcester Memorial Hospital, MA	Philips Academy Andover (elite boarding school)	Harvard College (1952); HBS (1954)	US Army Audit Agency	First National Bank of Boston (1956-1961), lending, small technological companies	Mid-1950s	Lending: Wang Laboratories and other MIT-based startups while at First National	Bessemer Securities (1961-1963), VC department	CAR

John Bryan (b. 1925)	Father CEO of Maxwell Hardware Company, CA	Piedmont schools, Webb School	Stanford; USC and HBS (Navy Training)	US Navy, Naval Supply Officer	Blyth & Co. (late 1950s -1961), stockbroker	Late 1950s	Blyth & Co. and informally with "The Group" (late 1950s)	Bryan and Edwards (1962)	CAR
William Edwards (b. 1927)	Father in oil business, Long Beach, CA	Polytechnic High School (public)	Stanford (1950), petroleum engineering; HBS (1952)	New Mexico Military Institute during high school	Standard Oil of California (1952-1959); Lionel D. Edie (1959-1962), investment manager	Late 1950s	Lionel D. Edie (1959-1962) and informally with "The Group" (late 1950s)	Bryan and Edwards (1962)	CAR
Charles Lea (b. 1927)	Father in home repairs business, Richmond, VA	Public	Cornell (1952), economics	US Army infantry (1945-1947), South Pacific, GI Bill	Bessemer Securities (1953-1961), security analyst	Late 1950s	Bessemer Securities (1953-1961), technological companies in New England; Damon Engineering (1961)	F.S. Smithers (1961) venture capital investments	CAR
Arthur Rock (b. 1926)	Father small business owner, Rochester, NY	Public	Syracuse, poli sci & finance ; HBS (1951)	US Army (1944-1945), GI Bill	Hayden, Stone (1952-1961), security analyst	1956-1957	Fairchild Semiconductor (1957)	Davis & Rock (1961)	CAR

William Hambrecht (b. 1935)	Middle-class, father with Standard Oil Company of NY, Brooklyn, NYC	n/a	Princeton (1957), history; football scholarship	ROTC program at Fort Benning (1957, six months)	Security Associates, small investment firm at Cape Canaveral, FL; later part of F.I. du Pont (1957-1965)	Since 1957	Early computer companies, Engineering Systems Labs (late 1950s), private placements and IPOs	Hambrecht & Quist (1968)	CAR
Arnold Ryden (b. 1921)	n/a, Minneapolis	Minneapolis South High School (public)	University of Minnesota (1941); HBS (1943)	US Army Quartermaster Corps (1943-1945)	Engineering Research Associates (1951/52 — 1957), treasurer	1957	Control Data Corporation (1957), co-founder	Midwest Technical Development Corp. (1958)	CAR
David Morgenthaler (b. 1919)	Farming family, South Carolina	Public	MIT (1941), mechanical engineering	Army Corps of Engineers (1941-1945)	President of Foseco Inc. (1957-1967), oil company affiliate of J.H. Whitney & Co.	1957	John Hay Whitney (personally)	Morgenthaler Ventures (1968)	ENG
Donald Lucas (b. 1928)	Ranchers family, Upland, CA	Public	Stanford (1951), economics; SGSB (1953)	US Army, served in Germany (1953-1955)	Smith Barney & Co. (1955-1959), corporate finance analyst	1959	National Semiconductor (1959), raised equity financing	Draper, Gaither & Anderson (1960)	CAR

Walter Curley (b. 1922)	Father CEO of General American Transportation Company, Pittsburgh	Philips Academy Andover (elite boarding school)	Yale (1943), HBS (1948)	Marine Corps infantry combat officer in Japan and Guam (1943-1945)	Caltex Oil Company (1949-1959)	1959	J.H. Whitney & Co. (1959-1974)	Independent VC investor (1974)	EL
William Draper III (b. 1928)	Father US Army General, US Ambassador to NATO	Scarsdale (public)	Yale (1950); HBS (1954)	US Army (1946-1950), Korean War (9 months) GI Bill	Inland Steel Company (1954-1959), East Chicago, Indiana	1960	Draper, Gaither and Anderson	Draper & Johnson SBIC (1962-1965); Sutter Hill Ventures (1965)	EL
Charles Waite (b. 1930)		Manchester High School (public)	University of Connecticut (1957), business; HBS (1959)	US Army (1951-	HBS (1959-1960), Assistant to Doriot	1960	ARD	Greylock Ventures (1965)	EL

Peter Crisp (b. 1932)	Father treasurer of Allied Chemical Corporation, then independent broker with R.W. Pressprich & Company, NYC	Elite boarding schools (Millbrook, Hotchkiss, Hebron Academy)	Yale (1955), history; HBS (1960)	US Air Force, Strategic Air Command Intelligence Officer (1955-1958)	no	1960	Laurance Rockefeller VC operation	Venrock (1969)	EL
Donald Valentine (b. 1933)	Father truck driver and union organizer, no college education	Private Jesuit school	Fordham University (1954), BA	US Navy (1954)	Fairchild Semiconductor (1960-1967), sales and marketing	1960	Sequoia Capital (1972)	Sequoia Capital (1972)	ENG
John Shane (b. 1933)	n/a	n/a	Princeton (1954), AB; HBS (1960)	n/a	HBS (1960-1961), Assistant to Doriot	1961	ARD (1961-1972)	Palmer Service Corporation, since 1972; non-VC	EL
Franklin Johnson (b. 1928)	Parents in education, Quincy, IL	Palo Alto High School (public)	Stanford (1950), mechanical engineering; HBS (1952)	US Air Force maintenance officer during Korean War	Inland Steel Company (1952-1962), East Chicago, Indiana	1962	Draper & Johnson SBIC (1962-1965)	Asset Management Company (1965)	CAR

Paul Bancroft III (b. 1930)	Bancroft family, CA	Culver military school	Yale (1951), social sciences, Georgetown Foreign Service Institute	US Air Force, Department of Defense, then Korea and Japan (1951-1955)	Merrill Lynch (1956-1957), sell-side security analyst trainee; F. Eberstadt & Co. (1957-1962), investment banking	1962	Draper, Gaither & Anderson (1962-1967)	Bessemer Securities (1967), Vice President for venture capital	EL
Tomas Perkins (b. 1932)	Parents didn't have college level education, NY	Public schools	MIT (1953), electrical engineering and computer science; HBS (1957)	no	Hewlett Packard (1960s)	Mid-1960s	University Labs, co-founder	Kleiner & Perkins (1973)	ENG
Sanford Robertson (b. 1932)	Father entrepreneur, Chicago	New Trier (public)	University of Michigan, BA, MBA (1954)	Japan and Guam (1956-1957)	Smith Barney & Co. (1959-1969)	Mid-1960s	University Labs / Spectra-Physics merger	Robertson, Colman & Siebel (1969), high-tech investment bank, San Francisco	CAR
Paul Wythes (b. 1933)	Father teacher and high school principal, New Jersey	Public schools	Princeton (1955), mechanical engineering; SGSB (1959)	US Navy Naval Supply Corps (1955-1957)	Beckman Instruments (1962-1964)	1964	Sutter Hill Ventures (1964)	Sutter Hill Ventures (1964)	ENG

Alan Patrikof (b. 1934)	Father stockbroker, NYC	Horace Mann School (1952) (private)	Ohio State University (1955); Columbia Business School (1957)	US Army (1958, six months), Fort Dix	Central National Corporation (1961-1968), family office, occasional VC-like investments	1964	Datascope Corporation (1964), medical devices, invested while at Central National, board member	Alan Patricof Associates (1970)	CAR
Bruce Everitt (b. 1928)	Father academic, OR director, US Signal Corps; then Dean of Engineering, Univ. of Illinois	n/a	University of Illinois (1950), electrical engineering; HBS (1952)	US Army Signal Corps	Duff, Anderson & Clark, Chicago (1959-1964), semiconductors investment analyst	1964	G.S. Grumman & Associates (1964-1976), Boston, technology investment firm, co-founder	High-tech investment advisor and portfolio manager, Boston, since 1976	ENG
Jack Melchor (b. 1925)	n/a	China Grove, North Carolina High School, 1943	University of North Carolina (1950), Notre Dame University (1953), MS and PhD Physics	US Navy V-12 Program, (1943); USNR Mid Shipmen School (1944); Ensign US 7th Fleet Pacific, (1945-1946)	Hewlett Packard Associates (1961-1968)	1965	Private investor in semiconductor startups, California since 1965		ENG
Edward Glassmeyer (b. 1941)	Father worked for NYC office of Blyth & Co	Private, NYC	Princeton (1963), BA psychology, Tuck Business School (1968)	US Marine Corps (1963-1966), Japan and Vietnam	no	1968	Citicorp SBIC (1968-1970), Venture Capital	Oak Investment Partners (1978)	CAR

James Swartz (b. 1942)	Working class parents, no college education, Pittsburgh, Pennsylvania	Public	Harvard, Engineering; Carnegie-Mellon GSIA, MS in Industrial Engineering	No	Cresap McCormick & Padget, consulting firm	1968	Data Science Ventures (1968) Morton Collins, personally	Accel Partners (1983)	ENG
Herman Fialkov (b. 1922)	Immigrant parents, father watchmaker, Brooklyn, NYC	Eastern District High School, Brooklyn, NYC (public)	NYU (1951), BA Administrative Engineering; NUY (1952), graduate work in mechanical engineering	US Army Signal Corps and Infantry (1942-1946),	General Instruments Corporation (1960-1968)	1968	Geiger & Fialkov Fund (1968-1977)	Aleph Null Fund (1978)	ENG
Richard Petritz (b. 1922)	Father lawyer, Rockford, Illinois	public	Northwestern University (1944), BS electrical engineering; PhD in Physics (1950)	US Navy, Radar Officer, Combat Information Center (1944-1946), GI Bill	Texas Instruments (1958-1968), Research director	1968	New Business Resources (NBR), investing in semiconductor firms (1969-1977)	New Venture Resources since 1986	ENG
C. Richard Kramlich (b. 1935)	Father founder of a food stores chain, mother aeronautical engineer	Milwaukee Country Day (private)	Northwestern University (1957), BS History; HBS (1960)	US Air Force, Strategic Air Command (1957-1958)	Preston & Moss investment firm, Boston (1960-1969), investing in Route 128 small high-tech companies	1969	Arthur Rock & Co. (1969)	New Enterprise Associates (1977)	CAR

Burton McMurtry (b. 1935)	Father rock geologist, worked as accountant at an oil company, mother English teacher	public	Rice University, BS electrical engineering (1957); Stanford (1962), MS and PhD electrical engineering	No	General Telephone and Electronics (1964-1969), researcher and research manager	1969	Jack Melchor, personally	Institutional Venture Associates (1973), co-founder	ENG
Gibson Myers (b. 1942)	Father in insurance business, St. Louis	n/a	Dartmouth (1964), BA engineering science; SGSB (1966)	No, 1966 four months army reserves training	Hewlett-Packard (1966-1970)	1969-1970	Mayfield (1970)		ENG
Jamieson Burgess (b. 1930)	Father a builder, mother a secretary at AT&T, NYC	Public schools	MIT (1952), electrical engineering	First Lieutenant, U. S. Army, 218th Ordnance Detachment, Antiaircraft Radar Units support (1952-1955)	Sycor, Inc., COO, raising venture capital (1970-1971)	1970	Limited Partner, Western Management venture capital fund of Bank of America (1971-1973)	Institutional Venture Associates (1973), co-founder	ENG

Sources: "John Bryan Obituary," San Francisco Chronicle, April 2 to April 4, 2012, https://www.legacy.com/obituaries/sfgate/obituary.aspx?n=john-bryan&pid=156839334; William C. Edwards, "Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009); "Paul Wythes Obituary," San Francisco Chronicle, November 5 to November 11, 2012, https://www.legacy.com/obituaries/sfgate/obituary.aspx?n=paul-wythes&pid=160894556; Paul Wythes, "Venture Capital Greats: A Conversation with Paul Wythes," an interview conducted and edited by Mauree Jane Perry, May 8, 2006, in Palo Alto, California (National Venture Capital Association, Arlington, Virginia, 2009); "William Ketcham "Bill" Bowes, Jr.," SF Gate, January 6 to January 8, 2017, https://www.legacy.com/obituaries/sfgate/obituary.aspx?pid=183434037; Alan J. Patricof, "Oral History with Alan Patricof," conducted by Carole Kolker, PhD. September 24 and October 26, 2010 (Computer History Museum, Mountain View, California, 2019); Arnold J. Ryden, "Oral history interview with Arnold J. Ryden," Conducted by Judy E. O'Neill on 5 April 1995, Edina, MN (Charles Babbage Institute, Center for the History of Information Processing, University of Minnesota, Minneapolis, 1996), http://hdl.handle.net/11299/107616; Arthur Rock, "Interview with

Arthur Rock," by Amy Blitz, March 2001 (HBS Entrepreneurs Oral History Collection, Baker Library Special Collections, Harvard Business School); Arthur Rock, interview by David C. Brock in San Francisco, California, 9 October 2002 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript #0265, 2002); Arthur Rock, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2008 and 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009); Bruce W. Everitt, an oral history conducted in 1996 by Andrew Goldstein, IEEE History Center, Piscataway, NJ, USA; "Cowen & Company In Deal To Acquire G. S. Grumman," New York Times, 24 February, 1976, 71; Burton J. McMurtry, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009); C. Richard Kramlich, "Venture Capital Greats: A Conversation with C. Richard Kramlich," interviewed by Mauree Jane Perry on August 31, 2006, in San Francisco, California (National Venture Capital Association, Arlington, Virginia, 2009); Charles L. Lea Jr., "Venture Capital Greats: A Conversation with Charles L. Lea," interviewed by Carole Kolker on October 10 and 11, 2008, in Easton, Maryland (National Venture Capital Association, Arlington, Virginia, 2009); Charles P. Waite, "Oral History of Charles P. Waite," conducted by Marguerite Gong Hancock, Ray Rothrock, February 16, 2017, San Francisco, CA (Computer History Museum, Mountain View, California, 2017); Computer History Museum, "Jack Melchor," n.d., https://computerhistory.org/profile/jack-melchor/?alias=Jack,Melchor; Burton J. McMurtry, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009); David Morgenthaler, "Venture Capital Greats: A Conversation with David Morgenthaler," Interview Conducted by Carole Kolker, PhD, April 14, 2010 (National Venture Capital Association, Arlington, Virginia, 2010); David T. Morgenthaler, "Oral History of David T. Morgenthaler," Interviewed by John Hollar, December 2, 2011, Mountain View, California (Computer History Museum, Mountain View, California, 2012); Donald Lucas, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010); Donald T. Valentine, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010); Edward F. Glassmeyer, "Venture Capital Greats: A Conversation with Edward F. Glassmeyer," interviewed by Carole Kolker on October 17, 2008, in Westport, Connecticut (National Venture Capital Association, Arlington, Virginia, 2009); Franklin P. Johnson, "Bay Area Venture Capitalists: Shaping the Economic and Business Landscape" conducted by Sally Smith Hughes in 2008 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009); Gibson S. Myers, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2008 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009); Herman Fialkov, interview by David C. Brock and Richard Ulrych in New York City, New York, Philadelphia, Pennsylvania, and Boca Raton, Florida, on 24 September and 23 November 2009 and 27 February and 28 June 2010 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript # 0667, 2010); J. Burgess Jamieson, "Bay Area Venture Capitalists: Shaping the Business and Economic Landscape," conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010); James R. Swartz, "Venture Capital Greats: A Conversation with James R. Swartz," interview conducted and edited by Mauree Jane Perry, July 19, 2006 (National Venture Capital Association, Arlington, Virginia, 2009); Paul Bancroft III, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2010 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010); Peter A. Brooke, Venture Capital Greats: A Conversation with Peter A. Brooke," interview by Carole Kolker, April 6 and September 1, 2010, Boston, Massachusetts (National Venture Capital Association, Arlington, Virginia, 2010); Peter O. Crisp, "Venture Capital Greats: A Conversation with Peter O. Crisp," interviewed by Carole Kolker on October 21, 2008, in Mill Neck, New York (National Venture Capital Association, Arlington, Virginia, 2009); Reid Dennis, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009); Reiner, "The Transformation of Venture Capital: A History of Venture Capital Organizations in the United States"; "Daniel J. McGanney, Jr. - Obituary," SF Gate, July 4, 1995, https://www.sfgate.com/news/article/OBITUARY-Daniel-McGanney-Jr-3029814.php; Richard Petritz, An Interview conducted by David Morton, Center for the History of Electrical Engineering, June 21, 1996 (Interview #272 for the Center for the History of Electrical Engineering, IEEE History Center, The Institute of Electrical and Electronics Engineers, Inc, 1996), https://ethw.org/Oral-History:Richard_Petritz/; Sam Roberts, "Walter Curley, Venture Capitalist and U.S. Ambassador, Dies at 93," June 8, 2016, D8. < https://www.nytimes.com/2016/06/09/nyregion/walter-curley-venture-capitalist-and-us-ambassador-dies-at-93.html>; Sanford R. Robertson, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2010 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2011); Spencer Ante, Creative Capital: Georges F. Doriot and the Birth of Venture Capital (Boston, Mass.: Harvard Business Press, 2008); Thomas J. Perkins, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history conducted by Sally Smith Hughes in 2009 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010); Thomas J. Perkins, "Oral History of Thomas J. Perkins," conducted by John Hollar, July 22, 2011, San Francisco, California (Computer History Museum, Mountain View, California, 2012); Walter J. P. Curley, "Venture Capital Greats: A Conversation with Walter J. P. Curley," interview by Carole Kolker, March 24, 2010 (National Venture Capital Association, Arlington, Virginia, 2009); Walter J. P. Curley, "Ambassador Walter Curley," Interviewed by Richard Jackson, November 30, 1998 (The Association for Diplomatic Studies and Training Foreign Affairs Oral History Project, 2000); William H. Draper, III, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," oral history conducted by Sally Smith Hughes in 2008 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009); William H. Draper III, "Venture Capital Greats: A Conversation with William H. Draper, III," Interview Conducted and Edited by Mauree Jane Perry, October 20005 (National Venture Capital Association, Arlington, Virginia, 2009); William H. Draper, III, "Oral History of William H. Draper III", conducted by John Hollar, April 14, 2011, Mountain View, California (Computer History Museum, Mountain View, California, 2011); William K. Bowes, Jr., "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2008 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009); William R. Hambrecht, "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," conducted by Sally Smith Hughes in 2010 (Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2011).

Primary Sources

Archival Collections Consulted:

American Research and Development Corporation Papers, Baker Library Special Collections, Harvard Business School.

Georges F. Doriot Papers, Baker Library Special Collections, Harvard Business School.

Georges F. Doriot Research Papers, Baker Library Special Collections, Harvard Business School.

John Hay Whitney and Betsey Cushing Whitney Papers, Yale University, New Haven.

Peter O. Crisp Papers, Baker Library Special Collections, Harvard Business School.

William Elfers Papers, Baker Library Special Collections, Harvard Business School.

Oral Histories:

Alafi, Moshe. "Biotech Pioneer and Entrepreneur," an oral history interview conducted by Sally Hughes in 2003. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2013.

Bancroft III, Paul. "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history interview conducted by Sally Smith Hughes in 2010. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010.

Blair, James C. "Venture Capital Greats: A Conversation with James C. Blair," interview conducted by Carole Kolker, June 17, 2009, Princeton, New Jersey. National Venture Capital Association, Arlington, Virginia, 2009.

Bowes, Jr., William K. "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history interview conducted by Sally Smith Hughes in 2008. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009.

Brooke, Peter A. "Venture Capital Greats: A Conversation with Peter A. Brooke," interview by Carole Kolker, April 6 and September 1, 2010, Boston, Massachusetts. National Venture Capital Association, Arlington, Virginia, 2010.

Crisp, Peter O. "Venture Capital Greats: A Conversation with Peter O. Crisp," interviewed by Carole Kolker on October 21, 2008, Mill Neck, New York. National Venture Capital Association, Arlington, Virginia, 2009.

Curley, Walter J. P. "Ambassador Walter Curley," interviewed by Richard Jackson, November 30, 1998, New York City. The Association for Diplomatic Studies and Training Foreign Affairs Oral History Project, 2000.

Curley, Walter J. P. "Venture Capital Greats: A Conversation with Walter J. P. Curley," interview by Carole Kolker, March 24, 2010, New York City. National Venture Capital Association, Arlington, Virginia, 2010.

Dennis, Reid. "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history interview conducted by Sally Smith Hughes in 2009. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009.

Draper III, William H. "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history interview conducted by Sally Smith Hughes in 2008. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009.

Draper III, William H. "Oral History of William H. Draper III", conducted by John Hollar, April 14, 2011, Mountain View, California. CHM Reference number: X6084.2011. Computer History Museum, Mountain View, California, 2011.

Draper III, William H. "Venture Capital Greats: A Conversation with William H. Draper III," interview conducted and edited by Mauree Jane Perry, October 2005, San Francisco, California. National Venture Capital Association, Arlington, Virginia, 2009.

Edwards, William C. "Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history interview conducted by Sally Smith Hughes in 2009. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009.

Everitt, Bruce W. Interview #268 for the IEEE History Center, conducted by Andrew Goldstein, May 9, 1996, IEEE History Center, Piscataway, New Jersey. URL: https://ethw.org/Oral-History:Bruce_W._Everitt (Accessed September 2019).

Evnin, Anthony B. "Venture Capital Greats: A Conversation with Anthony B. Evnin," interview conducted by Carole Kolker, June 30, 2009, New York City, National Venture Capital Association, Arlington, Virginia, 2009.

Fialkov, Herman. Interview by David C. Brock and Richard Ulrych in New York City, New York, Philadelphia, Pennsylvania, and Boca Raton, Florida, 24 September and 23 November 2009 and 27 February and 28 June 2010. Philadelphia: Chemical Heritage Foundation, Oral History Transcript # 0667, 2010.

Glassmeyer, Edward F. "Venture Capital Greats: A Conversation with Edward F. Glassmeyer," interviewed by Carole Kolker on October 17, 2008, Westport, Connecticut. National Venture Capital Association, Arlington, Virginia, 2009.

Hambrecht, William R. "Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape," an oral history interview conducted by Sally Smith Hughes in 2010. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2011.

Jamieson, J. Burgess. “Bay Area Venture Capitalists: Shaping the Business and Economic Landscape,” an oral history interview conducted by Sally Smith Hughes in 2009. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010.

Johnson, Franklin P. “Bay Area Venture Capitalists: Shaping the Economic and Business Landscape,” an oral history interview conducted by Sally Smith Hughes in 2008. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009.

Kramlich, C. Richard “Venture Capital Greats: A Conversation with C. Richard Kramlich,” interviewed by Mauree Jane Perry on August 31, 2006, San Francisco, California. National Venture Capital Association, Arlington, Virginia, 2009.

Lea Jr., Charles L. “Venture Capital Greats: A Conversation with Charles L. Lea,” interviewed by Carole Kolker on October 10 and 11, 2008, Easton, Maryland. National Venture Capital Association, Arlington, Virginia, 2009.

Lucas, Donald. “Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape,” an oral history interview conducted by Sally Smith Hughes in 2009. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010.

McMurtry, Burton J. “Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape,” an oral history interview conducted by Sally Smith Hughes in 2009. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009.

Morgenthaler, David T. “Oral History of David T. Morgenthaler,” interviewed by John Hollar, December 2, 2011, Mountain View, California. CHM Reference number: X6305.2012. Computer History Museum, Mountain View, California, 2012.

Morgenthaler, David T. “Venture Capital Greats: A Conversation with David Morgenthaler,” Interview Conducted by Carole Kolker, April 14, 2010, Cleveland, Ohio. National Venture Capital Association, Arlington, Virginia, 2010.

Myers, Gibson S. “Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape,” an oral history interview conducted by Sally Smith Hughes in 2008. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009.

Patricof, Alan J. “Oral History with Alan Patricof,” conducted by Carole Kolker, PhD. September 24 and October 26, 2010, New York City. National Venture Capital Association, Arlington, Virginia, 2010.

Perkins, Thomas J. “Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape,” an oral history interview conducted by Sally Smith Hughes in 2009. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010.

Perkins, Thomas J. “Oral History of Thomas J. Perkins,” conducted by John Hollar, July 22, 2011, San Francisco, California. CHM Reference number: X6219.2012. Computer History Museum, Mountain View, California, 2012.

Petritz, Richard. Interview #272 for the IEEE History Center, conducted by David Morton, June 21, 1996, IEEE History Center, Piscataway, New Jersey. URL: https://ethw.org/Oral-History:Richard_Petritz/ (Accessed September 2019).

Robertson, Sanford R. “Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape,” an oral history interview conducted by Sally Smith Hughes in 2010. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2011.

Rock, Arthur. “Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape,” an oral history interview conducted by Sally Smith Hughes in 2008 and 2009. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2009.

Rock, Arthur. “Interview with Arthur Rock,” by Amy Blitz, March 2001. HBS Entrepreneurs Oral History Collection, Baker Library Special Collections, Harvard Business School.

Rock, Arthur. Interview by David C. Brock in San Francisco, California, 9 October 2002. Philadelphia: Chemical Heritage Foundation, Oral History Transcript #0265, 2002.

Ryden, Arnold J. “Oral history interview with Arnold J. Ryden,” conducted by Judy E. O'Neill, 5 April 1995, Edina, Minnesota. Charles Babbage Institute, Center for the History of Information Processing, University of Minnesota, Minneapolis, 1996. URL: http://hdl.handle.net/11299/107616 (Accessed September 2019).

Swartz, James R. “Venture Capital Greats: A Conversation with James R. Swartz,” interview conducted and edited by Mauree Jane Perry, July 19, 2006, San Francisco, California. National Venture Capital Association, Arlington, Virginia, 2009.

Valentine, Donald T. “Early Bay Area Venture Capitalists: Shaping the Economic and Business Landscape,” an oral history interview conducted by Sally Smith Hughes in 2009. Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 2010.

Waite, Charles P. “Oral History of Charles P. Waite,” conducted by Marguerite Gong Hancock, Ray Rothrock, February 16, 2017, San Francisco, California. CHM Reference number: X8101.2017. Computer History Museum, Mountain View, California, 2017.

Wythes, Paul. “Venture Capital Greats: A Conversation with Paul Wythes,” an interview conducted and edited by Mauree Jane Perry, May 8, 2006, Palo Alto, California. National Venture Capital Association, Arlington, Virginia, 2009.

References[1]

Abbott, Andrew Delano. *The System of Professions: An Essay on the Division of Expert Labor*. Chicago: University of Chicago Press, 1988.

Abend, Gabriel. *The Moral Background: An Inquiry into the History of Business Ethics*. Princeton, NJ: Princeton University Press, 2014.

Abourahme, Nasser, and Omar Jabary-Salamanca. "Thinking against the Sovereignty of the Concept: A Conversation with Timothy Mitchell." *City* 20, no. 5 (2016): 737–54.

Adler, Philip, and Thomas W. Jackson. "Motivating Research Technicians: How Behavioral Science Theory Can Be Applied in a Research and Development Organization." *Research Management* 11, no. 3 (1968): 183–91.

Akerlof, George A. "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism." *The Quarterly Journal of Economics* 84, no. 3 (1970): 488–500.

Allan, John H. "Brokers Hire More Analysts: See Growing Impact on the Market." *Financial Analysts Journal* 17, no. 5 (1961): 89–91.

Allen, Robert C. *The British Industrial Revolution in Global Perspective*. Cambridge ; New York: Cambridge University Press, 2009.

Anscombe, G. E. M. "Under a Description." *Noûs* 13, no. 2 (1979): 219–233.

Anscombe, G. E. M. *Intention*. Cambridge, MA: Harvard University Press, 1957.

Antal, Ariane Berthoin, Hutter, Michael, and Stark, David. (eds.) *Moments of Valuation: Exploring Sites of Dissonance*. Oxford: Oxford University Press, 2015.

Ante, Spencer E. "Forbes's Robert Lenzner Gives Creative Capital 5 Stars!!!, Creative Capital," May 18, 2008. https://creativecapital.wordpress.com/tag/peter-drucker/. (Accessed September 2019).

———. "The Prophet of Start-Ups. An Unlikely HBS Professor Pioneers Modern Venture Capital." Harvard Business School Alumni Stories, 2008. https://www.alumni.hbs.edu/stories/Pages/story-bulletin.aspx?num=673. (Accessed September 2019).

Ante, Spencer E. *Creative Capital: Georges Doriot and the Birth of Venture Capital*. Boston, Mass.: Harvard Business Press, 2008.

Antonelli, Cristiano, and Morris Teubal. "Knowledge-Intensive Property Rights and the Evolution of Venture Capitalism." *Journal of Institutional Economics* 4, no. 2 (2008): 163–82.

———. "Venture Capitalism as a Mechanism for Knowledge Governance." In *The Capitalization of Knowledge: A Triple Helix of University-Industry-Government*, edited by Henry Etzkowitz and Riccardo Viale. Cheltenham, UK; Northampton, MA: Edward Elgar, 2010, 98–120.

[1] Including published primary sources.

Appadurai, Arjun. “The Spirit of Calculation.” *The Cambridge Journal of Anthropology* 30, no. 1 (2012): 3–17.

Arcand, Charles C. “Bureaucratic Innovation.” *CHEMTECH, December* 1975 (1975): 710–14.

Argyris, Chris. “Interpersonal Competence, Organizational Milieu, and Innovation.” *Research Management* 9, no. 2 (1966): 71–99.

Arrighi, Giovanni. “Braudel, Capitalism, and the New Economic Sociology.” *Review* 24, no. 1 (2001): 107–23.

———. *The Long Twentieth Century: Money, Power, and the Origins of Our Times*. London; New York: Verso, 1994.

Arrow, Kenneth J. “Economic Welfare and the Allocation of Resources for Invention.” In *The Rate and Direction of Inventive Activity*, edited by Richard R. Nelson, 609–26. Princeton: Princeton University Press for NBER, 1962.

Bakker, Gerben. “Money for Nothing: How Firms Have Financed R&D-Projects since the Industrial Revolution.” *Research Policy* 42, no. 10 (2013): 1793–1814.

Baumol, William J. “Entrepreneurship in Economic Theory.” *The American Economic Review* 58, no. 2 (1968): 64–71.

Beckert, Jens. *Imagined Futures: Fictional Expectations and Capitalist Dynamics*. Cambridge, Mass.: Harvard University Press, 2016.

———. “What Is Sociological about Economic Sociology? Uncertainty and the Embeddedness of Economic Action.” *Theory and Society* 25, no. 6 (1996): 803–840.

Beckert, Jens, and Patrik Aspers (eds.) *The Worth of Goods: Valuation and Pricing in the Economy*. Oxford: Oxford University Press, 2011.

Beckert, Jens, and David Dequech. “Risk and Uncertainty.” In *International Encyclopedia of Economic Sociology*, edited by Jens Beckert and Milan Zafirovski, 582–87. London: Routledge.

Beckert, Sven. *The Monied Metropolis: New York City and the Consolidation of the American Bourgeoisie, 1850-1896*. New York: Cambridge University Press, 2001.

Beckert, Sven, and Christine Desan. *American Capitalism: New Histories*. New York: Columbia University Press, 2018.

Bello, Francis. “The Prudent Boston Gamble.” *Fortune* 46, no. 5 (1952): 124–125, 208, 210, 213–216.

Bennis, Warren. *Beyond Bureaucracy: Essays on the Development and Evolution of Human Organization*. New York : McGraw-Hill, 1966.

———. “Beyond Bureaucracy.” *Trans-Action* 2, no. 5 (1965): 31–35.

Berlin, Leslie. “The First Venture Capital Firm in the Silicon Valley: Draper, Gaither

& Anderson." In *Making the American Century: Essays on the Political Culture of Twentieth Century America*, edited by Bruce J. Schulman, 155–71. New York: Oxford University Press, 2014.

———. *Troublemakers: Silicon Valley's Coming of Age*. New York: Simon and Shuster, 2017.

Beunza, Daniel, and Raghu Garud. "Calculators, Lemmings or Frame-Makers? The Intermediary Role of Securities Analysts." *Sociological Review* 55, no. SUPPL. 2 (2007): 13–39.

Beunza, Daniel, and David Stark. "Tools of the Trade the Socio-Technology of Arbitrage in a Wall Street Trading Room." *Industrial and Corporate Change* 13, no. 2 (2004): 369–400.

Block, Fred. "Swimming against the Current: The Rise of a Hidden Developmental State in the United States." *Politics and Society* 36, no. 2 (2008): 169–206.

Block, Fred, and Matthew R. Keller. "Where Do Innovations Come from? Transformations in the US Economy, 1970–2006." *Knowledge Governance: Reasserting the Public Interest* 7, no. 3 (2011): 81–104.

"Blue Ribbon Venture Capital." *Businessweek* October 29 (1960): 65–69.

Boltanski, Luc, and Eve Chiapello. *The New Spirit of Capitalism*. London: Verso, 2017.

"Books of the Week." *The Science News-Letter* 80, no. 27 (1961): 434.

"Books of the Week." *The Science News-Letter* 81, no. 11 (1962): 172.

Bowie, Robert M. "The Direction and Control of Research and Development." *Research Management* 6, no. 4 (1963): 277–88.

Bradley, W. E. "The Job of the Modern Research Manager: Effective Management Requires Business Orientation, a Commitment to Communications and to Entrepreneurial Concepts." *Research Management* 11, no. 3 (1968): 167–75.

Bralley, James A. "Proceedings of Industrial Research Institute Study Group Meetings, Number 1. The Environment for Creativity." *Research Management* 3, no. 3 (1960): 175–95.

———. "Proceedings of Industrial Research Institute Study Group Meetings. 2. Job Status as an Award for Scientific and Administrative Accomplishment." *Research Management* 3, no. 4 (1960): 227–38.

Braudel, Fernand. *Afterthoughts on Material Civilization and Capitalism*. Baltimore and London: The Johns Hopkins University Press, 1979.

Braudel, Fernand, and Siân Reynolds. *Civilization and Capitalism 15th-18th Century—Volume II: The Wheels of Commerce*. New York: Harper & Row, 1983.

Bretey, Pierre R, and Warren Burns. "The 1960 Financial Analysts Convention." *Financial Analysts Journal* 16, no. 4 (1960): 85–91.

Brick, Howard. *Transcending Capitalism: Visions of a New Society in Modern*

American Thought. Ithaca, New York: Cornell University Press, 2006.

Bright, Willard M. "Are Innovators Born or Made?" *Research Management* 12, no. 3 (1969): 173–80.

Brine, Kevin, and Mary Poovey. *Finance in America : An Unfinished Story*. Chicago and London: University of Chicago Press, 2017.

Brinson, Gary P., Jeffrey J. Diermeier, and Gary G. Schlarbaum. "A Composite Portfolio Benchmark for Pension Plans." *Financial Analysts Journal* 42, no. 2 (1986): 15–24

Brooke, Peter A. "Panel: Financing New Ventures." In *New Business: The Art of Joining Innovative Technology, Management and Capital. Proceedings, May 22-23, College School of Management*, 81–82. Chestnut Hill, MA: Boston College Press, 1969.

Brooke, Peter A., and Daniel Penrice. *A Vision for Venture Capital: Realizing the Promise of Global Venture Capital and Private Equity*. Hanover and London: New Venture Press and University Press of New England, 2009.

Brunt, Liam. "Rediscovering Risk: Country Banks as Venture Capital Firms in the First Industrial Revolution." *Journal of Economic History* 66, no. 1 (2006): 74–102.

Bush, George P., and Lowell H. Hattery. "Teamwork and Creativity in Research." *Administrative Science Quarterly* 1, no. 3 (1956): 361–372.

Bush, Vannevar. *Science: The Endless Frontier*. Washington, D.C.: U.S. Government Printing Office, 1945.

Butler, Dennis. "Benjamin Graham in Prespective." *Financial History* 86, no. Summer (2006): 24–28.

Byrne, John A. *The Whiz Kids : The Founding Fathers of American Business—and the Legacy They Left Us*. New York: Doubleday & Co, 1993.

Calder, Nigel. "Technology and the Investor." *Bulletin of Atomic Scientists. A Journal of Science and Public Affairs* XX, no. 4 (1964): 46–48.

Caldwell, J. E., and Charlotte Panimon. "Projective Testing in an Industrial Research Organization: One Experience." *The Journal of Business* 28, no. 1 (1955): 67–71.

Çalişkan, Koray, and Michel Callon. "Economization, Part 1: Shifting Attention from the Economy towards Processes of Economization." *Economy and Society* 38, no. 3 (2009): 369–98.

———. "Economization, Part 2: A Research Programme for the Study of Markets." *Economy and Society* 39, no. 1 (2010): 1–32.

Callon, M. *What Does It Mean to Say That Economics Is Performative?* Centre de Sociologie de l'Innovation Ecole des Mines de Paris, 2006. https://halshs.archives-ouvertes.fr/halshs-00091596/document. (Accessed September 2019).

———. “What Does It Mean to Say That Economics Is Performative?” In *Do Economists Make Markets? On the Performativity of Economics,* edited by Fabian Muniesa, Donald MacKenzie and Lucia Siu, 311–57. Princeton and Oxford: Princeton University Press, 2007.

Callon, Michel (ed.) *The Laws of the Markets (Sociological Review Monograph)*. Oxford ; Malden, MA: Blackwell /Sociological Review, 1998.

Callon, Michel, and Bruno Latour. “‘Thou Shall Not Calculate!’ Or How to Symmtricalize Gift and Capital.” 1998, Translated by Javier Krauel (Duke University), http://www.bruno-latour.fr/sites/default/files/downloads/P-71%20CAPITALISME-MAUSS-GB.pdf (Accessed September 2019).

Callon, Michel, and Fabian Muniesa. “Economic Markets as Calculative Collective Devices.” *Organization Studies* 26, no. 8 (2005): 1229–50.

Caminer, John J., and Gerhard R. Andlinger. “Operations Research Roundup.” *Harvard Business Review* 32, no. 6 (1954): 132–36.

Carlson, Elwood. *The Lucky Few: Between the Greatest Generation and the Baby Boom*. Dordrecht; London: Springer, 2008.

Carson, Cathryn. “Knowledge Economies: Toward a New Technological Age.” In *The Cambridge History of the Second World War: Volume 3: Total War: Economy, Society and Culture*, edited by Michael Geyer and Adam Tooze, 196–219. Cambridge: Cambridge University Press, 2015.

Castilla, Emilio J., Hokyu Hwang, Ellen Granovetter, and Mark Granovetter. “Social Networks in Silicon Valley.” In *The Silicon Valley Edge*, edited by William F. Miller, Marguerite Gong Hancock, and Henry S. Rowen, 218–47. Stanford: Stanford University Press, 2000.

Chandler, Alfred D. Jr. *The Visible Hand: The Managerial Revolution in American Business*. Cambridge, Mass.; London: Harvard University Press, 1977.

Chell, Elizabeth. *The Entrepreneurial Personality: A Social Construction: Second Edition*. Hove ; New York: Routledge, 2008.

Chollar, R. G., G. J. Wilson, and B. K. Green. “Creativity Techniques in Action.” *Research Management* 1, no. 1 (1958): 5–21.

Clark, Alfred E. “HARPER WOODWARD, LAWYER, IS DEAD.” *New York Times*, 1981.

Cohen, Barry, and Bruce G. Carruthers. “Credit, Classification and Cognition: Credit Raters in 19th-Century America.” *SSRN Electronic Journal*, 2011. https://doi.org/10.2139/ssrn.1525626. (Accessed September 2019).

Cohen, Stephen S., and Gary Fields. “Social Capital and Capital Gains in Silicon Valley.” In *Knowledge and Social Capital*, edited by Martin Kenney, 179–200. Stanford, Calif.: Stanford University Press, 2009.

Cole, Herman Jr. “Common Stocks and the Investor: GUIDES TO FINANCIAL SUCCESS.” *RQ* 5, no. 3 (1966): 3–11.

Collins, Orvis F., and David G. Moore. *The Enterprising Man*. Graduate School of Business Administration, Michigan State University: Bureau of Business and Economic Research, 1964.

Contas, Arthur P., and Hoyt Ecker. "A Window on New Technologies: Minority Investments as an Avenue of Corporate Development." *Research Management* 8, no. 5 (1965): 273–92.

Computer History Museum, "Jack Melchor," n.d., https://computerhistory.org/profile/jack-melchor/?alias=Jack,Melchor; (Accessed September 2019).

Cook, Eli. *The Pricing of Progress: Economic Indicators and the Capitalization of American Life*. Cambridge, MA: Harvard University Press, 2017.

Cooper, Arnold C., and John L. Komives. *Technical Entrepreneurship: A Symposium; Papers Presented at the Symposium on Technical Entrepreneurship (Purdue University, October 7 and 8, 1970)*. Milwaukee, Wisconsin: Center for Venture Management, 1972.

Coopey, Richard. "The First Venture Capitalist: Financing Development in Britain after 1945: The Case of ICFC/3i." *Business and Economic History* 23, no. 1, Fall (1994): 262–71.

Cootner, Paul H. *The Random Character of Stock Market Prices.* Cambridge, Mass.: MIT Press, 1964.

Coşgel, Metin M. "Metaphors, Stories, and the Entrepreneur in Economics." *History of Political Economy* 28, no. 1 (1996): 56–76.

Cox, Henry L. "The Personal Approach in Dealing with Technical People." *Research Management* 6, no. 2 (1963): 153–61.

Crane, Burton. *The Sophisticated Investor. Revised and Expanded by Sylvia Crane Eisenlohr.* New York: Simon and Shuster, 1964.

Dake, Leland E. "Are Analysts' Techniques Adequate for Growth Stocks?" *Financial Analysts Journal* 16, no. 6 (1960): 45–49.

"Damon Engineering Offering," *Wall Street Journal*, November 4, 1968, 35.

"Daniel J. McGanney, Jr. - Obituary," *SF Gate*, July 4, 1995, <https://www.sfgate.com/news/article/OBITUARY-Daniel-McGanney-Jr-3029814.php>. (Accessed September 2019).

David, Donald K. "Foreword." In *The Case Method at the Harvard Business School. Papers by Present and Past Members of the Faculty and Staff*, edited by Malcolm P. McNair, vii–x. New York: McGraw-Hill Book Company, 1954.

Davis, Shelby Cullom. "Our Mid-20th Century Capitalists." *Financial Analysts Journal* 6, no. 4 (1950): 15–19.

Dennis, Michael Aaron. "Our Monsters, Ourselves: Reimagining the Problem of Knowledge in Cold War America." In *Dreamscapes of Modernity: Sociotechnical*

Imaginaries and the Fabrication of Power, edited by Sheila Jasanoff and Sang-Hyun Kim, 56–78. Chicago and London: University of Chicago Press, 2015.

Deringer, William. "For What It's Worth: Historical Financial Bubbles and the Boundaries of Economic Rationality." *Isis* 106, no. 3 (2015): 646–56.

"DIGITAL EQUIPMENT MARKETS ITS SHARES," New York Times, August 19, 1966, 42.

Dinsmore, R. P. "Improving the Professional Environment of Research People: Human Relations Are Important." *Research Management* 1, no. 2 (1958): 101–12.

Divine, Robert A. *The Sputnik Challenge*. Oxford: Oxford University Press, 1993.

Donham, Wallace B. "Business Teaching by the Case System." *The American Economic Review* 12`, no. 1 (1922): 53–65.

———. "Essential Groundwork for a Broad Executive Theory." *Harvard Business Review* 1, no. October (1922): 1–10.

Doriot, Georges F. "Entrepreneurial Development Initiatives." In *New Business: The Art of Joining Innovative Technology, Management and Capital. Proceedings, May 22-23, College School of Management*, 117–123. Chestnut Hill, MA: Boston College Press, 1969.

Drucker, Peter F. "Management and the Professional Employee." *Harvard Business Review* 30, no. 3 (1952): 84–90.

Drucker, Peter F. "Twelve Fables of Research Management." *Harvard Business Review* 35, no. 6 (1963): 46–50.

Dwyer, Gerald P. "Wildcat Banking, Banking Panics, and Free Banking in the United States." *Economic Review (Federal Reserve Bank of Atlanta)* December, no. 3–6 (1996): 1–20.

Editorial. "About This Issue." *Research Management* 11, no. 4 (1968): 195.

Eiteman, Wilford J., and Frank Percy Smith. *Common Stock Values and Yields; a Study of Common Stocks as Long-Term Investments with Particular Emphasis on Investment Yields (Michigan Business Studies ; v. 11, No. 3)*. Ann Arbor: Bureau of Business Research, School of Business Administration, University of Michigan, 1953.

Engel, Louis, and Brenden Boyd. *How to Buy Stocks*. Boston: Little, Brown, 1982.

Erpf, Armand G. "The New American Capitalism." In *The Anatomy of the Wall Street: A Guide for the Serious Investor*, edited by Charles James Rolo and George J. Nelson, 235–50. Philadelphia and New York: J.B. Lippincott Company, 1968.

Etzkowitz, Henry. *MIT and the Rise of Entrepreneurial Science*. London and New York: Routledge, 2002.

Farr, James N. "Motivating an Industrial Research Group." *Research Management* 6,

no. 2 (1963): 109–24.

Feinberg, M. R. "Fourteen Suggestions for Managing Scientific Creativity: The Pervading Problem of Research Executives Is How Best to Manage and Motivate Creative People. Here Are Some Psychologically Derived Guidelines." *Research Management* 11, no. 2 (1968): 83–92.

Ferrary, Michel, and Mark Granovetter. "The Role of Venture Capital Firms in Silicon Valley's Complex Innovation Network." *Economy and Society* 38, no. 2 (2009): 326–59.

Finkelstein, Nisson A. "Evaluating the Product of Technical Programs." *Research Management* 6, no. 3 (1963): 223–30.

Fisher, Frank R. "Scientists Can Be Research Salesmen." *Research Management* 5, no. 2 (1962): 95–99.

Florida, Richard, and Martin Kenney. "Venture Capital and High Technology Entrepreneurship." *Journal of Business Venturing* 3, no. 4 (1988): 301–19.

Floyd, John D. "Training: Catalyst for Growth." *Research Management* 1, no. 4 (1958): 215–18.

Fohlin, Caroline. *Mobilizing Money: How the World's Richest Nations Financed Industrial Growth*. Cambridge: Cambridge University Press, 2012.

Forrester, Jay W. "Social Structure and Motivation for Reducing Research Costs." *Research Management* 9, no. 1 (1966): 45–60.

Foucault, Michel. "Technologies of the Self." In *Technologies of the Self. A Seminar with Michel Foucault*, edited by Luther H. Martin, Huck Gutman, and Patrick H. Hutton, 16–49. London: Tavistock, 1988.

Foucault, Michel. "Questions of Method." In *The Foucault Effect : Studies in Governmentality ; with Two Lectures by and an Interview with Michel Foucault.*, edited by Gordon Colin, Miller Peter, and Graham Burchell, 73–86. London: Harvester Wheatsheaf; University of Chicago Press, 1991.

———. *The Archaeology of Knowledge*. London: Tavistock Publications, 1972.

———. "The Subject and Power." *Critical Inquiry* 8, no. 4 (1982): 777–95.

Fourcade, Marion, and Kieran Healy. "Classification Situations: Life-Chances in the Neoliberal Era." *Accounting, Organizations and Society* 38, no. 8 (2013): 559–72.

———. "Seeing like a Market." *Socio-Economic Review* 15, no. 1 (2017): 9–29.

Fourcade, Marion, and Rakesh Khurana. "From Social Control to Financial Economics: The Linked Ecologies of Economics and Business in Twentieth Century America." *Theory and Society* 42, no. 2 (2013): 121–59.

———. "The Social Trajectory of a Finance Professor and the Common Sense of Capital." *History of Political Economy* 49, no. 2 (2017): 347–81.

Frank, Edward R. “Motivation by Objectives—A Case Study.” *Research Management* 12, no. 6 (1969): 391–400.

Fraser, Cecil Eaton, and Georges F. Doriot. *Analyzing Our Industries*. New York: McGraw-Hill, 1932.

Funk, Russell J., and Daniel Hirschman. “Derivatives and Deregulation: Financial Innovation and the Demise of Glass–Steagall.” *Administrative Science Quarterly* 59, no. 4 (2014): 669–704.

Gaither, H. Rowan. “Private Philanthropy and Human Welfare.” *Pakistan Horizon* 8, no. 2 (1955): 339–47.

———. “We Must Have Courage: Law, National Security and Survival.” *American Bar Association Journal* 44, no. 5 (1958): 425–28.

Gaither, H. Rowan, Charles Dollard, and Milton Katz. “Communication: Foundations in American Society and the World Today.” *Bulletin of the American Academy of Arts and Sciences* 8, no. 1 (1954): 1–2.

Gambone, Michael D. *The Greatest Generation Comes Home : The Veteran in American Society*. College Station: Texas A&M University Press, 2005.

Geiger, Richard L. “Investing in Science and Technology.” In *The Anatomy of the Wall Street: A Guide for the Serious Investor*, edited by Charles James Rolo and George J. Nelson, 104–23. Philadelphia and New York: J.B. Lippincott Company, 1968.

Geiger, Roger L. *To Advance Knowledge: The Growth of American Research Universities, 1900-1940*. New York: Oxford University Press, 1986.

Geisst, Charles R. *Wall Street: A History.* New York: Oxford University Press, 1997.

Gershinowitz, Harold. “Sustaining Creativity Against Organizational Pressures.” *Research Management* 3, no. 1 (1960): 49–56.

Gieryn, Thomas F. “Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists.” *American Sociological Review* 48, no. 6 (1983): 781–795.

Gilman, Nils. “The Prophet of Post-Fordism: Peter Drucker and the Legitimation of the Corporation.” In *American Capitalism: Social Thought and Political Economy in the Twentieth Century*, edited by Nelson Lichtenstein, 109–31. Philadelphia: University of Pennsylvania Press, 2006.

Gilson, Ronald J. “Engineering a Venture Capital Market: Lessons from the American Experience.” *Stanford Law Review* 55, no. 4 (2003): 1067–1103.

Giraudeau, Martin. “Processing the Future: Venture Project Evaluation at American Research and Development Corporation (1946-73).” In *Uncertain Futures: Imaginaries, Narratives, and Calculation in the Economy*, edited by Jens Beckert and Richard Bronk, 259–77. Oxford: Oxford University Press, 2018.

———. “Remembering the Future: Entrepreneurship Guidebooks in the US, from Meditation to Method (1945-1975).” *Foucault Studies*, no. 13 (2012): 40–66.

———. “The Business of Continuity.” In *Reset Modernity!*, edited by Bruno Latour and Christophe Leclercq, 278–85. Cambridge, MA: MIT Press, 2016.

———. “The Predestination of Capital: Projecting E. I. Du Pont de Nemours and Company into the Newworld.” *Critical Historical Studies* 6, no. 1 (2019): 33–62.

Gmitter, G. T. “Towards a Better Understanding of Industrial R&D and Cost Control.” *Research Management* 8, no. 4 (1965): 229–39.

Gmitter, G. T. “The Industrial R&D Scientist and His Environment.” *Research Management* 9, no. 2 (1966): 115–31.

Goddu, Robert F. “FREEDOM: Promoter of New Ideas.” *Research Management* 1, no. 4 (1958): 218–20.

Godin, Benoît. “Innovation: A Study in the Rehabilitation of a Concept.” *Contributions to the History of Concepts* 10, no. 1 (2015): 45–68.

———. “Research and Development: How the ‘D’ Got into R&D.” *Science and Public Policy* 33, no. 1 (2006): 59–76.

———. “Technological Innovation: On the Origins and Development of an Inclusive Concept.” *Technology and Culture* 57, no. 3 (2016): 527–56.

Gompers, Paul A., and Joshua Lerner. *The Venture Capital Cycle. Second Edition*. Cambridge, MA: MIT Press, 2004.

Gompers, Paul, and Josh Lerner. “The Venture Capital Revolution.” *Journal of Economic Perspectives* 15, no. 2 (2001): 145–68.

Good, Harry Gehman, and James Davis Teller. *A History of American Education. 3rd Ed*. New York: Macmillan, 1973.

Goodman, Nelson. “Words, Works, Worlds.” *Erkenntnis* 9, no. 1 (1975): 57–73.

Gordon, Bruce F. and Ian C. Ross. “Professionals and the Corporation.” *Research Management* 5, no. 6 (1962): 493–505.

Graeber, David. “The Sword, the Sponge, and the Paradox of Performativity: Some Observations on Fate, Luck, Financial Chicanery, and the Limits of Human Knowledge.” *Social Analysis* 56, no. 1 (2012): 25–42.

Graham, Benjamin. "Special Situations." The Analysts Journal 2, no. 4 (1946): 31–38.

———. “The Future of Financial Analysis.” *Financial Analysts Journal* 19, no. 3 (1963): 65–70.

———. “The New Speculation in Common Stocks.” *Financial Analysts Journal* 14, no. 3 (1958): 17–21.

———. *The Intelligent Investor. A Book of Practical Counsel. Revised Edition*, ed. Jason Zweig. New York: Harper Collins Publishers Inc., 1984.

Graham, Benjamin, and David Dodd. *Security Analysis*. 6th ed. New York: McGraw-Hill, 1934.

Gupta, Udayan. *The First Venture Capitalist: Georges Doriot on Leadership, Capital, and Business Organization*. Calgary: Gondolier Publishers, 2004.

Gutman, Walter K. *You Only Have to Get Rich Once*. New York: E.P. Dutton & Company, 1961.

Hacking, Ian. "Between Michel Foucault and Erving Goffman: Between Discourse in the Abstract and Face-to-Face Interaction." *Economy and Society* 33, no. 3 (2004): 277–302.

———. "Biopower and the Avalanche of Printed Numbers." *Humanities in Society* 5 (1982): 279–95.

———. "Degeneracy, Criminal Behavior, and Looping." In *Genetics and Criminal Behavior*, ed. David T. Wasserman and Robert Samuel Wachbroit, 141–68. Cambridge: Cambridge University Press, 2001.

———. "Inaugural Lecture: Chair of Philosophy and History of Scientific Concepts at the Collège de France, 16 January 2001." *Economy and Society* 31, no. 1 (2002): 1–14.

———. "Kinds of People: Moving Targets." *Proceedings of the British Academy* 151 (2007): 285–318.

———. "Making Up People." In *Historical Ontology*, edited by Ian Hacking, 99–114. Cambridge, MA; London, England: Harvard University Press, 2002.

———. "Michel Foucault's Immature Science." *Noûs* 13, no. 1 (1979): 39–51.

———. *The Social Construction of What?* Cambridge, Mass.: Harvard University Press, 1999.

———. *The Taming of Chance*. *The Taming of Chance*. Cambridge: Cambridge University Press, 1990.

Hafstad, Lawrence R. "Making Research Pay: One Corporation's Approach." *Research Management* 8, no. 5 (1965): 331–41.

Hainer, Raymond M., Sherman Kingsbury, and David B. Gleicher. *Uncertainty in Research, Management, and New Product Development. Arthur D. Little, Inc., Cambridge, Massachusetts.* New York; Amsterdam; London: Reinhold Publishing Corporation, 1967.

Hall III., J. Parker "Toward Effective Portfolio Management." *Financial Analysts Journal* 22, no. 1 (1966): 91–95.

Hambrecht, William R. "Venture Capital & the Growth of Silicon Valley." *California Management Review* 26, no. 2 (1984): 74–82.

Hartman, Chester. *City for Sale: The Transformation of San Francisco, Revised and Updated Edition*. Berkeley and Los Angeles, California: University of California Press, 2002.

Hayek, Friedrich A. "Two Types of Mind." In *New Studies in Philosophy, Politics,*

Economics and the History of Ideas, edited by Friedrich A. Hayek, 52–53. Chicago: The University of Chicago Press, 1978.

Hayes, Douglas A. "The Undervalued Issue Strategy." *Financial Analysts Journal* 23, no. 3 (1967): 121–27.

Healey, Frank H. "Job Status for the Research Scientist." *Research Management* 3, no. 4 (1960): 239–44.

Hennessey, Jessica L., and John J. Wallis. "Corporations and Organizations in the United States after 1840." In *Corporations and American Democracy*, edited by Naomi Lamoreaux and William J. Novak. Cambridge, MA: Harvard University Press, 2017.

"Henry A. McMicking Obituary," March 16, 2008 <https://www.legacy.com/obituaries/sfgate/obituary.aspx?n=henry-a-mcmicking&pid=105717990> (Accessed September 2019).

Hersey, Paul, and Kenneth H. Blanchard. "Managing Research and Development Personnel: An Application of Leadership Theory." *Research Management* 12, no. 5 (1969): 331–38.

Hershey, Robert L. "Finance and Productivity in Industrial Research and Development." *Research Management* 9, no. 4 (1966): 261–69.

Hillier, James. "Venture Activities in the Large Corporation." *IEEE Transactions on Engineering Management* 15, no. 2 (1968): 65–70.

Hirschman, Daniel, and Isaac Ariail Reed. "Formation Stories and Causality in Sociology." *Sociological Theory* 32, no. 4 (2014): 259–82.

Hitchcock, Lauren B. "Problems of First-Line Supervisors." *Research Management* 10, no. 6 (1967): 385–97.

Hobsbawm, Eric. *Age of Extremes: The Short Twentieth Century, 1914-1991*. London: Michael Joseph, 1994.

Hopwood, Anthony G. "Accounting Calculation and the Shifting Sphere of the Economic." *European Accounting Review* 1, no. 1 (1992): 125–43.

Hsu, David H., and Martin Kenney. "Organizing Venture Capital: The Rise and Demise of American Research & Development Corporation, 1946-1973." *Industrial and Corporate Change* 14, no. 4 (2005): 579–616.

Huber, George P. "Implications of Organization Theory for Research Management." *Research Management* 10, no. 5 (1967): 301–7.

Industrial Research Institute. "Motivation, Incentives, and Rewards for R&D Personnel." *Research Management* 12, no. 3 (1969): 169–71.

———. "Proceedings of Industrial Research Institute Study Group Meetings. Number 8. Control of Research and Development." *Research Management* 6, no. 6 (1963): 435–49.

———. “Proceedings of Industrial Research Institute Study Group Meetings. Number 3. Selection and Placement of Research Personnel.” *Research Management* 4, no. 1 (1961): 43–56.

Isaac, Joel. “The Human Sciences in Cold War America.” *Historical Journal* 50, no. 3 (2007): 725–46.

———. *Working Knowledge : Making the Human Sciences from Parsons to Kuhn*. Cambridge, Mass.: Harvard University Press, 2012.

James, William. *The Principles of Psychology*. Vol. 1. London: MacMillan and Co., Ltd, 1890.

Janeway, William H. “Doing Capitalism: Notes on the Practice of Venture Capitalism.” *Journal of Economic Issues* 20, no. 2 (1986): 431–41.

———. *Doing Capitalism in the Innovation Economy: Markets, Speculation and the State*. Cambridge: Cambridge University Press, 2012.

Jasanoff, Sheila, and Sang.-Hyun. Kim. *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. Chicago: University of Chicago Press, 2015.

Jeffery, Grant. *Science and Technology Stocks: An Investor’s Guide*. Doubleday: Cleveland, 1961.

Jenkins, D. J., Carleton, F.O., Peres, S.H., and Garcia, J.H. “Studies in Managing Research and Development Personnel.” *Research Management* 7, no. 5 (1964): 349–65.

Joas, Hans, and Wolfgang Knöbl. *Social Theory: Twenty Introductory Lectures*. *Social Theory: Twenty Introductory Lectures*. Cambridge; New York: Cambridge University Press, 2009.

“John Bryan Obituary.” *San Francisco Chronicle*, 2012. https://www.legacy.com/obituaries/sfgate/obituary.aspx?n=john-bryan&pid=156839334. (Accessed September 2019).

Kalthoff, Herbert. “Practices of Calculation: Economic Representations and Risk Management.” *Theory, Culture & Society* 22, no. 2 (2005): 69–97.

Kandel, Myron, and Philip Greer. “Inside the New York Stock Exchange.” In *The Anatomy of the Wall Street: A Guide for the Serious Investor*, edited by Charles James Rolo and George J. Nelson, 9–17. Philadelphia and New York: J.B. Lippincott Company, 1968.

Katz, Jerome A. “The Chronology and Intellectual Trajectory of American Entrepreneurship Education 1876-1999.” *Journal of Business Venturing* 18, no. 2 (2003): 283–300.

Kaufman, Stanley L. *Practical and Legal Manual for the Investor*. New York: Oceana Publications, 1956.

Kelley, Albert J. “Introduction.” In *New Business: The Art of Joining Innovative*

Technology, Management and Capital. Proceedings, May 22-23, Boston College School of Management., 5–6. Chestnut Hill, MA: Boston College Press, 1969.

Kelton, Gilbert. "PERT and Automation Philosophy." *Research Management* 7, no. 1 (1964): 55–71

———. "The Evaluation of Scientific Personnel." *Research Management* 2, no. 3 (1959): 185–98.

Kennedy, John L., and G. H. Putt. "Administration of Research in a Research Corporation." *Administrative Science Quarterly* 1, no. 3 (1956): 326–339.

Kenney, Martin. "How Venture Capital Became a Component of the US National System of Innovation." *Industrial and Corporate Change* 20, no. 6 (2011): 1677–1723.

Kenney, Martin, and Urs Von Burg. "Institutions and Economies: Creating Silicon Valley." In *Understanding Silicon Valley: The Anatomy of an Entreprenurial Region*, edited by Martin Kenney, 218–40. Stanford, Calif.: Stanford University Press, 2000.

Kenney, Martin, and Richard Florida. "Venture Capital in Silicon Valley: Fueling New Firm Formation." In *Understanding Silicon Valley: The Anatomy of an Entrepreneurial Region*, edited by Martin Kenney, 98–123. Stanford, Calif.: Stanford University Press, 2000.

Khurana, Rakesh. *From Higher Aims to Hired Hands: The Social Transformation of American Business Schools and the Unfulfilled Promise of Management as a Profession*. Princeton, NJ: Princeton University Press, 2007.

Kidd, Charles V. "The Federal Government and the Shortage of Scientific Personnel." *Science* 105, no. 2717 (1947): 84–88.

King, L, and Iván Szelényi. *Theories of the New Class : Intellectuals and Power (Contradictions (Minneapolis, Minn.) ; 20)*. Minneapolis: University of Minnesota Press, 2004.

Kirsch, David, Brent Goldfarb, and Azi Gera. "Form or Substance: The Role of Business Plans in Venture Capital Decision Making." *Strategic Management Journal* 30, no. 5 (2009): 487–515.

Klingler-Vidra, Robyn. *The Venture Capital State : The Silicon Valley Model in East Asia (Cornell Studies in Political Economy)*. Ithaca: Cornell University Press, 2018.

Knafo, Samuel, Sahil Jai Dutta, Richard Lane, and Steffan Wyn-Jones. "The Managerial Lineages of Neoliberalism." *New Political Economy* 24, no. 2 (2019): 235–51.

Knight, Frank H. *Risk, Uncertainty and Profit*. New York: Hart, Schaffner and Marx, 1921.

Knodel, H. William, and M. C. Fergenson. "The 'Value Line' Method." *The Analysts Journal* 5, no. 2 (1949): 45–46.

Knorr Cetina, Karin, and Alex Preda. "The Epistemization of Economic Transactions." *Current Sociology* 49, no. 4 (2001): 27–44.

Knorr-Cetina, Karin D. "Financial Analysis: Epistemic Profile of an Evaluative Science." In *Social Knowledge in the Making*, edited by ed. Charles Camic, Neil Gross, Michèle Lamont, 405–42. Chicago, Ill.: University of Chicago Press, 2011.

Kogut, Bruce. *The Global Internet Economy*. Cambridge, Mass.: MIT Press, 2003.

Kornberger, Martin, Lise Justesen, Jan Mouritsen, and Anders Koed Madsen (eds.) *Making Things Valuable*. Oxford: Oxford University Press, 2015.

Krippner, Greta R. "Democracy of Credit: Ownership and the Politics of Credit Access in Late Twentieth-Century America." *American Journal of Sociology* 123, no. 1 (2017): 1–47.

Krippner, Greta R., and Anthony S. Alvarez. "Embeddedness and the Intellectual Projects of Economic Sociology." *Annual Review of Sociology* 33, no. 1 (2007): 219–40.

Kronfeld, Morris, and Arthur Rock. "Some Considerations of the Infinite." *The Analysts Journal* 14, no. 5 (1958): 87–90.

Kühl, Stefan. "Konturen Des Exit-Kapitalismus." *Leviathan* 30, no. 2 (2002): 195–219.

Kurunmäki, Liisa, and Peter Miller. "Calculating Failure: The Making of a Calculative Infrastructure for Forgiving and Forecasting Failure." *Business History* 55, no. 7 (2013): 1100–1118.

Lambert, W. V. "The Administration of Federal Research." *Science* 107, no. 2773 (1948): 179–83.

Lamont, Michèle. "Toward a Comparative Sociology of Valuation and Evaluation." *Annual Review of Sociology* 38 (2012): 201–21.

Lamoreaux, Naomi R. and Novak, William J.. "Corporations and American Democracy: An Introduction" In Corporations and American Democracy edited by Naomi R. Lamoreaux and William J. Novak, 1-34. Cambridge, MA and London, England: Harvard University Press, 2017.

Lamoreaux, Naomi R. *Insider Lending: Banks, Personal Connections, and Economic Development in Industrial New England*. Cambridge: Cambridge University Press, 1994.

———. *The Great Merger Movement in American Business, 1895-1904*. Cambridge: Cambridge University Press, 1985.

Lamoreaux, Naomi R., Margaret Levenstein, and Kenneth L. Sokoloff. "Mobilizing Venture Capital during the Second Industrial Revolution: Cleveland, Ohio, 1870-1920." *Capitalism and Society* 1, no. 3 (2006).

Lamoreaux, Naomi R., and Kenneth L. Sokoloff. *Financing Innovation in the United States, 1870 to Present*. Cambridge, MA: MIT Press, 2007.

Lamson, Robert W. “The Present Strains between Science and Government.” *Social Forces* 33, no. 4 (1955): 360–367.

Landes, David S., Joel Mokyr, and William J. Baumol. *The Invention of Enterprise: Entrepreneurship from Ancient Mesopotamia to Modern Times*. Princeton, NJ: Princeton University Press, 2012.

Langlois, Richard N., and Metin M. Cosgel. “Frank Knight on Risk, Uncertainty, and the Firm: A New Interpretation.” *Economic Inquiry* 31, no. 3 (1993): 456–65.

Lansburgh, Richard H., and William R. Spriegel. *Industrial Management*. London: John Wiley & Sons, Inc.; Chapman & Hall, Limited, 1940.

Latour, Bruno. *Reassembling the Social : An Introduction to Actor-Network-Theory (Clarendon Lectures in Management Studies)*. Oxford ; New York: Oxford University Press, 2005.

Lazonick, William. “Innovative Business Models and Varieties of Capitalism: Financialization of the US Corporation.” *Business History Review* 84, no. 4 (2010): 675–702.

———. “Varieties of Capitalism and Innovative Enterprise.” *Comparative Social Research* 24 (2007): 21–69.

Leamer, Frank D. “Professional and Administrative Ladder: The Advantages of Broad Job Classification in a Research Organization.” *Research Management* 2, no. 1 (1959): 53–62.

Leavitt, Harold J. “Small Groups in Large Organizations.” *The Journal of Business* 28, no. 1 (1955): 8–17.

Lécuyer, Christophe. *Making Silicon Valley: Innovation and the Growth of High Tech, 1930–1970*. Cambridge, Mass.: MIT Press, 2006.

Lécuyer, Christophe, and David C. Brock. *The Makers of the Microchip: A Documentary History of Fairchild Semiconductor*. Cambridge, MA: MIT Press, 2010.

Lee, Chong-Moon, William F. Miller, Marguerite Gong Hancock, and Henry S. Rowen. *The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship*. Stanford, Calif.: Stanford University Press, 2000.

Leontieff, Wassily. “Preface.” In *The Research Revolution*, edited by Leonard S. Silk. New York, Toronto, London: McGraw-Hill Book Company, Inc., 1960.

Lerner, Josh. *Boulevard of Broken Dreams: Why Public Efforts to Boost Entrepreneurship and Venture Capital Have Failed—and What to Do about It. Boulevard of Broken Dreams*. Princeton: Princeton University Press, 2009.

Leslie, Stuart. “The Biggest" Angel" of Them All: The Military and the Making.” In *Understanding Silicon Valley: The Anatomy of an Entrepreneurial Region*, edited by Martin Kenney, 44–67. Stanford, Calif.: Stanford University Press, 2000.

Levy, Jonathan. “Accounting for Profit and the History of Capital.” *Critical Historical*

Studies 1, no. 2 (2014): 171–214.

———. "Capital as Process and the History of Capitalism." *Business History Review* 91, no. 3 (2017): 483–510.

———. *Freaks of Fortune: The Emerging World of Capitalism and Risk in America*. Cambridge, MA; London, UK: Harvard University Press, 2012.

Lichtenstein, Nelson. *American Capitalism: Social Thought and Political Economy in the Twentieth Century*. Philadelphia: University of Pennsylvania Press, 2006.

Liles, Patrick R. *Sustaining the Venture Capital Firm*. Cambridge, MA: Management Analysis Center, Inc, 1977.

Litchfield, Edward H. "Notes on a General Theory of Administration." *Administrative Science Quarterly* 1, no. 1 (1956): 3–29.

Longstreth, Bevis. *Modern Investment Management and the Prudent Man Rule*. New York and Oxford: Oxford University Press, 1988.

Lowen, Rebecca S. *Creating the Cold War University: The Transformation of Stanford*. Berkeley: University of California Press, 1998.

Lufkin, Dan W. "Investing for Growth." In *The Anatomy of the Wall Street: A Guide for the Serious Investor*, edited by Charles James Rolo and George J. Nelson, 97–103. Philadelphia and New York: J.B. Lippincott Company, 1968.

MacKenzie, Donald. *An Engine, Not a Camera : How Financial Models Shape Markets (Inside Technology)*. Cambridge, Mass.: MIT Press, 2006.

Maggor, Noam. *Brahmin Capitalism: Frontiers of Wealth and Populism in America's First Gilded Age*. Cambridge, MA: Harvard University Press, 2017.

———. "To Coddle and Caress These Great Capitalists: Eastern Money, Frontier Populism, and the Politics of Market-Making in the American West." *American Historical Review* 122, no. 1 (2017): 55–84.

Malkiel, Burton Gordon. *A Random Walk Down Wall Street, Including a Life-Cycle Guide to Personal Investing.* New York and London: W.W. Norton & Company, 1999.

Mann, Michael. *The Sources of Social Power: Volume 1: A History of Power from the Beginning to AD 1760*. 2nd ed. Cambridge: Cambridge University Press, 2010.

———. *The Sources of Social Power: Volume 2: The Rise of Classes and Nation-States, 1760-1914*. Cambridge: Cambridge University Press, 2012.

Markham, Jerry W. *A Financial History of the United States: From J.P. Morgan to the Institutional Investor (1900-1970)*. M. E. Sharpe, Inc. Amonk, New York; London, England: M.E. Sharpe, 2002.

May, William F. "What Needs Improving at R&D—The Chief Executive's Viewpoint." *Research Management* 10, no. 1 (1967): 5–11.

Maynard, Walter. "Inside the Research Department." In *The Anatomy of the Wall*

Street: A Guide for the Serious Investor, edited by Charles James Rolo and George J. Nelson, 29–35. Philadelphia and New York: J.B. Lippincott Company, 1968.

Mayo, Elton. "The Limits of Logical Validity." *Mind* XXIV, no. 1 (1915): 70–74.

———. *The Social Problems of Industrial Civilization*. Boston, Mass.: Graduate School of Business Administration, Harvard University, 1945.

McClelland, David C. *The Achieving Society*. Princeton, NJ: Van Nostrand, 1961.

McDougall, Walter A. "Technocracy and Statecraft in the Space Age—Toward the History of a Saltation." *The American Historical Review* 87, no. 4 (1982): 1010–1040.

Menippus. "Some Self-Criticism of Institutional Investing." *The Analysts Journal* 6, no. 4 (1950): 29–31.

Mennicken, Andrea. "Bringing Calculation Back in : Sociological Studies in Accounting." *Economic Sociology: European Electric Newsletter* 3, no. 3 (2002): 17–27.

Mennicken, Andrea, and Peter Miller. "Accounting, Territorialization, and Power." *Foucault Studies* 13 (2012): 4–24.

———. "Michel Foucault and the Administering of Lives." In *The Oxford Handbook of Sociology, Social Theory, and Organization Studies: Contemporary Currents.*, edited by S Adler Paul, du Gay, Morgan Paul, Glen, and Michael Reed, 11–38. Oxford, UK: Oxford University Press, 2014.

Mennicken, Andrea, and Michael Power. "Accounting and the Plasticity of Valuation." In *Moments of Valuation: Exploring Sites of Dissonance*, edited by Berthoin Ariane Antal, Michael Hutter, and David Stark, 208–28. Oxford, UK: Oxford University Press, 2015.

Merrill, A. *Investing in the Scientific Revolution: A Serious Search for Growth Stocks in Advanced Technology*. Garden City, New York: Doubleday & Company, Inc, 1962.

Merrill, Fred H. "Fire and Casualty Insurance Companies." *Financial Analysts Journal* 10, no. 3 (1954): 51–53.

Merrill, Fred H., Richard H. Samuels, Horace W. Brower, and S. Davis. "The Insurance Industry." *The Analysts Journal* 8, no. 4 (1952): 129–39.

Merton, Robert K. "Role of the Intellectual in Public Bureaucracy." *Social Forces* 23, no. 4 (1945): 405–415.

Mettler, Suzanne. "The Creation of the GI Bill of Rights of 1944: Melding Social and Participatory Citizenship Ideals." *Journal of Policy History* 17, no. 4 (2005): 345–74.

Michael, Stephen R. "Developing Managers Out of Creative Specialists." *Research Management* 4, no. 2 (1961): 119–31.

Michie, Ronald C. "Options, Concessions, Syndicates, and the Provision of Venture

Capital, 1880–1913." *Business History* 23, no. 2 (1981): 147–64.

———. "The Finance of Innovation in Late Victorian and Edwardian Britain: Possibilities and Constraints." *Journal of European Economic History* 17, no. 3 (1988): 491–530.

Miller, Alfred L. "Management and the Natural Sciences." *Research Management* 10, no. 5 (1967): 309–20.

Miller, Peter. "Accounting and Objectivity: The Invention of Calculating Selves and Calculable Spaces." In *Rethinking Objectivity*, edited by Allan Megill, 239–64. Durham and London: Duke University Press, 1994.

———. "Accounting Innovation beyond the Enterprise: Problematizing Investment Decisions and Programming Economic Growth in the UK in the 1960s." *Accounting, Organizations and Society* 16, no. 8 (1991): 733–62.

———. "Calculating Economic Life." *Journal of Cultural Economy* 1, no. 1 (2008): 51–64.

———. "L'économisation de l'échec (Economizing Failure)." *Politiques et Management Public* 31, no. 4 (2014): 369–76.

———. "Accounting for the Calculating Self." In *Globalisation in Practice*, edited by Nigel Thrift, Adam Tickell, Steve Woolgar, and William H. Rupp, 236–41. Oxford: Oxford University Press, 2014.

Miller, Peter, Liisa Kurunmäki, and Ted O'Leary. "Accounting, Hybrids and the Management of Risk." *Accounting, Organizations and Society* 33, no. 7–8 (2008): 942–67.

Miller, Peter, and Ted O'Leary. "Mediating Instruments and Making Markets: Capital Budgeting, Science and the Economy." *Accounting, Organizations and Society* 32, no. 7–8 (2007): 701–34.

Miller, Peter, and Michael Power. "Accounting, Organizing, and Economizing: Connecting Accounting Research and Organization Theory." *Academy of Management Annals* 7, no. 1 (2013): 557–605.

Miller, Peter, and Nikolas Rose. "Governing Economic Life." *Economy and Society* 19, no. 1 (1990): 1–31.

Milton, Helen S. "Cost-Of-Research Index, 1920-1965." *Operations Research* 14, no. 6 (1966): 977–91.

Mirowski, Philip. *Machine Dreams : Economics Becomes a Cyborg Science*. Cambridge: Cambridge University Press, 2002.

Misa, Thomas J. *Digital State: The Story of Minnesota's Computing Industry*. Minneapolis: University of Minnesota Press, 2013.

Mokyr, Joel. *The Gifts of Athena: Historical Origins of the Knowledge Economy*. Princeton, NJ: Princeton University Press, 2002.

Molodovsky, Nicholas. “Lessons from the Recent Past.” *Financial Analysts Journal* 20, no. 1 (1964): 50–51.

Moore, David G., and Richard Renck. “The Professional Employee in Industry.” *The Journal of Business* 28, no. 1 (1955): 58–66.

Moore, R. F. “Appraisal at Its Apogee.” *Research Management* 10, no. 1 (1967): 61–72.

———. “Ways to Meet the Increasing Pressure on R&D Organizations.” *Research Management* 12, no. 1 (1969): 25–36.

Morgan, Mary S. “Economic Man as Model Man: Ideal Types, Idealization and Caricatures.” *Journal of the History of Economic Thought* 28, no. 1 (2006): 1–27.

———. “Economics.” In *The Cambridge History of Science: The Modern Social Sciences*, edited by Theodore Porter and Dorothy Ross, 275–305. Cambridge: Cambridge University Press, 2003.

Morgner, A. “Security Analysis in a Science-Oriented Society.” *The Analysts Journal* 11, no. 4 (1955): 59–61.

Moritz, Michael. “Arthur Rock: The Best Long-Ball Hitter Around.” *Time* 123, no. 4 (1984): 55. http://content.time.com/time/subscriber/article/0,33009,949965-3,00.html. (Accessed September 2019).

Mowery, David C. “Plus ca Change: Industrial R&D in the ‘Third Industrial Revolution.’” *Industrial and Corporate Change* 18, no. 1 (2009): 1–50.

Mueller, Robert K. “The Managerial Gap: Traditionalists vs. ‘Scientists.’” *Personnel, November-December* 1969 (1969): 3–21.

Muniesa, Fabian. “Setting the Habit of Capitalization: The Pedagogy of Earning Power at the Harvard Business School, 1920-1940.” *Historical Social Research* 41, no. 2 (2016): 196–217.

———. “The Live Act of Business and the Culture of Realization.” *HAU: Journal of Ethnographic Theory* 7, no. 3 (2017): 347–62.

Muniesa, Fabian, and Liliana Doganova. “Capitalization Devices. Business Models and the Renewal of Markets.” In *Making Things Valuable*, edited by Kornberger, Martin, Lise Justesen, Jan Mouritsen, and Anders Koed Madsen, 109–25. Oxford: Oxford University Press, 2015.

Muniesa, Fabian, Liliana Doganova, Horácio Ortiz, Florence Pina-Stranger, Alvaro, Paterson, Alaric Bourgoin, Véra Ehrenstein, Pierre-André Juven, David Pontille, Başak Saraç-Lesavre, and Guillaume. Yon. *Capitalization : A Cultural Guide (Sciences Sociales).* Paris: Presses des Mines, 2017.

Murphy, Walter J. “‘More Steelman Reports.’” *Chemical & Engineering News* 25, no. 42 (1947): 3067.

Nasaw, David. *Andrew Carnegie.* New York: Penguin Books, 2006.

New England Regional Commission. *Venture Capital: A Guidebook for New Enterprises. Prepared by the Management Institute, School of Management, Boston College.* Washington, DC: US Government Printing Office, 1972.

Newman, Maurice S. "The Return on Investment in Research and Development." *Research Management* 10, no. 1 (1967): 41–50.

Nicholas, Tom. *VC: An American History*. Cambridge, Mass.: Harvard University Press, 2019.

O'Malley, Pat. *Risk, Uncertainty and Government*. *Risk, Uncertainty and Government*. London: Glasshouse Press, 2004.

Olson, Keith W. "The GI Bill and Higher Education: Success and Surprise." *American Quarterly* 25, no. 5 (1973): 596–610.

Ornstein, Allan C. *Class Counts : The Shrinking Middle Class*. Lanham, MD: Rowman & Littlefield Pub. Group, 2007.

Ortiz, Stephen R. *Beyond the Bonus March and GI Bill: How Veteran Politics Shaped the New Deal Era*. New York: New York University Press, 2010.

Ott, Julia. "What Was The Great Bull Market? Value, Valuation, and Financial History." In *American Capitalism: New Histories (Columbia Studies in the History of U.S. Capitalism)*, edited by & Christine Desan and Sven Beckert, 63–85. New York: Columbia University Press, 2018.

———. *When Wall Street Met Main Street : The Quest for an Investors' Democracy*. Cambridge, Mass.: Harvard University Press, 2011.

Palmer, George B. "What Needs Improving at R&D—The Security Analyst's Viewpoint." *Research Management* 10, no. 1 (1967): 13–31.

Patterson, James T. *Grand Expectations: The United States, 1945-1974 (Oxford History of the United States)*. New York: Oxford University Press, 1995.

"Paul Wyhtes Obituary," San Francisco Chronicle, November 5 to November 11, 2012, https://www.legacy.com/obituaries/sfgate/obituary.aspx?n=paul-wythes&pid=160894556. (Accessed September 2019).

Peckman, Morris. "A Means for Measuring Market Movements." *The Analysts Journal* 11, no. 5 (1955): 71–76.

Pelz, Donald C. "Some Social Factors Related to Performance in a Research Organization." *Administrative Science Quarterly* 1, no. 3 (1956): 310–25.

Peneder, Michael, and Andreas Resch. "Schumpeter and Venture Finance: Radical Theorist, Broke Investor, and Enigmatic Teacher." *Industrial and Corporate Change* 24, no. 6 (2015): 1315–52.

Perez, Carlota. "Finance and Technical Change: A Long-Term View." In *Elgar Companion to Neo-Schumpeterian Economics*, edited by Horst Hanusch and Andreas Pyka, 775–99. Cheltenham, UK; Northampton, MA: Edward Elgar, 2007.

Pinchot, Gifford. “Intrapreneuring Revisited.” *European Management Journal* 4, no. 2 (1986): 89–94.

Poovey, Mary. “Risk, Uncertainty, and Data: Managing Risk in Twentieth-Century America.” In *American Capitalism*, 221–35. New York Chichester, West Sussex: Columbia University Press, 2018.

Porter, Theodore. *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life*. Princeton, NJ: Princeton University Press, 1995.

Power, Michael. “Fair Value Accounting, Financial Economics and the Transformation of Reliability.” *Accounting and Business Research* 40, no. 3 (2010): 197–210.

———. *Organized Uncertainty: Designing a World of Risk Management*. Oxford: Oxford University Press, 2007.

Preda, Alex. “Where Do Analysts Come from? The Case of Financial Chartism.” *Sociological Review* 55, no. SUPPL. 2 (2007): 40–64.

Randall, Raymond L. “The Dynamics of Research Administration.” *Public Administration Review* 12, no. 4 (1952): 288–91.

Randell, Donald H. “Review.” *Financial Analysts Journal* 18, no. 3 (1962): 117–18.

Reeves, E. D. “What Needs Improving At R&D—The Consultant’s Viewpoint.” *Research Management* 10, no. 1 (1967): 33–40.

Reiner, Martha Louise. “The Transformation of Venture Capital: A History of Venture Capital Organizations in the United States.” UC Berkeley, 1989.

Richardson, Ralp A. “Research Toward Specific Goals: Development of the Light-Weight, Two-Cycle Diesel.” *Research Management* 1, no. 2 (1958): 85–100.

“Risk, Incorporated.” *Challenge* 2, no. 6 (1954): 6–10.

Roberts, Edward B. “A Basic Study of Innovators; How to Keep and Capitalize on Their Talents.” *Research Management* 11, no. 4 (1968): 249–66.

Roberts, Edward B. “Successful Technical Entrepreneurship.” In *New Business: The Art of Joining Innovative Technology, Management and Capital. Proceedings, May 22-23, Boston College School of Management. Boston College Press*, 43–52. Chestnut Hill, MA: Boston College Press, 1969.

Roberts, Sam. “Walter Curley, Venture Capitalist and U.S. Ambassador, Dies at 93,” June 8, 2016, D8. < https://www.nytimes.com/2016/06/09/nyregion/walter-curley-venture-capitalist-and-us-ambassador-dies-at-93.html>. (Accessed September 2019).

Roces, Alejandro R. “The Entrepreneurs.” *The Philippine Star,* July 10 (2010). https://www.philstar.com/opinion/2010/07/10/591542/entrepreneurs. (Accessed September 2019).

Rolo, Charles James. “Introduction: A Portrait of the Ideal Investor.” In *The Anatomy*

of the Wall Street: A Guide for the Serious Investor, edited by Charles James Rolo and George J. Nelson, 3–8. Philadelphia and New York: J.B. Lippincott Company, 1968.

Rolo, Charles James, and George J. Nelson. "Foreword." In *The Anatomy of the Wall Street: A Guide for the Serious Investor*, edited by Charles James Rolo and George J. Nelson, v–3. Philadelphia and New York: J.B. Lippincott Company, 1968.

Rossmassler, P. "Luncheon Address." In *New Business: The Art of Joining Innovative Technology, Management and Capital. Proceedings, May 22-23, Boston College School of Management*, 34–42. Chestnut Hill, MA: Boston College Press, 1969.

Rotnem, Ralph A. "The Valuation of Common Stocks: The Fundamentalist's Approach." In *The Anatomy of the Wall Street: A Guide for the Serious Investor*, edited by Charles James Rolo and George J. Nelson, 145–57. Philadelphia and New York: J.B. Lippincott Company, 1968.

Royer, George L. "Salary Administration of Research Personnel." *Research Management* 1, no. 2 (1958): 113–28.

Rubel, Stanley M., and Edward G. Novotny. *How to Raise and Invest Venture Capital*. New York, New York: Presidents Publishing House, Inc, 1972.

Ruef, Martin, and Kelly Patterson. "Credit and Classification: The Impact of Industry Boundaries in Nineteenth-Century America." *Administrative Science Quarterly* 54, no. 3 (2009): 486–520.

Rutterford, Janette, and Leslie Hannah. "The Rise of Institutional Investors." In *Financial Market History: Reflections on the Past for Investors Today*, edited by David Chambers and Elroy Dimson, 242–64. CFA Research Foundation and Cambridge Judge Business School, 2016.

Sanders, G. S. "Training of Management in Research." *Research Management* 9, no. 6 (1966): 365–70.

Saxenian, AnnaLee. *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge, Mass.: Harvard University Press, 1996.

Schaefer, E. George. *How I Helped More Than 10,000 Investors To Profit In Stocks*. Prentice-Hall, Inc.: Englewood Cliffs, NJ, 1964.

Schiller, Maurece. *Investor's Guide to Special Situations in the Stock Market*. Larchmont, New York: American Research Council, 1966.

———. *Special Situations in Stocks and Bonds*. New York: Research & Appraisal, 1955.

———. *Stock Market Profits through Special Situations*. Larchmont, New York: American Research Council, 1964.

Schott, Stuart. "Are Research Administrators Getting Lazy." *Research Management* 2, no. 3 (1959): 139–47.

Schrage, Harry. "The R&D Entrepreneur: Profile of Success." *Harvard Business*

Review 43, no. 6 (1965): 56–69.

Schrum, Ethan. "To 'Administer the Present': Clark Kerr and the Purpose of the Postwar American Research University." *Social Science History* 36, no. 4 (2012): 499–523.

Schumpeter, Joseph A. *Business Cycles: A Theoretical, Historical and Statistical Analysis of the Capitalist Process*. New York and London: McGraw-Hill Book Company, Inc, 1939.

———. *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, and the Business Cycle*. New Brunswick (USA) and London (UK): Transaction Publishers, 1934.

Schwartz, Sidney L. "Charles R. Blyth." *California Historical Society Quarterly* 38, no. 4 (1959): 360–61.

Scott, James C. *Seeing like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven, Conn. ; London: Yale University Press, 1999.

Sebrell, W. H., and C. V. Kidd. "Administration of Research in the National Institutes of Health." *The Scientific Monthly* 74, no. 3 (1952): 152–61.

Secrist, Horace A. "Motivating the Industrial Research Scientist." *Research Management* 3, no. 1 (1960): 57–64.

Segal, David R., and Mady Wechsler Segal. "America's Military Population." *Population Bulletin* 59, no. 4 (2004): 3–40.

Sever, Earl L. "Security Analysts of San Francisco." *The Analysts Journal* 5, no. 2 (1949): 43–44.

Shapin, Steven. "The Man of Science." In *The Cambridge History of Science: Early Modern Science: Volume 3,* edited by Lorraine Daston and Katharina Park, 179–91. Cambridge: Cambridge University Press, 2006.

———. *The Scientific Life : A Moral History of a Late Modern Vocation*. Chicago ; London: University of Chicago Press, 2008.

———. "Who Is the Industrial Scientist? Commentary from Academic Sociology and from the Shop-Floor in the United States, ca. 1900-ca. 1970." In *The Science–Industry Nexus: History, Policy, Implications: Nobel Symposium 123*, edited by Karl Grandin, Nina Wormbs, and Sven Widmalm, 337–63. Sagamore Beach, MA: Science History Publications, 2004.

Shenhav, Yehouda. *Manufacturing Rationality: The Engineering Foundations of the Managerial Revolution*. Oxford: Oxford University Press, 1999.

Shepard, Herbert A. "Applied Behavioral Science and R&D Effectiveness." *Research Management* 11, no. 5 (1968): 305–21.

———. "Innovation-Resisting and Innovation-Producing Organizations." *The Journal of Business* 40, no. 4 (1967): 470–77.

———. “Applied Behavioral Science and R&D Effectiveness.” *Research Management* 11, no. 5 (1968): 305–21.

———. “Democratic Control in a Labor Union.” *American Journal of Sociology* 54, no. 4 (1949): 311–16.

———. “Superiors and Subordinates in Research.” *The Journal of Business* 29, no. 4 (1956): 261–267.

———. “The Dual Hierarchy in Research.” *Research Management* 1, no. 3 (1958): 177–87.

Shurtleff, William R. *The Shurtleff and Lawton Families: Genealogy and History*. Second. Lafayette, CA: Pine Hill Press, 2005.

Silk, Leonard S. *The Research Revolution*. McGraw-Hill Book Company, Inc.: New York, Toronto, London, 1960.

Simon, Leslie E. “A Continuum of Applied Science in the Corporation.” *Research Management* 2, no. 4 (1959): 251–59.

Sinclair, Leroy W. *VENTURE CAPITAL*. New York: Technimetrics, Inc, 1971.

“SIX ROCKEFELLERS TO INVEST JOINTLY: PARTNERSHIP WITH A CAPITAL OF $1,500,000 AIMS TO FIND AND FINANCE NEW BUSINESSES,” *New York Times*, April 23, 1946, 24.

Smith, Barnard E. “Decision Analysis in Research and Development.” *Research Management* 12, no. 6 (1969): 417–24.

Smith, J. F. Downie. “Academic and Industrial Research.” *Research Management* 5, no. 4 (1962): 257–75.

Sprinkel, Beryl W. *Money and Stock Prices*. Richard D. Irwin, Inc.: Homewood, Illinois, 1964.

Stark, David, Daniel Beunza, Monique Girard, and János Lukács. *The Sense of Dissonance: Accounts of Worth in Economic Life*. Princeton, NJ: Princeton University Press, 2009.

Steelman, John R. “‘Science and Public Policy.’” *Bulletin of the Atomic Scientists* 4, no. 1 (1948): 23–31.

Steelman, John R. *Administration for Research: Volume Three of Science and Public Policy. A Report to the President.* Washington, DC: US Government Printing Office, 1948.

Stevens, Raymond. “Viewpoint of the Research Administrator.” *The Scientific Monthly* 72, no. 6 (1951): 364–67.

Stevenson, Howard H., and J. Carlos Jarillo. “A Paradigm of Entrepreneurship: Entrepreneurial Management.” *Strategic Management Journal* 11, no. SP ISS (1990): 17–27.

Stiglitz, Joseph E., and Andrew Weiss. “Credit Rationing in Markets with Imperfect

Information." *The American Economic Review* 71, no. 3 (1981): 393–410.

Stinchcombe, Arthur L. *Constructing Social Theories.* New York: Harcourt, Brace and World, 1968.

Stone, Louis. "Wall Street's 'Knowledge Industry.'" In *The Anatomy of the Wall Street: A Guide for the Serious Investor*, edited by Charles James Rolo and George J. Nelson, 18–28. Philadelphia and New York: J.B. Lippincott Company, 1968.

"Stormy Weather." *Time*, December 4, 1944. http://content.time.com/time/subscriber/article/0,33009,797011,00.html. (Accessed September 2019).

Story, Ronald. "Harvard Students, the Boston Elite, and the New England Preparatory System." In *The Social History of American Education*, edited by B. Edward McClellan and William J. Reese, 73–90. Illinois: University of Illinois Press, 1988.

Sturgeon, Timothy J. "How Silicon Valley Came to Be." In *Understanding Silicon Valley: Anatomy of an Entrepreneurial Region*, edited by Martin Kenney, 15–47. Stanford, Calif.: Stanford University Press, 2000.

Synnott, Marcia G. "The Admission and Assimilation of Minority Students at Harvard, Yale, and Princeton, 1900-1970." In *The Social History of American Education*, 313–32. Illinois: University of Illinois Press, 1988.

Szelenyi, Ivan, and Bill Martin. "The Three Waves of New Class Theories." *Theory and Society* 17, no. 5 (1988): 645–67.

Tabell, Anthony W. "Forecasting Stock Prices: The Technician's Approach." In *The Anatomy of the Wall Street: A Guide for the Serious Investor*, edited by Charles James Rolo and George J. Nelson, 158–77. Philadelphia and New York: J.B. Lippincott Company, 1968.

Talmey, Paul, and Gregoire Gutzeit. "Research in a Highly Diversified Corporation." *The Analysts Journal* 10, no. 3 (1954): 137–39.

Tan, Zhiyuan Simon. "The Construction of Calculative Expertise: The Integration of Corporate Governance into Investment Analyses by Sell-Side Financial Analysts." *Accounting, Organizations and Society* 39, no. 5 (2014): 362–84.

Van Tassel, Karl R. "Managing Research and Development." *Research Management* 8, no. 3 (1965): 145–57.

Teixeira, Newton A. "The Latent Entrepreneur: Industry's Unused Asset." *IEEE Transactions on Aerospace and Electronic Systems* 7, no. 5 (1971): 777–80.

Thelin, John R. *A History of American Higher Education*. Baltimore: Johns Hopkins University Press, 2004.

Thomas, Charles Allen. "Research and Development: A Challenge for Management." *Research Management* 6, no. 4 (1963): 305–11.

Thompson, Victor A. "Bureaucracy and Innovation." *Administrative Science*

Quarterly 10, no. 1 (1965): 1–20.

———. "How Scientific Management Thwarts Innovation." *Trans-Action* 5, no. 7 (1968): 51–55.

Tilly, Richard. "Universal Banking in Historical Perspective." *Journal of Institutional and Theoretical Economics - JITE* 154, no. 1 (1998): 1–7.

Towbin, Belmont. "Special Situations: A Discussion of Their Investment Characteristics." *The Analysts Journal* 9, no. 5 (1953): 85–86.

Traflet, Janice M. *A Nation of Small Shareholders: Marketing Wall Street after World War II*. Baltimore, MD: Johns Hopkins University Press, 2013.

Trahair, Richard. *The Humanist Temper: The Life and Work of Elton Mayo*. New Brunswick, US, and London, UK: Transaction Books, 1984.

Turner, Ralph H. "The Navy Disbursing Officer as a Bureaucrat." *American Sociological Review* 12, no. 3 (1947): 342–348.

"Two Kinds of Capital," *Wall Street Journal*, January 13, 1938, 35.

United States Congress. *Hearings before the Committee on Banking and Currency, United States Senate, Eighty-Fourth Congress, First Session, on Factors Affecting the Buying and Selling of Equity Securities*. Washington, DC: United States Government Printing Office, 1956.

United States Government. *Economic Report of the President Together with the Annual Report of the Council of Economic Advisors*. Washington, DC: United States Government Printing Office, 1962.

United States National Security Council. *Report to the President by the Security Resources Panel of the ODM Science Advisory Committee* [Entitled 'Deterrence & Survival in the Nuclear Age']. Wachington, DC: United States National Security Council, 1957.

Uskali, Turo, and David Nordfors. "The Role of Journalism in Creating the Metaphor of Silicon Valley." *IJ-4 The Fourth Conference on Innovation Journalism* 23 (2007). https://web.archive.org/web/20120907002807/http://www.innovationjournalism.org/ij4/presentations/turouskalidavidnordfors.pdf. (Accessed September 2019).

Van Fleet, Richard. "Salary Administration for Scientific and Engineering People." *Research Management* 10, no. 6 (1967): 371–83.

Van Metre, Thurman William. *A History of the Graduate School of Business, Columbia University*. Columbia University, New York: Morningside Heights, 1954.

Vaughn, Thomas H. "The Research Management Study Group Program of the Industrial Research Institute." *Research Management* 3, no. 2 (1960): 93–96.

Veblen, Thorstein Bunde. *The Engineers and the Price System.* New York: New York : Kelley, 1965.

Vérin, Hélène. “Entrepreneur.” In *Dictionary of Untranslatables: A Philosophical Lexicon* / Translated by Steven Rendall, Christian Hubert, Jeffrey Mehlman, Nathanael Stein, and Michael Syrotinski; Translation Edited by Emily Apter, Jacques Lezra, and Michael Wood; Edited by Barbara Cassin, 265–68. Princeton: Princeton University Press, 2014.

Viale, Riccardo, and Henry Etzkowitz (eds.) *The Capitalization of Knowledge: A Triple Helix of University-Industry-Government*. Cheltenham, UK; Northampton, MA: Edward Elgar, 2010.

Von Walwitz, Georg. *Odysseus Und Die Wiesel: Eine Fröhliche Einführung in Die Finanzmärkte*. Berlin: Berenberg Verlag GmbH, 2016.

Waite, Charles P. “Panel: Financing New Ventures.” In *New Business: The Art of Joining Innovative Technology, Management and Capital. Proceedings, May 22-23, Boston College School of Management*, 83–86. Chestnut Hill, MA: Boston College Press, 1969.

Wallerstein, Immanuel. “Braudel on Capitalism, or Everything Upside Down.” *The Journal of Modern History* 63, no. 2 (1991): 354–61.

———. Immanuel Wallerstein, “The Bourgeois(Ie) as Concept and Reality,” in T*he Essential Wallerstein*, ed. Immanuel Wallerstein, 324–44. New York: New Press, 1988.

Wansleben, Leon. “‘Dreaming with BRICs.’” *Journal of Cultural Economy* 6, no. 4 (2013): 453–71.

———. “Financial Analysts, In: Knorr-Cetina, K., & Preda, Alex. (2012).” In *The Oxford Handbook of the Sociology of Finance (Oxford Handbooks in Business and Management)*, 251–65. Oxford ; New York: Oxford University Press, 2012.

Waring, Stephen P. *Taylorism Transformed: Scientific Management Theory since 1945*. Chapel Hill: North Carolina University Press, 1991.

Waterman, Alan T. “Government Support of Research.” *Science* 110, no. 2870 (1949): 701–7.

Weber, Max. *General Economic History*. Translated be Frank H. Knight. Clencoe, Illinois: The Free Press, 1950.

Weinstein, Barbara. “Commentary on Part I.” In *The Making of the Middle Class: Toward a Transnational History. Radical Perspectives*, edited by A. Ricardo López and Barbara Weinstein, 107–21. Durham, NC: Duke University Press, 2012.

Weiss, Linda. *America Inc.? Innovation and Enterprise in the National Security State*. Ithaca: Cornell University Press, 2014.

Whitley, Richard. “The Transformation of Business Finance into Financial Economics: The Roles of Academic Expansion and Changes in U.S. Capital Markets.” *Accounting, Organizations and Society* 11, no. 2 (1986): 171–92.

Whyte, William Holley. *The Organization Man*. New York: Simon and Schuster, 1956.

"William Ketcham "Bill" Bowes, Jr.," *SF Gate*, January 6 to January 8, 2017, <https://www.legacy.com/obituaries/sfgate/obituary.aspx?pid=183434037> (Accessed September 2019).

Williams, Robin M. "Some Observations on Sociological Research in Government During World War II." *American Sociological Review* 11, no. 5 (1946): 573–77.

Wilson, John W. *The New Venturers: Inside the High-Stakes World of Venture Capital*. Boston, MA: Addison-Weseley, 1985.

Wolfle, Dael. "The Government and Research." *Public Administration Review* 8, no. 1 (1948): 71–74.

Wright, Erik Olin. *Understanding Class*. London ; Brooklyn, NY: Verso, 2015.

Yogev, Esther. "Corporate Hand in Academic Glove: The New Management's Struggle for Academic Recognition—The Case of the Harvard Group in the 1920's." *American Studies International* 39, no. 1 (2001): 52–71.

Zweig, Jason. "A Different Perspective on Graham." *Financial History* 86/Summer (2006): 27.

———. "A Note About Benjamin Graham."In Benjaming Graham, *The Intelligent Investor. A Book of Practical Counsel. Revised Edition*, ed. by Jason Zweig, x–xiii. New York: Harper Collins Publishers Inc., 1984.