

Schumpeter's Fatalistic View of Capitalism: How His "Essential" Process of Creative Destruction Survived

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Abstract

Joseph Schumpeter (1883–1950) was pessimistic regarding capitalism's ability to survive. He predicted that large firms would crowd out start-up entrepreneurs—the ones inspiring creative destruction. These entrepreneurs, he thought, would be unable to obtain sufficient funds to launch products on a competitive scale. Since 1950, a venture capital industry has emerged, which now inspires creative destruction on an unprecedented scale. Our retrospective analysis reveals that the venture capital industry evolved in Schumpeterian fashion. Finally, we argue that had Schumpeter taken Knight (1921) and Hayek (1945) into account, he might not have made the claim that capitalism requires creative destruction to endure.

JEL Codes: B26, B31, B53

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"This process of Creative Destruction is the essential fact about capitalism."

—Joseph A. Schumpeter (1942, p. 83)

"Can capitalism survive? No. I do not think it can."

—Joseph A. Schumpeter (1942, p. 61)

I. Introduction

When Joseph Schumpeter saw the crowding out of perennial creative destruction wrought by start-up entrepreneurs, he concluded that capitalism would not survive. Large firms, he thought, would suppress innovation because of their great advantage in accessing

capital. No longer would the lone entrepreneur be able to launch sweeping, equilibrium-disrupting innovation on a competitive scale. Schumpeter believed that an era of “trustified capitalism” began in the late 1920s that would abolish creative destruction and ultimately capitalism.

Yet today, creative destruction flourishes at an unprecedented scale. Schumpeter’s fatalism about creative destruction (and hence capitalism) traces to three misconceptions. In section 2, we discuss Schumpeter’s misunderstanding of where entrepreneurs operate and the entrepreneurial function. In section 3, we consider Schumpeter’s expectations of a future based on a continuation of the trends that played out over his lifetime. In section 4, we discuss Schumpeter’s inability to foresee how the venture capital revolution would emerge to finance future generations of entrepreneurs. In section 5, we argue that had Schumpeter taken Knight (1921) and Hayek (1945) into account, he might have avoided incorrectly claiming that capitalism without creative destruction would be indistinguishable from socialism. Section 6 concludes.

II. Schumpeter’s Myopia about Entrepreneurs and the Entrepreneurial Function

Schumpeter ([1942] 2008, pp. 82–83) defined capitalism as a discontinuous “evolutionary process” that “unfolds through decades.” Capitalism, he thought, was a process by which the creative innovations of entrepreneurial individuals led to the destruction of the status quo, typifying the ordinary circular flow of economic life. Schumpeter ([1934] 2012, p. 34) mocked the inadequacy of the static circular-flow analysis propounded by most economists of his day: “Add successively as many mail coaches as you please, you will never get a railway thereby. . . . new combinations are, as a rule, embodied, as it were, in new firms which generally do not arise out of the old ones but start producing beside them. . . . in general it is not the owner of stage-coaches who builds railways.”

Schumpeter considered it a “meaningless job” to investigate “how capitalism administers existing structures” because “the relevant problem is how it creates and destroys them” (Schumpeter [1934] 2012, p. 84). Capitalism’s survival, Schumpeter argued, was beneficial because entrepreneurs delivered revolutionary new products such as railroads and automobiles. Notwithstanding the obsolescence of more primitive forms of transportation, railroads and automobiles brought net benefits.

For Schumpeter, innovating entrepreneurs were “the fundamental impulse that sets and keeps the capitalist engine in motion.” Entrepreneurs are the source of Schumpeter’s *new-combination* innovations—the “new consumers’ goods, the new methods of production or transportation, the new markets, [and] the new forms of industrial organization” ([1942] 2008, p. 83). To facilitate understanding of how these innovations impact the economy, Schumpeter analogized that just as genetic mutations periodically disrupt evolving biological processes, entrepreneurs’ new-combination innovations are “industrial mutations” that “incessantly revolutionize the economic structure from within, incessantly destroying the old ones, incessantly creating new ones” ([1942] 2008, p. 83).

Behind the revolutionary new-combination innovation in Schumpeter’s theory are the entrepreneur and the entrepreneurial function (Schumpeter [1942], 2008, p. 132). In Schumpeter’s explanation of innovation, it is “only a small fraction of the population” who possess the required “aptitudes . . . that define the entrepreneurial type as well as the entrepreneurial function” ([1942] 2008, p. 132). The entrepreneurial function, according to Schumpeter, “does not essentially consist in either inventing anything or otherwise creating conditions which the enterprise exploits.” Rather, entrepreneurs “reform or revolutionize the pattern of production by exploiting an invention or, more generally untried technological possibility for producing a new commodity or producing an old one in a new way, opening up a new source of supply of materials or a new outlet for products, by reorganizing an industry and so on.”

For Schumpeter, the entrepreneurial function consists of people with special aptitudes going about the business of getting the new thing done. The special aptitudes of entrepreneurs drive Schumpeter’s new-combination innovations in each of his three books on this topic. In the first, *The Theory of Economic Development*, the entrepreneur possesses an aptitude of “great surplus over the everyday demand and is something peculiar and by nature rare” (Schumpeter [1934] 2012, p. 86). In the second book, *Business Cycles*, Schumpeter (1939, p. 103) discusses entrepreneurs similarly, referring readers who might be interested in greater detail specifically to his earlier book “*Theory of Economic Development*, notably Chaps. II and IV.” Last, in *Capitalism, Socialism and Democracy*, Schumpeter ([1942] 2008, p. 132) explains the entrepreneur’s special aptitude as the rare

ability “to act with confidence” and undertake new things that “lie outside of the routine tasks” in an “environment [that] resists.”

Progress is lumpy under capitalism, because “mere” businesspeople, those arranging the static circular flow of ordinary economic life, are slow to embrace the changes associated with widespread adoption of the new-combination innovations that entrepreneurs deliver. Instead, these businesspeople delay and then come “swarming after the entrepreneur”—bringing such excessive quantities of goods to market that they temporarily disrupt the market order. Progress is lumpy and more costly than it would be, if only the “good brains” of the “heroic” entrepreneurs were involved.¹

Schumpeter’s theory of leading entrepreneurs, followed reluctantly by mere businesspeople, is the essence of his theory of business cycles. Schumpeter thought business cycles were inherent to capitalism, with the “entrepreneurs’ demand [being] the initiating cause” (Schumpeter 1927, p. 306). He thought business cycles occur because (1) only a select group, the entrepreneurs, possess the special aptitudes of power and leadership; and (2) others [the mere businesspeople who lack these special aptitudes] lag behind but are forced onward and often “ruined by competition setting in from those who lead” (Schumpeter 1927). Those without entrepreneurial aptitudes fail to promptly imitate innovations because “outside routine, most people find it difficult—and often are unable to act” (p. 298). Imitators delay, Schumpeter argues, but eventually rush after the entrepreneur’s innovation in a swarm. New products hit the market in clusters that are impossible for the market to seamlessly absorb.² Entrepreneurial booms of this type lead to periods of depression, during which people adapt to innovations and absorb them into a new status quo circular flow of economic life.

Schumpeter’s pessimism about capitalism’s survival was largely due to an underestimation of the future ability of new-product entrepreneurs to acquire the funding needed to compete with large firms. Schumpeter mistakenly believed that banks would continue to be *the* source of funding for these entrepreneurs, whom he considered the wellspring of capitalism’s essential process—creative

¹ Schumpeter used the metaphor of “swarming after the entrepreneur” primarily in his 1934 book, *The Theory of Economic Development*, most notably in a passage on page 231.

² Marz (1991) uses the term “clusters” in an insightful summary of Schumpeter’s business cycle theory on page 7.

destruction. As Schumpeter ([1934] 2012, p. 89) emphasized, “The only man he [the entrepreneur] has to convince or to impress is the banker who is to finance him.”

Without creative destruction (i.e., sans business cycles), capitalism, as defined by Schumpeter, was doomed to devolve into an “order of things which it will be merely a matter of taste and terminology to call Socialism or not” (Schumpeter 1928, p. 286).

The problem was not that Schumpeter’s basic definition of the entrepreneur was not broad enough. It was that he did not apply it broadly enough. Schumpeter (1947, p. 151) defined the entrepreneur and his function very broadly: “the defining characteristic is simply the doing of new things or the doing of things that are already being done in a new way.”

But again, as we emphasized previously, Schumpeter’s hallmark discussions were about new-product entrepreneurs.

The function of the entrepreneur is to reform or revolutionize the pattern of production by exploiting an invention or, more generally, an untried technological possibility for producing a new commodity or producing an old one in a new way, by opening up a new source of supply of materials or a new outlet for products, by reorganizing an industry and so on. Railroad construction in its earlier stages, electrical power production before the First World War, steam and steel, the motorcar, colonial ventures afford spectacular instances of a large genus which comprises innumerable humbler ones—down to such things as making a success of a particular kind of sausage or toothbrush. (Schumpeter [1942] 2008, p. 132)

Schumpeter did mention, in passing, that his definition of the heroic entrepreneur—as the one getting the new thing done—might apply to the financial realm as well as the new-product realm. But scholars who study Schumpeter recognize that it was the doing of old things in new ways within commercial banking that Schumpeter (1947, p. 158) focused on: “Financial institutions and practices enter our circle of problems in three ways: they are ‘auxiliary and conditioning’; banking may be the object of entrepreneurial activity, that is to say, the introduction of new banking practices may constitute enterprise; and bankers (or other ‘financiers’) may use the means at their command in order to embark upon commercial and

industrial enterprise themselves (for example, John Law).”³ There is no evidence that Schumpeter thought that “other financiers” might arise to save the heroic entrepreneur. As emphasized by Martin Kenney: “*The venture financier*, a capitalist whose sole purpose is to invest in new firms, *is a unique role not envisioned by Schumpeter*” (1986, p. 26; emphasis added).

Schumpeter’s pessimism about creative destruction and the consequent survival of capitalism might have moderated had he thought about entrepreneurship as had one of his prominent contemporaries—Frank Knight (1921)—whose emphasis was on the *entrepreneurial function* rather than on the Schumpeterian leader-entrepreneur. Both Knight and Schumpeter emphasized the importance of planning and adapting in the face of uncertainty as key aspects of entrepreneurship.⁴ But while Schumpeter envisioned the great-man entrepreneur sparking economy-wide creative destruction, Knight (1921) emphasized judgment and control as the rational means by which the entrepreneur confronts uncertainty.⁵ Thinking about entrepreneurship this way, emphasizing *functions* employed by firms, Knight saw specialization across firms as a means of productively confronting uncertainty.

Of particular importance for our purposes is Knight’s discussion of the speculative “promoters” who specialized in the “launching” of new enterprises—a harbinger of the forthcoming venture capital revolution:

Besides organized speculation as carried on in connection with produce and security exchanges, the principle of specialization is exemplified in the tendency for the highly uncertain or speculative aspects of industry to become

³ See Arnold Heertje (2006) for more on Schumpeter’s emphasis on entrepreneurs who deliver product and product-process innovation and the role of banks in financing these entrepreneurs.

⁴ The title of Knight’s (1921) book, *Risk, Uncertainty, and Profit*, makes his emphasis on uncertainty obvious. Although Schumpeter did not use the word “uncertainty” in the title of his books on entrepreneurs, he framed his thoughts explicitly in terms of uncertainty. For example, in discussing the “phenomenon of leadership,” Schumpeter ([1934] 2012) emphasizes that success depends on the ability to “foresee and estimate on the basis of his experience” in situations where “many things must remain uncertain,” where “still others are only ascertainable within wide limits, and where “some can perhaps only be ‘guessed.’”

⁵ Inspired by Knight, Foss, and Klein (2012, p. 98), “develop the notion of the firm as a *nested hierarchy of judgement* . . . in which owners who possess the ‘ultimate’ rights to make decisions about resource allocation [empowering] subordinates to make decisions on the owners’ behalf.”

separated from the stable and predictable aspects and be taken over by different establishments. . . . For example, that which so commonly takes place between the establishment or founding of new enterprise and the operation after they are set going. . . . A considerable and increasing number of individual promoters and corporations give their exclusive attention to the launching of new enterprises, withdrawing entirely as soon as the prospects of the business become fairly determinate. The gain from arrangements of this sort arises largely from the consolidation of uncertainties. . . . Such a promoter takes it as a matter of course that a certain proportion of his ventures will be failures and involve heavy losses, while a larger proportion will be relatively unprofitable, and counts on making his gains from the occasional conspicuous success. (Knight 1921, p. 257; emphasis in original)

Although not referencing this specific passage, Foss and Klein (2012, p. 238) identify venture capitalists as “Knightian entrepreneurs.” Later in this paper, we provide a brief history of the venture capital revolution, as well as evidence that venture capital entrepreneurs played a major role in funding Schumpeter’s new-product entrepreneurs and, consequently, in revitalizing creative destruction and capitalism.

III. Schumpeter’s Pessimism: Fed by Trends That Persisted for Decades

During Schumpeter’s lifetime, 1883 to 1950, creative destruction went from peak to trough. Illustrative is the history of per capita patent applications shown in figure 1.

As seen in figure 1, annual US patent applications per capita exceeded 40 per 100,000 multiple times during the pre-1929 years of Schumpeter’s life. From 1930 to 1950, patent applications were typically below 25 per 100,000. Schumpeter’s pessimism about the re-emergence of creative destruction and capitalism sprang from his observation of the increasing state control of the means of production, rising taxation, and the increasing corporate consolidation that followed the 1929 stock market crash: “Capitalism cannot be expected to function efficiently except on its own terms, that is to say, in a social atmosphere that accepts its responsibilities and incentives and allows it sufficient freedom of action. As we have

seen, however, such an atmosphere and the corresponding attitude of public authority have not existed for some time, do not exist now, and are obviously unlikely to exist in the future (Schumpeter 1951, p. 178).

Figure 1. Per capita (100k) patent applications



Source: US Patent and Trademark Office.

In the late 1920s, Schumpeter (1928, p. 362; emphasis added) advanced the argument that the nineteenth century was a “time of *competitive*” capitalism that was giving way to a “time of increasing ‘trustified,’ or otherwise ‘organized,’ ‘regulated,’ or ‘managed’” capitalism. Under competitive capitalism, as defined by Schumpeter, innovation is “embodied typically in new firms,” whereas under trustified capitalism, it “goes on within the big units now existing, largely independent of individual persons” (1928, p. 384). Schumpeter argued that progress was “impersonal” under trustified capitalism, making it “decreasingly a matter of leadership and individual initiative” (1928, p. 385). A transformation from competitive to trustified capitalism, in Schumpeter’s view, would “divorce the success of the concern [the firm] from the success of the man” and, consequently, implied (1) that the capitalist *system* would become more stable, and yet (2) that the capitalist *order* would ultimately transition “into an order of things which it will be merely a

matter of taste and terminology to call Socialism or not” (1928, p. 386).

Schumpeter thought that the trustified firms would select leaders by a different process than the smaller competitive firms. More specifically, the leaders selected under trustified capitalism, Schumpeter (1928, p. 385) argued, would no longer possess the unique attributes of superior vision and aptitude he associated with the entrepreneurs. As a result, Schumpeter (1928, pp. 384–85) predicted that business cycles (the direct result of creative destruction) would tend to “soften” under trustified capitalism because the innovation directed by large firms, rather than by an owner-operator entrepreneur, (1) “meets with much less friction,” (2) “tends to be carried out as a matter of course with the advice of specialists” making “possible” a “conscious policy towards demand and taking a long-time view towards investment,” and (3) is less affected by the role of bank credit creation because of the power of larger firms to “accumulate reserves” and benefit from “direct access to the money market.”

Despite the 1929 stock market crash and the Great Depression, Schumpeter ([1942] 1975) continued to anticipate the replacement of competitive capitalism with processes whereby innovation emerges from “corporations” (or “big concerns”). Under this scenario, “proprietary interests [would] have vanished from the picture” (p. 141), and Schumpeter thought that eventually nobody would be willing to defend private property, the bedrock of capitalism (p. 142).

IV. The Venture Capitalists: Entrepreneurs Unforeseen by Schumpeter

“In the second half of the twentieth century, the United States experienced a historic transformation, in which a society dominated by large corporations such as Standard Oil, U.S. Steel, and General Motors shifted to a nation driven by venture-backed start-ups such as Digital Equipment Corporation, Intel Corporation, Microsoft, Starbucks, and many others. ... A recent study by the National Venture Capital Association found that U.S. venture backed companies between 1970 and 2005 accounted for ten million jobs and nearly 17 percent of the nation’s gross domestic product.” —Ante 2008, p. XIX

To compete in the era of large corporations (Schumpeter’s trustified capitalism era), the lone entrepreneur could no longer effectively bootstrap a startup because the process requires time, money, and secrecy. It is not unusual for the pre-launch effort to take

seven to ten years. This effort generally includes four phases: (1) research to complete a proof of concept, (2) design and construction of a working prototype, (3) creation of an initial inventory, and (4) promotion and distribution. Each of these four phases, depending on the product and business environment, could require millions of dollars, adding to the motivation for the entrepreneur to expend great effort and resources to maintain secrecy, keeping potential competitors from getting a whiff of what is coming. Secrecy is, obviously, not a free good.

Schumpeter's fatalism about creative destruction (and hence capitalism) resulted from his belief that the lone entrepreneur would only have access to capital through the sources available at the time—investment banks, private capital (raised through family members and patrons), and public capital raised via the sale of stock. Traditional bank financing was debt financing, requiring increased collateral in proportion to risk. Family members and patrons, as individuals, rarely have the wherewithal, and are almost never willing (due to risk aversion) to finance the lone entrepreneur's new idea on a sufficient scale to compete with large corporate competitors. Finally, publicly traded firms derive their value from the most recent quarterly results, creating an insurmountable barrier for the lone entrepreneur, operating for years in secrecy, to enter the public stock markets. In fact, many states restrict the public sale of such startup ventures as a violation of blue sky laws.⁶

A. Georges Doriot: Venture Capital Pioneer

"You can always spot the pioneers by the arrows in their backs."

—Source unknown

In 1946, Georges Doriot launched American Research and Development Corporation (ARD), aided by then-MIT president Karl Compton and senatorial candidate Ralph Flanders. ARD and Doriot set out to nurture an expanding portfolio of fledgling firms by providing financing, advice, and other types of support as needed. In contrast to earlier startup financing approaches (appealing to relatives and/or borrowing from banks), ARD sought to raise capital via the

⁶ The website Investopedia explains "blue sky laws" as "*a slang industry term used to describe the laws passed by various U.S. states to protect the public against securities fraud. It is said that the term originated from a judge who compared the value of a particular stock offering with a patch of blue sky.*"

public sale of stock, which “greatly expanded the potential amount of money that could be devoted to venture capital” (Ante 2008, p. 108).⁷

From the outset, ARD’s public-stock-sale approach to capitalization posed difficulties due to various national and state laws. At the national level, for example, it was crucial for ARD to obtain exemptions to provisions of the 1940 Investment Company Act that precluded a company from owning more than 3 percent of another company.⁸ The three exemptions allowed “ARD to hold more than 5 percent of the stock of a company, permitted any investment company to purchase up to 9.9 percent of ARD’s shares, and allowed ARD to sell its shares not only to investment companies but also other fiduciary organizations” (Ante 2008, p. 110). At the state level, ARD’s plan for capitalization required lobbying four states to bypass their blue sky laws, which “prevented investment trusts from investing in common stocks that were less than three to five years old, or had not paid dividends for several years” (Ante 2008, p. 110). Despite ARD’s exemptions, its 1946 stock offering “nearly failed” for still other reasons: “For starters, it was unable to persuade an investment bank to underwrite its offering. Instead, it hired two enterprising mid-tier banks, Estabrook & Company and Harriman, Ripley & Company, to pitch the deal on a best-efforts basis. Then, bad timing almost torpedoed the offering as the stock market swooned in the fall. ARD would have blown its November 1 deadline for raising \$3 million were it not for a last-minute subscription by Lessing Rosenwald, the former chairman of Sears, Roebuck & Company” (Ante 2008, p. 112).

ARD struggled to survive, yielding mediocre returns over the next ten years. Being a publicly traded firm gave rise to recurring difficulties associated with SEC oversight:

Every time ARD wanted to change the capitalization of one of its companies, it essentially needed to prove to the government that the transaction was on fair terms. It was not exactly the most efficient way to do business, and

⁷ “Today’s venture industry is the economy’s engine of innovation, providing the financial fuel and guidance that help fledgling companies reach their potential. But who conceived this crucial industry? It was Paris-born Georges Doriot” (Ante 2008, book jacket).

⁸ The 1940 Investment Company Act was “a key piece of legislation that aimed to restore public trust in capital markets after the 1929 stock market crash. In writing the 1940 Act, Congress and the Securities and Exchange Commission sought to prevent companies from extending their control through investment pyramids, as was done frequently in the 1920s” (Ante 2008, p. 110).

Doriot was becoming increasingly frustrated with regulators who were denying or delaying ARD's financial moves. "I wonder if our personnel and directors are not more qualified to decide on that valuation than even the most distinguished person at the SEC," wrote Doriot. "I wish to state that with the present system we are greatly hampered. It is expensive, and in some cases dangerous . . . In other words, while the SEC believes it is protecting our stockholders, they are actually suffering. (Ante 2008, p. 140)

Beyond external problems with regulations, ARD's uninspiring rate of return was also the result Doriot's deliberate de-emphasizing of the bottom line. He insisted instead on a corporate culture that cast ARD in the role not only of fledgling-firm financier, but also of father figure and sick-firm physician:

When you have a child, you don't ask what return you expect. Of course you have hopes—you hope the child will become President of the United States. But that is not very probable. I want them to do outstandingly well in their field. And if they do, the rewards will come. But if a man is good and loyal and does not achieve a so-called good rate of return, I will stay with him. Some people don't become geniuses until after they are 24, you know. If I were a speculator, the question of return would apply. But I don't consider a speculator—in my word—constructive. I am building [both] men and companies . . . we have our hearts in our companies, we are really doctors of childhood diseases here. When bankers or brokers tell me I should sell an ailing company, I ask them, "Would you sell a child running a temperature of 104?" (Doriot quoted in Bylinski 1967, p. 104)

In 1957, after a decade of struggling for modest returns, the law of large numbers delivered a home run to ARD. In return for investing \$70,000 with entrepreneurs Kenneth Olsen and Harlan Anderson, ARD secured a majority position in Olsen & Anderson's Digital Equipment Corporation (DEC). By 1963, the success of ARD's innovation (of extending the pool of funding for venture capital beyond family members) was profound.

As the summer [of '63] drew to a close, it was Digital's time to come out, time for ARD's Cinderella to put on

her glass slipper. On August 19, Lehman led an \$8 million offering to sell 375,000 shares of stock in Digital Equipment under the ticker “DEC.” The offering easily sold out. At \$22 a share, Ken Olsen’s 13% stake of 350,000 shares was worth \$7 million on paper. ARD’s 65 percent stake of 1,750,000 shares was valued at \$38.5 million. In nine years, ARD’s \$70,000 investment had skyrocketed in value by a factor of five hundred, validating Doriot’s model. (Ante 2008, p. 196)

ARD’s 1963 success with DEC, taken together with its occasional losses and numerous mediocre results, revealed that venture capital is riskier than other types of investing but offers expected returns above other investment classes.⁹ Figure 2 shows how the risk and expected return of venture capital compare with other classes of investment given Doriot’s experiences.

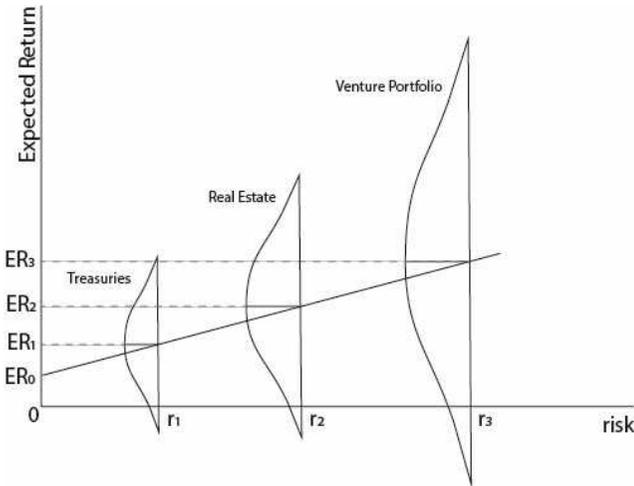
In figure 2, the upward sloping line, intersecting the vertical axis at ER_0 , represents the standard Markowitz (1952) depiction of the frontier trade-off available to investors. As implied by Howard Marks (2011, pp. 34, 51), figure 2 shows three successively riskier classes of investments: (1) treasuries, having an expected return ER_1 and risk r_1 ; (2) real estate, having an expected return ER_2 and risk r_2 , and (3) venture-backed firms, having an expected return ER_3 and risk r_3 . As figure 2 shows, venture capital has the greatest risk, the highest mean return, and the broadest distribution curve around its mean.

Beyond this, ARD’s pioneering legacy offered two other lessons to those who followed: (1) a publicly traded venture capital firm would likely have difficulty with initial capitalization and ongoing problems with SEC regulators; and (2) a venture capital firm that treated poor prospects with the devotion that parents afford a severely sick child would pay a significant price in terms of its rate of return on capital.¹⁰

⁹ By the summer of 1963, the path-breaking models on optimal investing based on expected return *and* risk of Markowitz (1952), Roy (1952), and Markowitz (1959) had gained a broader audience via Sharpe’s (January 1963 simplification. Following a diagram provided by Sharpe (1963, p. 283), Marks (2011, pp. 34, 51) shows two diagrams that highlight the key differences between venture capital and other investment classes. A major flaw in Marks’s (2011) book is that it provides no bibliography. We credit Sharpe as the likely inspiration for Marks’s diagrams, because Sharpe’s is the first diagram showing distribution curves for a security along a market line.

¹⁰ Bylinski (1967, p. 105) provides this example: “By the time A.R.D. got out [of Magnecord Inc., a prospective tape-recorder maker], it had lost more than a million

Figure 2. Expected return and risk of a venture portfolio



B. Arthur Rock's Success with Private Capitalization

According to a Harvard Business School (1997) publication, Arthur Rock, a student of Doriot, is the financier most often credited with coining the term “venture capital.” Although the term, in fact, precedes Rock by decades, it is appropriate to credit Rock as one of the fathers of the modern venture capital firm because of what he learned from Doriot’s experience with public capitalization.¹¹ Rock capitalized his firms privately, tapping foundations and wealthy individuals, setting an example others have followed and that has become the norm. Rock, as one of Doriot’s students, would have been aware of Doriot’s failures.

In 1957, a contact representing seven computer scientists approached Rock while he was working for a New York investment firm that specialized in financing companies. These computer scientists were leaving the Shockley Laboratory Division of Beckman Instruments and were looking for a place where they could get a job together. Rock suggested that they “form a company and get one of the bigger companies to finance it” (Gupta 2000, pp. 139–42). The group formed a company in which each scientist would own 10 percent of the stock. Rock introduced these scientists to Sherman Fairchild, IBM’s largest stockholder. Fairchild provided \$1.5 million

dollars . . . It was a case of Doriot’s becoming too enamored with a company, a failing to which he admits. ‘When is a hope no longer a hope?’ he asks.”

¹¹ With the clarity of 20-20 hindsight, Ante (2008, p. XIX) emphasized: “ARD should never have been incorporated as a publicly traded company.”

in financing with an option to buy all the stock for \$3.0 million. Fairchild Semiconductor was the result. It took only two years for Fairchild to exercise his option. After Fairchild died, the replacement CEO, who did not believe in stock options, forced everyone to directly report to him. Soon people started to leave, including the original scientists. Among them were Robert Noyce and Gordon Moore, who left to create Intel.

Rock relocated to California in 1961, spurred by the flurry of innovations coming out of Stanford. Fred Terman, the head of Stanford's engineering school, encouraged his professors to form companies while continuing to teach at Stanford. This practice was unheard of at other engineering schools. Rock reported that "people got fired from MIT in those days if they started companies" (Gupta 2000).

Rock met Thomas Davis and discovered someone with a similar vision. Together, they raised \$5 million as the firm of Davis and Rock, primarily from East Coast private investors who knew Rock. The fund found early success with investments in Teledyne and Scientific Data Systems (SDS). Xerox acquired SDS in 1969 for just under \$1 billion.

C. Tom Perkins's Success with Continue-or-Terminate Thresholds

The fledgling venture capital industry could not expand unless venture capitalists found a way to encourage wealthy individuals and private firms to invest. Foss and Klein (2012, p. 239) list several Knightian controls that venture firms employ to grapple with uncertainty: "Venture capitalists maintain tight control of their investments, allocating cash flow rights, control rights, board rights, voting rights, liquidation rights, etc. separately and reserving the right to take them back if particular thresholds aren't met." In addition to thresholds on the control rights, venture capitalists often apply thresholds to the vesting of stock options given to entrepreneurs in conjunction with venture investments.

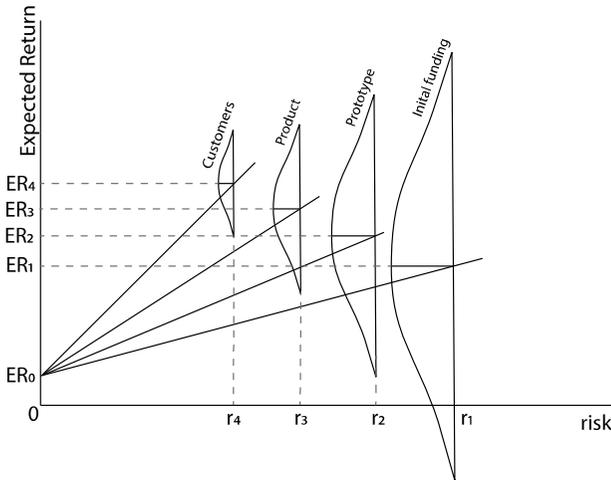
Thresholds are vital to the success of venture capital firms. Rather than coddling struggling client-firms as one would a "sick child," in the Doriot fashion, modern venture firms increase expected returns by parting ways with entrepreneurs that fail to meet key milestones on schedule. Here, Tom Perkins, cofounder of a leading venture firm (established in 1972), explains the experience that led him to see that successfully targeting exceptional returns demanded the discipline of timely continue-or-terminate project assessments

and reassessments. In his view, this is the foundational principle of venture capital. “Everything I learned about venture capital I learned from David Packard of the Hewlett-Packard Company . . . They did projects within the company in which each project had to make a contribution of at least a factor of ten. So, they sought high risk, they managed it carefully, they got rid of the risk up front, and then they poured in the money. And that is the fundamental lesson of venture capital” (Perkins 2013).

Figure 3 illustrates the process by which modern venture capital firms use thresholds (“tranches,” in the language of investment banking) to reduce risk and increase their expected return on invested capital. As shown, venture firms reduce risk and increase expected returns by winnowing out firms that fail to meet benchmarked requirements. These requirements represent three measurable achievements after the initial funding: (1) the production of a working prototype, (2) a completed and marketable product, and (3) initial sales to customers. As shown, the initial funding tranche carries the highest risk, r_1 , and the lowest expected return, ER_1 . By providing the second tranche to only those firms that complete a working prototype in a timely fashion, the resulting pool (labeled “prototype”) carries a risk of only r_2 (less than r_1) for its higher expected return of ER_2 (greater than ER_1).

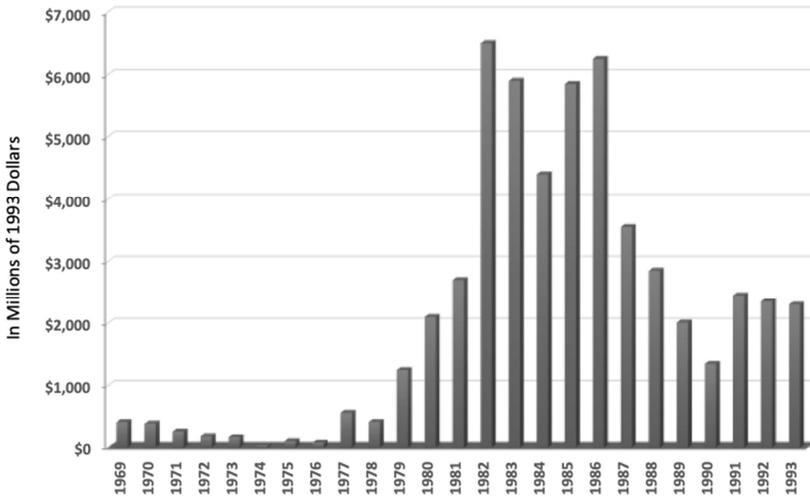
Continuing the process, the venture firm finances only those firms that demonstrate that their prototypes can be a viable manufactured product. Here, risk falls again, to r_3 , and expected return rises, to ER_3 . The final tranche is shown in figure 3 as “Customers.” To reach this stage and receive the next tranche, a firm already in the “Product” tranche must demonstrate sufficient customer demand for the product to sell profitably. The risk for this final tranche shown in the figure is r_4 ($< r_3 < r_2 < r_1$) and the expected return is ER_4 ($> ER_3 > ER_2 > ER_1$).

Figure 3. Expected return and risk of the tranches in a venture firm’s portfolio



D. Venture Capital Evolution: Creative Destruction in Finance

The up-and-down success of the venture capital industry, from the late 1940s through the early 1990s, led Paul Gompers (1994) to speculate, in “The Rise and Fall of Venture Capital,” that perhaps venture capital had peaked in the 1980s. The primary evidence that inspired Gompers’ thesis appears in the figure below (reproduced from his paper):

Figure 4. Gompers' evidence on new commitments to venture capital firms

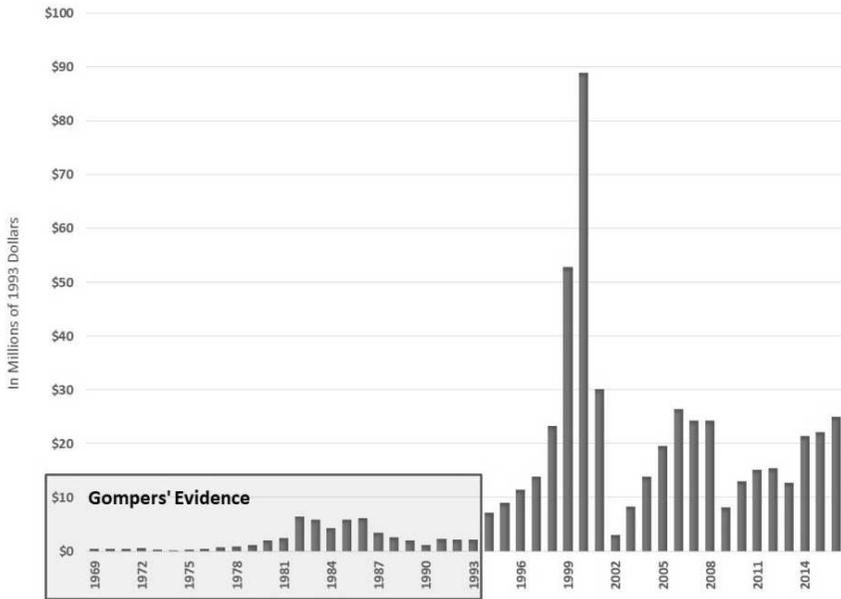
Source: Gompers (1994, p. 11)

Figure 1, which shows patents per capita declining throughout the stagflation of the 1970s offers additional insight into Gompers' pessimism. Macroeconomic growth in that era was stagnant, inflation was high, and the rising price of oil was a key negative supply shock.¹² As figure 1 shows, patents per capita recovered somewhat in the 1980s and began the 1990s barely above the level experienced in 1970. Macroeconomic headwinds were present during the formative years of the venture capital evolution. Furthermore, the best practices by which to operate a venture capital firm did not spring from the womb fully developed, as demonstrated by Doriot's decades of difficulty. Figure 5 contrasts new commitments to venture capital (in 1993 dollars) for the period 1969 to 1993 with the period 1994 to 2016.

As figure 5 shows, the earlier period is Gompers' evidence—which, again, he used in his tentative/pessimistic forecast about the prospects for venture capital.

¹² Gompers (1994, p. 20) also noted that the oil shock harmed the economy in the 1970s.

Figure 5. New commitments to venture capital



Source: National Venture Capital Association (2014).

Looking at figure 5, it is evident that the pessimism of both Gompers and Schumpeter was unjustified. Venture capital flourished post-Gompers and capitalism’s essential process of creative destruction has carried on demonstratively since 1993.

As macroeconomic headwinds receded and the use of threshold tranches gained broader acceptance, sophistication, and use, the venture capital industry began to grow and thrive. While the silicon chip revolution stimulated the early growth of venture capital, innovations arising from the internet’s emergence in the 1990s catalyzed the venture boom during that period. As software replaced silicon, venture firms successfully expanded from financing primarily hardware to backing software, biotech, and pharmaceuticals.

The evolution of venture capital conforms to the broad outlines of the process Schumpeter used to describe creative destruction. Following Doriot’s pioneering struggles (circa 1946–1963), it took decades before venture capitalists overcame his failures. Crucial in this achievement were Rock’s demonstration (circa 1957–1969) of the benefits of private financing and Perkins’s exposure (beginning in the early 1970s) to the value of using threshold tranches for risk reduction and higher expected returns. In the 1990s, when new-product innovations demanded tremendous financial capital, venture

capitalists swarmed in and supplied it—replacing traditional investment banks with the modern venture capital industry.¹³

IV. Schumpeter's Mistaken Assessment of Capitalism sans Creative Destruction

Setting aside the analysis above, here we discuss an additional question: was Schumpeter ([1942] 2008) correct in thinking that without startup-driven creative destruction, capitalism would have evolved into a system indistinguishable from socialism?¹⁴ Framing our discussion is Schumpeter's ([1942] 2008, p. 186) underlying belief that “socialist management” would find it “easier” to implement a “practical solution” to the two key uncertainties with which “commercial management” struggles: (1) the uncertainty “about the reaction of one’s actual and potential competitors,” and (2) the uncertainty “about how general business situations are going to take shape.” Unfortunately, Schumpeter ([1942] 2008) failed to consider important perspectives challenging his view: those presented in Frank Knight’s *Risk, Uncertainty, and Profit* (1921) and Friedrich Hayek’s *The Use of Knowledge in Society* (1945).

Knight (1921), as discussed above, emphasizes that under capitalism, an entrepreneurial function emerges in the face of uncertainty that (1) fosters profit-enhancing controls within firms that facilitate rational planning and adaptation (a theme recently expanded on in the pivotal work of Foss and Klein); and (2) gives rise to beneficial specialization across firms (also expanded on by Foss and Klein). Schumpeter either ignored Knight or, less likely, was unaware of his ideas. The index of Schumpeter’s *Capitalism, Socialism and Democracy* offers no reference to Knight in any of its editions (1942, 1947, or 1950), indicating that Schumpeter gave no serious consideration to Knight’s *Risk, Uncertainty, and Profit*.

¹³ Our discussion of venture capital entrepreneurs’ differing approaches during the industry’s evolution dovetails with Foss et al.’s (2021) analysis of value creation’s dependence not only on private ownership, but also on “ownership competence.” Their literature review references research on the venture capital industry indicating heterogeneous competencies across firm owners.

¹⁴ This section was written at the urging of an anonymous referee, whom we thank for giving us the opportunity to discuss this question that sets aside this paper’s primary focus on Schumpeter’s failure to foresee the venture capital revolution that provided sufficient funding to allow start-up entrepreneurs to launch new products competitively in an environment where large firms are present.

Hayek (1945, pp. 526–27), in contrast to Schumpeter's (1942) view that creative destruction distinguishes capitalism from socialism, argues that "the most significant fact" about capitalism "is the economy of knowledge with which it operates, or how little the individual participants need to know in order to take the right decision." Only under capitalism are resources coordinated by market price signals. These signals emerge from the knowledge of time and circumstances possessed only by the multitudinous individual, private-property-owning participants in the many markets.

While it is chronologically impossible for Schumpeter (1942) to have considered Hayek's (1945) article, Schumpeter's 1947 and 1950 editions of *Capitalism, Socialism and Democracy* could have, but did not. Schumpeter ([1942] 2008, p. 185) repeats verbatim his 1942 treatment of Hayek, mocking Hayek and Robbins as the "chief authorities of the view" that a rational socialist calculation was a "practical impossibility." Schumpeter ([1942] 2008, p. 175) derided this view, exactly as in 1942, arguing that the possibility of rational calculation logically "follows from the elementary proposition that consumers in evaluating ('demanding') consumers' goods *ipso facto* also evaluate the means of production which enter into the production of those goods." Schumpeter said the same in the 1947 and 1950 editions of his book despite Hayek's (1945, p. 529) refutation:

Professor Schumpeter argues that the possibility of a rational calculation in the absence of markets for the factors of production follows for the theorist "from the elementary proposition that consumers in evaluating ('demanding') consumers' goods *ipso facto* also evaluate the means of production which enter into the production of these goods." Taken literally, this statement is simply untrue. The consumers do nothing of the kind. What Professor Schumpeter's "ipso facto" presumably means is that the valuation of the factors of production is implied in, or follows necessarily from, the valuation of consumers' goods. But this, too, is not correct. Implication is a logical relationship which can be meaningfully asserted only of propositions simultaneously present to one and the same mind. It is evident, however, that the values of the factors of production do not depend solely on the valuation of the consumers' goods but also on the conditions of supply of the various factors of production. Only to a mind to which all these

facts were simultaneously known would the answer necessarily follow from the facts given to it. The practical problem, however, arises precisely because these facts are never so given to a single mind, and because, in consequence, it is necessary that[,] in the solution of the problem[,] knowledge should be used that is dispersed among many people.¹⁵

Granting Hayek's refutation of Schumpeter's assertion of the possibility of rational calculation raises a final question: If market prices are the marvels that Hayek (1945) emphasizes, then why don't they reign in the perennial gale of Schumpeterian creative destruction that has continued unabated for over a century? This question has been a fundamental theme of the literature on business cycles that Schumpeter ([1942] 2008, p. 82) traces to Karl Marx. The confines of this journal article do not permit a review of this vast literature. Still, we can suggest an answer inspired by a recent line of research in Austrian economics on sequestered capital.¹⁶

This research recognizes that the Hayekian knowledge problem facing firms in the new-product R&D space is fundamentally different from the problem facing firms whose products are priced and available on the market in competition with others. The key difference is that the capital used by firms working laterally to research and develop some new product *cannot* be coordinated by the knowledge of one another's priced products because this product is not for sale. Absent priced products on the market, laterally competing firms in the R&D space work secretly and rapidly in

¹⁵ In a footnote on the same page as this quote, Hayek (1945, p. 529) continues his refutation of Schumpeter's thesis: "J. Schumpeter, *Capitalism, Socialism and Democracy* (New York, Harper, 1942), p. 175. Professor Schumpeter is, I believe, also the original author of the myth that Pareto and Barone have "solved" the problem of socialist calculation. What they, and many others, did was merely to state the conditions which a rational allocation of resources would have to satisfy, and to point out that these were essentially the same as the conditions of equilibrium of a competitive market. This is something altogether different from showing how the allocation of resources satisfying these conditions can be found in practice. Pareto himself (from whom Barone has taken practically everything he has to say), far from claiming to have solved the practical problem, in fact explicitly denies that it can be solved without the help of the market."

¹⁶ For a sequestered capital explanation of (1) the timing of the Dutch Tulipmania, see McClure and Thomas (2017); (2) the role of sticky consumption in business cycles, see McClure and Thomas (2018a); (3) the impact of new-product R&D on the circular flow, see McClure and Thomas (2018b); and (4) new-product R&D as the earliest stage of the capital structure, see McClure and Thomas (2018c).

pursuit of first-mover advantage. Because sunk costs are irrelevant to project completion, there will be a propensity for firms who fail to gain first-mover advantage to bring their versions of the new product to market in large quantities in a Schumpeterian swarm. These excessive quantities would never have been contemplated had laterally competing firms known about one another's pre-market preparations.

Absent recognition of sequestered capital, Austrian economists have quite naturally been at odds with nonmonetary disproportionality explanations of business cycles. These explanations posit excessive production that unexpectedly emerges, precipitating price collapses. As Kirzner (1973, p. 228) explains, “a tendency toward equilibrium” exists as long as “the competitive-entrepreneurial process communicates steadily improved flows of information to market participants...we know that this process is a gradual one, in which entrepreneurs gradually feel their way toward the true temper of the market, while the course of price movements gradually communicates more and more accurate information to more and more market participants.” Kirzner (1973, pp. 72–73) contrasts his view with creative destruction: “Schumpeter's entrepreneur acts to disturb an existing equilibrium situation. Entrepreneurial activity disrupts the continuing circular flow...For me the changes the entrepreneur initiates are always toward the hypothetical equilibrium.” This view traces to Hayek ([1928] 2012, p. 30), who considered it a “misconception of the deliberations that regulate the entrepreneur's actions and of the significance of the price mechanism” to think it possible that “under free competition . . . more and more people try to profit by the favorable situation, all ignoring one another's preparations.” Explaining creative destruction as resulting from a lack of knowledge about prices and production in the R&D space breaks an intellectual logjam that has long blocked efforts to think seriously about the intersection of the Hayekian and Schumpeterian theories on industrial fluctuations. Hayek was unpersuaded by Schumpeter's business cycle theory and Kirzner (1973), following Hayek's lead, was similarly distrustful: “Capitalist development for Schumpeter consists of spurts of entrepreneurial energy, continually dogged by the imitators and routine-huggers.” Although Schumpeter's explanation of the creative destruction process, sometimes set off by start-up entrepreneurs, was

unacceptable to both Kirzner and Hayek,¹⁷ it remains a palpable phenomenon for which there is a solid price-theoretic explanation whenever sequestered capital is in play.

VI. Conclusions

Joseph Schumpeter, circa 1950, made a related set of predictions that did not pan out: (1) that individual new-product entrepreneurs would be unable to acquire sufficient funding to launch their innovations in the age of large conglomerate corporations, and, consequently, (2) that capitalism would cease to exist as a system distinct from socialism. The history of business, following these predictions, provides an explanation of an important oversight in Schumpeter's vision—the emergence of venture-capital entrepreneurs. These financial entrepreneurs made it possible for new-product entrepreneurs to obtain the means to create and launch their innovations competitively.

A venture capital revolution occurred post-1950 that played out, ironically, in Schumpeterian fashion—in finance rather than in new products. After decades of struggle, best practices in venture capital emerged, followed by a period of rapid entry resulting in the displacement of traditional investment banking as the primary source of startup entrepreneur financing. Creative destruction in finance saved Schumpeter's creative destruction.

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¹⁷ Regarding Hayek: It appears that only his oversight of the possibility that lateral competitors could be uninformed by one another's prices and production, as they can be in the new-product R&D space, stood in the way of his being able to complete a capital theory that could have undergirded his much-criticized business-cycle theory. For details, see McClure, Thomas, and Spector (2021).

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