

## Enhancing the Innovative Capacity of Venture Capital

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*How can law help translate great ideas into great innovations? Venture capital (VC) markets play an increasingly important role in funding innovation, and they have benefitted from substantial public support. While venture capital is almost synonymous with innovation, the ability of VC markets to catalyze innovations is often overstated. This Article examines the innovation limitations of VC and the role of law and policy in enhancing its innovative capacity. It draws upon academic commentary and original interviews with thirty-two early-stage investors, entrepreneurs, lawyers, and other innovation professionals in Northern California.*

*This Article explores, in an integrated fashion, three mutually reinforcing features that limit the capacity of VC markets to fund a wide range of socially valuable innovations. First, social ties are critical to connecting entrepreneurs and venture capital. This phenomenon shrinks the pool of entrepreneurs with a realistic chance of obtaining funding and distorts capital allocations in favor of those with greater social capital. Second, VCs exhibit a surprising degree of herd mentality, investing in trendy technologies while shying away from truly radical innovations. Finally, the VC business model favors innovations that promise large returns in a medium time frame with minimal risk. Such criteria necessarily deprioritize large swaths of socially valuable innovations with longer, riskier development timelines. While*

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*such practices are privately expedient in many contexts, they may leave significant profits unrealized. At a societal level, such practices are problematic to the extent that policymakers support VC markets to help effectuate innovation policy objectives.*

*This Article argues that law and policy have an important role to play in addressing these structural deficiencies and enhancing the innovative capacity of venture capital. It proposes a holistic suite of prescriptions to increase diversity and inclusiveness within the VC-startup ecosystem and to nudge VCs toward greater funding of certain technologies of high social value.*

Introduction.....	613
I. Examining Venture Capital from the Perspective of Innovation	
Law and Policy .....	622
A. Venture Capital Mechanics .....	622
B. The Public Foundations of Private Ordering: The Legal and Policy Architecture of Venture Capital Markets ...	626
C. The Increasing Importance of Venture Capital to National Innovation Policy .....	633
II. Social Capital Leading to Venture Capital.....	637
A. The Importance of Social Connections in Accessing Venture Capital .....	638
1. Empirical Findings .....	642
B. Normative Analysis.....	646
III. Herd Mentality and Trends .....	651
A. Conservatism and a Following Mentality in Markets to Fund Innovation .....	651
1. Empirical Findings .....	658
B. Normative Analysis.....	662
IV. The VC Business Model and Technological Discrimination .....	665
A. Investment Criteria as Constraints on Venture Capital's Innovative Capacity.....	665
1. Empirical Findings .....	675
B. Normative Analysis.....	678
V. Prescriptions.....	681
A. Expanding Diversity and Inclusiveness in the VC-Startup Ecosystem.....	683

B. Modifying Incentives to Shift Venture Capital Investments.....	693
Conclusion .....	699
Methodological Appendix .....	700

## **Introduction**

“[T]here’s just countless examples of that, where poor quality innovation is what actually makes it to market, ’cause of the team, the network, the location, the hype, the everything.”<sup>1</sup>

How can law help translate great ideas into great innovations? Consider a scientist at a national laboratory who develops a revolutionary technology to enhance the efficiency of power grids.<sup>2</sup> The technology has significant potential to reduce energy consumption and greenhouse gas emissions. After working with the intellectual property office at her national laboratory, she establishes a startup to commercialize the technology. She needs funding, but she has no connections with venture capitalists (VCs) and no idea how to meet them. She participates in an “open pitch day” sponsored by a VC firm and gets fifteen minutes to impress investors. The VCs recognize that her technology has great social potential, but it requires many more years of costly development and faces substantial uncertainty. They are focused on maximizing returns in a shorter period of time, and so they decide to fund a mobile gaming startup instead. The scientist-entrepreneur never gets funding, the technology never develops further, and a promising innovation that could combat climate change is abandoned. This Article explores structural factors guiding VC investment decisions and the role of law and policy in enhancing the innovative capacity of VC markets.

The inability of our scientist-entrepreneur to obtain funding is not only a problem for her, it is a problem for innovation

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<sup>1</sup> Respondent 20 (university technology transfer official).

<sup>2</sup> This example is fictitious but represents a composite drawn from the experiences of several interview respondents.

law and policy more generally. VC plays a central role in the U.S. innovation system. The domestic venture capital industry has helped fund companies that currently comprise 41% of this country's market capitalization.<sup>3</sup> While VC often appears to be the paragon of private ordering, this Article will show that it is in important ways both a creation and instrument of public policy. The U.S. government played a critical role in catalyzing the VC industry, and it has actively promoted its development for decades. It does so for several reasons, including to promote technological leadership, economic growth, job creation, and higher standards of living. Relatedly, policymakers fashion laws and regulations that support VC markets to spur the development of innovations that address pressing social needs. VC markets have been critical in this regard, funding the development of biotechnology, information technologies, and other highly valuable advances. In an era where the importance of federal research funding is declining, policymakers will increasingly look to VC markets to fund innovations to serve important policy objectives. Indeed, it is fair to say that VC markets both benefit from public support and are mechanisms for effectuating innovation policy.

This Article examines the innovative capacity of VC markets and how law and policy can enhance it. In so doing, it fills an important gap in the literature. Corporate legal scholarship has extensively studied venture capital, focusing on the way in which VC financing resolves information asymmetries and agency costs in areas of high uncertainty.<sup>4</sup> However, it has largely overlooked how VC markets select particular innovations for funding and the broader social value of those innovations. Intellectual property scholars focus centrally on how

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<sup>3</sup> Will Gornall & Ilya A. Strebulaev, *The Economic Impact of Venture Capital: Evidence from Public Companies* 3 (Stanford Graduate Sch. of Bus., Working Paper No. 3362, June 2021), [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2681841](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2681841) [<https://perma.cc/P4CX-2LYB>].

<sup>4</sup> See, e.g., Ronald J. Gilson, *Engineering a Venture Capital Market: Lessons from the American Experience*, 55 STAN. L. REV. 1067, 1076-92 (2003) [hereinafter Gilson, *Engineering*]; Andrew A. Schwartz, *The Digital Shareholder*, 100 MINN. L. REV. 609, 637-44 (2015); see also Darian M. Ibrahim, *The New Exit in Venture Capital*, 65 VAND. L. REV. 1, 6-15 (2012) (examining lock-in in venture capital financing) [hereinafter Ibrahim, *The New Exit*].

legal instruments, such as patents, promote innovation. However, they have devoted less attention to related processes by which new firms obtain VC funding, which can crucially determine what kinds of patented technologies society produces and by whom.<sup>5</sup> While the innovation management scholarship has extensively examined links among public policy, venture capital, and innovation outcomes,<sup>6</sup> it has largely focused on discrete topics and tended not to link such insights to comprehensive legal reforms to increase VC inclusiveness and alter the mix of technologies funded. This Article fills an important gap by exploring several interrelated innovation limitations of VC markets and suggesting broad and actionable reforms to address them.

While VC is synonymous with innovation, this Article argues that VC markets possess several interrelated structural features that constrain their ability to identify and fund a wide range of socially valuable innovations. It augments existing scholarship with original interviews with thirty-two early-stage investors, entrepreneurs, lawyers, and other professionals involved in technological innovation in Northern California.<sup>7</sup> These qualitative accounts from Silicon Valley and its environs help elucidate three significant limitations in the innovative capacity of VC.

First, social connections play an outsized role in connecting startups with VCs.<sup>8</sup> Such reliance shrinks the pool of

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<sup>5</sup> Notable exceptions have addressed the role of patents in startups' efforts to obtain venture capital. *See, e.g.*, Stuart J.H. Graham, Robert P. Merges, Pam Samuelson & Ted Sichelman, *High Technology Entrepreneurs and the Patent System*, 24 BERKELEY TECH. L.J. 1255, 1296-1308 (2009).

<sup>6</sup> D. Clay Ackerly et al., *Fueling Innovation in Medical Devices (And Beyond): Venture Capital in Health Care*, 27 HEALTH AFFS. 68, 69 (2008); *see* Andrew B. Hargadon & Martin Kenney, *Misguided Policy? Following Venture Capital into Clean Technology*, 54 CAL. MGMT. REV. 118, 122 (2012); Darian M. Ibrahim, *Financing the Next Silicon Valley*, 87 WASH. U. L. REV. 717, 733-35 (2010); P. Lehoux et al., *How Venture Capitalists Decide Which New Medical Technologies Come to Exist*, 43 SCI. & PUB. POL'Y 375, 376 (2016).

<sup>7</sup> *See infra* Methodological Appendix.

<sup>8</sup> *See infra* Part II.

entrepreneurs with a realistic chance of obtaining funding. This in turn inhibits VCs from identifying and financing the most truly innovative startups. While commentators have long recognized the importance of connections to obtaining VC, this Article's qualitative accounts add new complexities and insights. For instance, interview respondents reveal how the importance of social connections bolsters structural discrimination and allows implicit bias to distort investment decisions. Addressing these structural deficiencies can help increase the pool of entrepreneurs with a realistic chance of obtaining VC. Furthermore, while interviewees confirm that connections are important to accessing capital, they indicate that institutional endorsements and other credentials can help. These resources provide a pathway for unconnected entrepreneurs to successfully navigate the process of obtaining VC funding.

Second, in several ways, VC investment is not very venturesome.<sup>9</sup> While VCs enjoy an iconoclastic reputation, in many contexts they tend to invest in the same popular technologies while eschewing truly revolutionary innovations. Historical evidence reveals several trends of "hot" technologies receiving significant VC funding and then losing favor. Perhaps owing to the close-knit, socially connected nature of the VC-startup ecosystem, information signals from a few key decisionmakers can steer significant shifts in funding trends. Interview respondents confirm these phenomena and add new insights. While widespread investment in hot technologies may seem like an effective recipe for innovation, respondents highlight how this practice creates significant waste and overlooks promising innovations outside the mainstream.

Third and relatedly, the VC business model—which aims for quick, big hits while mitigating risk—inherently constrains the universe of ventures that can realistically obtain financing.<sup>10</sup> While this is not surprising from the perspective of maximizing profits, it belies the image of VC as fueling a wide array of innovations. The constraints of the VC business model, for instance, help explain why VC investments have focused so much

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<sup>9</sup> See *infra* Part III.

<sup>10</sup> See *infra* Part IV.

on software to the exclusion of more capital-intensive investments in biotech and cleantech. Interview respondents provide greater detail on how the VC business model constrains funding in ways that limit innovation. They emphasize the popularity of software enterprises and how capital-intensive industries with long investment horizons are a challenging fit for the VC business model.

From the private perspective of venture capitalists, relying on social connections, focusing on trendy technologies, and allowing the VC business model to guide investment decisions may be a largely expedient way to allocate funds. Even for VCs, however, such practices can leave valuable investment opportunities unexploited.<sup>11</sup> More importantly, however, to the extent that policymakers rely on VC markets to fuel broad-based and socially valuable innovation, these structural limitations are highly problematic.<sup>12</sup>

To address these deficiencies, this Article proposes a holistic suite of legal and policy interventions to enhance the innovative capacity of VC markets. First, it suggests reforms to expand the pool of entrepreneurs with a realistic chance of obtaining funding. It proposes aggressively enforcing antidiscrimination laws at VC firms and applying insights from the literature on implicit bias to increase access to capital for unconnected entrepreneurs. It also suggests that limited partners exercise their financial and legal leverage to force VCs to broaden their search for promising startups. It further argues for bolstering the government's role in credentialing unknown entrepreneurs to allow them to compete more effectively for capital. It highlights the importance of alternate financing vehicles, such as crowdfunding, to supplement traditional VC markets. Finally, it suggests utilizing government grants and regulatory

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<sup>11</sup> See *infra* notes 346-349 and accompanying text.

<sup>12</sup> Cf. Elizabeth MacBride, *Why Venture Capital Doesn't Build the Things We Really Need*, MIT TECH. REV. (June 17, 2020), <https://www.technologyreview.com/2020/06/17/1003318/why-venture-capital-doesnt-build-the-things-we-really-need> [<https://perma.cc/CZ7M-EJHR>] (“This largely white, largely male corner of finance has backed software companies that grow fast and generate large amounts for a shrinking number of Americans—companies like Google, Facebook, Uber, and Airbnb.”).

incentives to increase the geographic diversity of VC firms and the startups they fund. By expanding the pool of entrepreneurs with access to capital, these proposals help increase the probability that truly innovative ventures will receive financing.

Second, this Article suggests legal, regulatory, and policy reforms to nudge VC markets to fund a broader set of innovations of high social value. This Article highlights the role of the government in de-risking high-priority technologies, thereby priming them for private investment. It can perform this function both by reducing regulatory burdens and by providing public funding to assume more of the risk of technological development in particular areas. Relatedly, tax policy represents a valuable lever for altering VC incentives to invest in high-priority categories of technology. Furthermore, this Article argues that governments can broaden the investment perspective of VC funds by acting as direct market participants and investing in such funds themselves.

Before proceeding, it is important to clarify this Article's ambitions and limitations. This Article does not claim to be the first to identify the importance of social connections, herding, and the VC business model in determining VC investments. Rather, this Article's aims are integrative and translational. While each of these deficits has been recognized in the economics and management literature, this Article examines them together to provide an integrated account of the innovative deficiencies of VC markets. Furthermore, such an integrated approach reveals the myriad ways in which these separate deficiencies mutually support and reinforce each other. Thus, for instance, the centrality of social connections in VC financing promotes herding behavior and exacerbates the innovation constraints inherent in the VC business model.

Additionally, this Article seeks to translate these recognized deficiencies into actionable legal and policy reforms. While non-legal scholarship has devoted substantial attention to these characteristics, they have not fully penetrated legal scholarship on VC markets. Such scholarship has tended to focus on how law structures VC deals rather than the sociological inputs and innovative outputs of those deals. Relatedly, this



Article seeks to translate these academic findings into legal and policy changes. There appears to be a disconnect in which policymakers extol VC markets as broad engines of innovation without fully understanding their particular character and constraints. This Article seeks to highlight the public dimension of ostensibly private VC markets, the innovation deficits of such markets, and policy interventions to increase their innovative capacity.

On a related note, it is useful to clarify the role of original empirical evidence in this Article. This Article relies on a variety of sources to illustrate the innovation deficiencies of VC markets, including established scholarship and original interviews with thirty-two innovators from Northern California. These qualitative accounts are intended to “complement[] and enrich[]” the scholarly analysis presented, much of which is quantitative in nature.<sup>13</sup> As noted in the Methodological Appendix, any claims of generalizability from these interviews are subject to limitations based on sample size and selection techniques.<sup>14</sup> To a certain extent, the consistency of these interviews with prior academic accounts of the role of social ties, herding, and the VC business model determine funding decisions provides a useful robustness check. More importantly, however, these interviews provide lawyers and policymakers with a more subtle, textured understanding of how these dynamics play out for a cohort of innovators in the Northern California VC market. As legal scholar Jessica Silbey observes, “Qualitative research identifies the situated knowledge (i.e. actors’ experiences and interpretations) about a particular object through data that is ‘densely textured, locally grounded, meaningful to the subjects themselves.’”<sup>15</sup> Additionally, the open-ended, experiential nature of qualitative research is well suited to

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<sup>13</sup> Jessica Silbey, *Intellectual Property and Ethnography: A Qualitative Research Approach*, in HANDBOOK OF INTELLECTUAL PROPERTY RESEARCH: LENSES, METHODS AND PERSPECTIVES 586, 587 (Irene Calboli & Maria Lilla Montagnani eds., 2021).

<sup>14</sup> See *infra* Methodological Appendix.

<sup>15</sup> Silbey, *supra* note 13, at 587 (quoting Jack Katz, *Ethnography’s Warrants*, 25 SOCIO. METHODS & RSCH. 391, 392 (1997)).

generating hypotheses for further study.<sup>16</sup> In this Article, interviewees raised several novel claims about VC markets that the existing literature has not addressed, thus suggesting avenues for further research.<sup>17</sup>

In its findings and prescriptions, this Article challenges several widely held perceptions of venture capital. The VC-startup nexus, particularly based in Silicon Valley, enjoys an almost mythic reputation for meritocracy, innovation, and long-term value creation.<sup>18</sup> Such popular perception has political valence, contributing to laws and policies subsidizing such markets and shielding them from regulation.<sup>19</sup> However, this Article reveals that VC markets' reliance on social ties renders

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<sup>16</sup> *Id.* at 587.

<sup>17</sup> *See, e.g.*, Respondent 3 (startup founder) (stating that startups unnecessarily engineer their products with the latest trendy technology—such as blockchain—to be more attractive to venture capitalists).

<sup>18</sup> *Cf.* Darek Klonowski, *How Venture Capitalists May Impair the Entrepreneurial Ecosystem throughout Their Investment Process*, 20 CESIFO F. 40, 40 (2019) (“Business newspapers and magazines often mythologize venture capital (VC) and VC-backed entrepreneurial firms. . . . Mainstream media promotes VC by illustrating its spectacular successes . . . .”); George Packer, *Change the World*, NEW YORKER (May 20, 2013), <https://www.newyorker.com/magazine/2013/05/27/change-the-world> [<https://perma.cc/PJ5Y-PAB5>] (noting “the tech world’s belief in itself as a meritocracy”); *id.* (“[I]t’s the best and the brightest who have succeeded here.” (quoting Mitch Kapor, founder of Lotus)); Robyn Klinger-Vidra, *Building the Venture Capital State*, AM. AFFS. J. (Aug. 20, 2018), <https://americanaffairsjournal.org/2018/08/building-the-venture-capital-state> [<https://perma.cc/M23V-JTPP>] (“For the followers of Ronald Reagan and Milton Friedman—not to mention staunch libertarians and ‘tech bros’ in the Bay Area today—Silicon Valley is the triumph of the free market and American capitalism.”).

<sup>19</sup> *See* MARIANA MAZZUCATO, *THE ENTREPRENEURIAL STATE* 17-18 (2011); Charles Duhigg, *How Venture Capitalists Are Deforming Capitalism*, NEW YORKER (Nov. 23, 2020), <https://www.newyorker.com/magazine/2020/11/30/how-venture-capitalists-are-deforming-capitalism> [<https://perma.cc/9QAN-H9B2>] (“Politicians have generally been reluctant to criticize the venture-capital industry, in part because it has successfully portrayed itself as crucial to innovation.”).

them far from meritocratic in the traditional sense.<sup>20</sup> And rather than iconoclastic thinking, VCs display a surprising degree of herd behavior. Furthermore, instead of funding groundbreaking technologies and building long-term value, VCs often favor quick, cheap hits like software rather than riskier innovations of higher social value. VC markets play a crucial role in innovation law and policy, but policymakers must be aware of the limitations of these markets and craft interventions accordingly.<sup>21</sup>

This Article proceeds in five parts. Part I introduces venture capital markets. It explores the federal government's considerable legal and regulatory support for VC markets and their importance to effectuating innovation policy goals. Parts II-IV examine structural features that limit the capacity of VC markets to finance a wide range of socially valuable innovations. In so doing, they augment existing scholarship with original findings from semi-structured interviews with thirty-two innovators in Northern California. Part II explores the importance of social ties in connecting startups with venture financing. Part III examines the importance of trends and herd mentality in VC investments. Part IV investigates how the VC business model seeks relatively quick, low-risk "hits" to the exclusion of innovations with longer, riskier development timelines. Part V provides legal and policy prescriptions for enhancing access to venture capital and shifting VC investments toward certain innovations of high social value.

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<sup>20</sup> Cf. Mark Granovetter, *Economic Action and Social Structure: The Problem of Embeddedness*, 91 AM. J. SOCIO. 481, 482 (1985) ("This view sees the economy as an increasingly separate, differentiated sphere in modern society, with economic transactions defined no longer by the social or kinship obligations of those transacting but by rational calculations of individual gain.").

<sup>21</sup> Cf. Josh Lerner & Ramana Nanda, *Venture Capital's Role in Financing Innovation: What We Know and How Much We Still Need to Learn*, 34 J. ECON. PERSPS. 237, 244 (2020) ("The growth of the venture capital market in the past decade should not blind us to its limitations as an engine of innovation.").

## I. Examining Venture Capital from the Perspective of Innovation Law and Policy

This Part explores the public dimensions of an ostensibly private-ordering system of entrepreneurial finance. After briefly introducing the mechanics of VC firms and investments, it examines the substantial ways in which federal laws, regulations, and policies cultivated and continue to support the VC industry. In the contemporary landscape, VC markets play an important and increasingly prominent role in effectuating innovation-related public policy objectives.

### A. *Venture Capital Mechanics*<sup>22</sup>

To place venture capital in context, it is useful to consider a schematic timeline for financing a startup company. A founder or founders will establish a company and initially rely on bootstrapping (self-funding) in the early stages of product development.<sup>23</sup> Eventually, the entrepreneurial team will need additional capital to grow the enterprise. Internal financing and external debt are often unavailable because early-stage ventures lack stable cash flows and tangible assets to use as collateral.<sup>24</sup> Accordingly, many startups will turn to a first round of so-called seed-round funding. Such financing typically takes the form of convertible debt or other instruments that convert loans into equity.<sup>25</sup> As the venture grows, it will seek subsequent rounds of equity financing, such as Series A, Series B, and so on.<sup>26</sup> Two important classes of early-stage investors are angel investors and VCs. Angels are wealthy individuals who typically invest in early rounds and may conduct limited due

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<sup>22</sup> Readers familiar with the basics of VC financing may skip this section and proceed directly to Part I.B.

<sup>23</sup> Geoff Ralston, *A Guide to Seed Fundraising*, Y COMBINATOR (Jan. 7, 2016), <https://blog.ycombinator.com/how-to-raise-a-seed-round/> [<https://perma.cc/9J3D-RSC4>].

<sup>24</sup> Pascal Gantenbein et al., *Individualism and Venture Capital: A Cross-Country Study*, 59 MGMT. INT'L REV. 741, 744 (2019).

<sup>25</sup> Ralston, *supra* note 23.

<sup>26</sup> *Id.*

diligence.<sup>27</sup> VCs are more professionalized investors who invest assets on behalf of other parties. VCs participate in several stages of financing, from seed-round funding to later equity rounds. Based on their investment, VCs obtain an equity stake in a portfolio company and can exercise a significant level of control over it.<sup>28</sup> This may be manifested, for instance, in “disproportionate representation or even control of the portfolio company’s board of directors.”<sup>29</sup>

Institutional investors, such as pension funds, university endowments, and foundations, provide the vast majority of capital for VC funds.<sup>30</sup> These institutional investors are passive limited partners (LPs) in such entities. Actual day-to-day management of a VC fund is handled by a general partner (GP), which is typically a firm comprised of several investment professionals, known colloquially as VCs.<sup>31</sup> Notably, VC funds have a limited lifespan—generally, ten years—after which the GP liquidates the fund and distributes proceeds to LPs.<sup>32</sup> VCs receive a nominal annual fee for their services, but their primary compensation is a percentage of profits (typically 20%) realized by the partnership upon liquidation.<sup>33</sup> Each VC fund is

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<sup>27</sup> See Darian M. Ibrahim, *The (Not So) Puzzling Behavior of Angel Investors*, 61 VAND. L. REV. 1405, 1428-33 (2008) [hereinafter Ibrahim, *Angels*]; *id.* at 1407 (characterizing angel investing as “strikingly informal”); Ralston, *supra* note 23 (“The difference between an angel and a VC is that angels are amateurs and VCs are pros. VCs invest other people’s money and angels invest their own on their own terms.”).

<sup>28</sup> See Paul A. Gompers, *The Rise and Fall of Venture Capital*, 23 BUS. & ECON. HIST. 1, 3, 5 (1994).

<sup>29</sup> Gilson, *Engineering*, *supra* note 4, at 1082.

<sup>30</sup> This section draws on Gilson, *Engineering*, *supra* note 4, at 1070-72.

<sup>31</sup> *Id.* at 1071; see Ibrahim, *The New Exit*, *supra* note 4, at 9 fig. 1 (illustrating the relationship between limited partners, general partners (venture capitalists), and start-up firms).

<sup>32</sup> Gilson, *Engineering*, *supra* note 4, at 1071-72; see Elizabeth Pollman, *Information Issues on Wall Street 2.0*, 161 U. PA. L. REV. 179, 184 (2012) (discussing how detailed rules govern how investors can liquidate their funds at the end of this period).

<sup>33</sup> Gilson, *Engineering*, *supra* note 4, at 1072; but see Lerner & Nanda, *supra* note 21, at 254 (indicating the increasing importance of annual fees, particularly for exceptionally large funds).

a finite entity, and VCs frequently seek to raise money for successive funds on an ongoing basis.<sup>34</sup>

Venture capital is “a high-touch form of financing used primarily by young, innovative, and risky companies.”<sup>35</sup> In addition to providing funding, VCs perform a range of functions: they identify investment opportunities, evaluate companies, negotiate investment terms, advise the management of portfolio companies, and liquidate investments.<sup>36</sup> As noted, VCs exercise significant control over portfolio companies, and they utilize this control to make or influence numerous operational and strategic decisions.<sup>37</sup> For instance, VCs help recruit and hire CEOs and other senior management, and they provide strategic advice to the leadership team.<sup>38</sup> Liquidation of a VC investment typically takes the form of a sale of the venture to an established company or an initial public offering (IPO).<sup>39</sup> IPOs are the “gold standard” of exits and generate significant

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<sup>34</sup> Gilson, *Engineering*, *supra* note 4, at 1071.

<sup>35</sup> Gornall & Strebulaev, *supra* note 3, at 2.

<sup>36</sup> Fred Dotzler, *What Do Venture Capitalists Really Do, and Where Do They Learn to Do It?*, 5 J. PRIV. EQUITY 6, 6-7 (2001); Gilson, *Engineering*, *supra* note 4, at 1072. The quality of such services is uneven. See Klonowski, *supra* note 18, at 44 (noting that VCs lose interest in underperforming portfolio companies and that “the vast majority of venture capitalists lack real-life, business-grounded operations experience, preventing them from making meaningful, value-added contributions to these firms”). While this section presents a stylized example of a VC firm, the activities of such firms differ by context. For example, empirical research shows that VC firms investing in late-stage companies offer 50% more term sheets per deal compared to firms that invest in early-stage firms, which suggests greater competition among VC firms to invest in late-stage opportunities. Furthermore, VC firms focused on IT investments consider 151 deals for each completed investment, while VC firms focused on healthcare consider 78 deals per investment. Paul A. Gompers et al., *How Do Venture Capitalists Make Decisions?*, 135 J. FIN. ECON. 169, 176 (2019).

<sup>37</sup> Dotzler, *supra* note 36, at 9.

<sup>38</sup> *Id.*

<sup>39</sup> *Id.* at 10. Another potential exit, though less preferred, is the dissolution and liquidation of a funded company. Brian Broughman & Jesse M. Fried, *Carrots and Sticks: How VCs Induce Entrepreneurial Teams to Sell Startups*, 98 CORNELL L. REV. 1319, 1321-22 (2013).

proceeds for reinvestment in subsequent startups.<sup>40</sup> However, the market for IPOs has fluctuated significantly in recent years; these days, sales of portfolio companies to established industry players are much more common than IPOs.<sup>41</sup> VCs pursue a portfolio strategy in which a few blockbusters subsidize numerous failures.<sup>42</sup> On average, for every ten investments by a VC, one or two are successful, six grossly underperform, and two are complete write-offs.<sup>43</sup>

Much of the legal scholarship on venture capital explores how VC funding contracts address the unique challenges of investing in early-stage technology startups.<sup>44</sup> As Professor Ronald Gilson explores in a classic article, startups face significant technological and business uncertainty, founders have more information about their firms than VCs, and the interests of founders and VCs may diverge.<sup>45</sup> Numerous mechanisms—including staged financing, allocation of control elements, compensation forms, the role of exit, and implicit contracts—help

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<sup>40</sup> Ibrahim, *The New Exit*, *supra* note 4, at 2.

<sup>41</sup> See NAT'L VENTURE CAPITAL ASSOC., 2020 YEARBOOK 34 (2020) (reporting annual VC-backed IPOs ranging from 42 to 124 in the period of 2014-19) [hereinafter NVCA, 2020 YEARBOOK]; *id.* at 36 (reporting 800 VC-backed M&A each year from 2014-19); Mark A. Lemley & Andrew McCreary, *Exit Strategy*, 101 B.U. L. REV. 1, 7 (2020) (“[IPOs] now account for fewer than one in ten exits for startups.”); *id.* at 17-26 (describing the significant increase in acquisitions rather than IPOs as “exits” for VC-backed companies).

<sup>42</sup> Pollman, *supra* note 32, at 237; Lemley & McCreary, *supra* note 41, at 32 (characterizing VC investing as a “homerun” business).

<sup>43</sup> Klonowski, *supra* note 18, at 40.

<sup>44</sup> See, e.g., Gilson, *Engineering*, *supra* note 4, at 1067; Ibrahim, *The New Exit*, *supra* note 4, at 1; Schwartz, *supra* note 4, at 638-44.

<sup>45</sup> Gilson, *Engineering*, *supra* note 4, at 1076-77; see Bronwyn H. Hall & Josh Lerner, *The Financing of R&D and Innovation*, in 1 HANDBOOK OF THE ECONOMICS OF INNOVATION 609, 625 (Bronwyn H. Hall & Nathan Rosenberg eds., 2010). The economics and management literatures have also explored these issues. See, e.g., Josh Lerner & Joacim Tag, *Institutions and Venture Capital*, 22 INDUS. & CORP. CHANGE 153, 154 (2013); Joel A.C. Baum & Brian S. Silverman, *Picking Winners or Building Them? Alliance, Intellectual, and Human Capital as Selection Criteria in Venture Financing and Performance of Biotechnology Startups*, 19 J. BUS. VENTURING 411, 412 (2004).

mitigate moral hazard and information asymmetries.<sup>46</sup> In this manner, the legal and organizational framework for venture capital enjoys significant advantages in financing early-stage technology startups compared to other sources of funding.

*B. The Public Foundations of Private Ordering: The Legal and Policy Architecture of Venture Capital Markets*

Although VC markets seem to epitomize private ordering,<sup>47</sup> they are in many ways the products of deliberate public policy.<sup>48</sup> As Professor Martin Kenney has chronicled, “[t]he emergence of VC is intimately related to various governmental actions.”<sup>49</sup> The first modern venture capital firms emerged following World War II to help commercialize technologies arising from federal defense spending.<sup>50</sup> For example, American Research and Development was formed to invest in small

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<sup>46</sup> Gilson, *Engineering*, *supra* note 4, at 1078; *see also* Hall & Lerner, *supra* note 45, at 625 (noting how *ex ante* due diligence, intensive monitoring, and staged financing mitigate information asymmetries and moral hazard).

<sup>47</sup> *See, e.g.*, Gilson, *Engineering*, *supra* note 4, at 1070 (“The U.S. venture capital market developed organically, largely without government assistance and certainly without government design.”).

<sup>48</sup> *See* MAZZUCATO, *supra* note 19, at 18; Klinger-Vidra, *supra* note 18; NAT’L RSCH. COUNCIL, *RIISING TO THE CHALLENGE: U.S. INNOVATION POLICY FOR THE GLOBAL ECONOMY* xiv (2012); Lerner & Nanda, *supra* note 21, at 256 (observing that governments have been involved in promoting venture capital since the 1940s). State and local governments have also subsidized start-up and VC activity. *See, e.g.*, Packer, *supra* note 18 (describing San Francisco’s termination of a stock-option tax and efforts to keep Twitter in the city).

<sup>49</sup> Martin Kenney, *How Venture Capital Became a Component of the US National System of Innovation*, 20 *INDUS. & CORP. CHANGE* 1677, 1677 (2011) [hereinafter Kenney, *Venture Capital*].

<sup>50</sup> PAUL GOMPERS & JOSH LERNER, *THE VENTURE CAPITAL CYCLE* 6 (1999); Klinger-Vidra, *supra* note 18; Hall & Lerner, *supra* note 45, at 624; Lerner & Tag, *supra* note 45, at 164 (2013); *see* Tom Nicholas, *The Origins of High-Tech Venture Investing in America*, in *FINANCIAL MARKET HISTORY: REFLECTIONS ON THE PAST FOR INVESTORS TODAY* 227, 228-33 (David Chambers & Elroy Dimson eds., 2016) (discussing the early VC firm American Research and Development Corporation).



technology firms spun out of publicly funded research.<sup>51</sup> Through the late 1950s, these firms pioneered the model of combining investments with hands-on managerial advice for portfolio companies.<sup>52</sup> Successful VC-funded firms like Fairchild Semiconductor and Digital Equipment Corporation provided momentum for the emerging VC industry.<sup>53</sup>

The federal government played a critical role in catalyzing the VC industry by funding technologies that attracted private investment. Public research funding increased dramatically in the postwar period.<sup>54</sup> The Sputnik launch in 1957 intensified U.S. research funding, and the Space Race “fueled an enormous increase in demand for lightweight components, such as transistors, computers, and various scientific instruments.”<sup>55</sup> The Defense Advanced Research Projects Administration (DARPA), which was founded a year after the Sputnik launch, “opened the funding floodgates.”<sup>56</sup> Massive government spending expanded the market for cutting-edge electronics and other components. Furthermore, it increased funding for university electrical engineering and computer science departments.<sup>57</sup> Cold war defense policy played a critical role in configuring Silicon Valley<sup>58</sup> and, by extension, the VC industry.

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<sup>51</sup> Kenney, *Venture Capital*, *supra* note 49, at 1688; Lerner & Nanda, *supra* note 21, at 239.

<sup>52</sup> Kenney, *Venture Capital*, *supra* note 49, at 1688.

<sup>53</sup> *See id.* at 1690-91.

<sup>54</sup> David C. Mowery & Bhaven N. Sampat, *University Patents and Patent Policy Debates in the USA, 1925-1980*, 10 *INDUS. & CORP. CHANGE* 781, 793 (2001). Following World War II, Vannevar Bush, advisor to President Franklin Delano Roosevelt, advocated for robust federal funding for scientific research. *See* VANNEVAR BUSH, *SCIENCE: THE ENDLESS FRONTIER* 11, 31 (1945). Bush also contended that small, technology-based companies—catalyzed by federally funded research—would provide profitable investment opportunities. Kenney, *Venture Capital*, *supra* note 49, at 1688.

<sup>55</sup> Kenney, *Venture Capital*, *supra* note 49, at 1689.

<sup>56</sup> *Id.*; *see also* MAZZUCATO, *supra* note 19, at 75-81.

<sup>57</sup> Kenney, *Venture Capital*, *supra* note 49, at 1689-90.

<sup>58</sup> Stuart W. Leslie, *How the West Was Won: The Military and the Making of Silicon Valley*, in *TECHNOLOGICAL COMPETITIVENESS: CONTEMPORARY*

In addition to public research funding, the federal government also adopted laws and regulations to promote entrepreneurial finance. In 1953, Congress created the Small Business Administration, and five years later, it established Small Business Investment Corporations (SBICs).<sup>59</sup> This program provided federal guarantees for loans by private investors to small enterprises,<sup>60</sup> and it spurred the formation of hundreds of SBICs that invested hundreds of millions of dollars.<sup>61</sup> Over time, due to poor performance, abuse, and increasing bureaucracy, the SBIC program lost influence as a financing vehicle for startups.<sup>62</sup> Nevertheless, it reflected the federal government's commitment to supporting financing for small businesses.

In the late 1950s and 1960s, a new financing model emerged that would have lasting impact: the VC limited partnership.<sup>63</sup> Although this model embodied a greater degree of private ordering than government-backed SBICs, it was also significantly shaped by prevailing laws and regulations. For example, federal tax law helped structure this new model of entrepreneurial finance. Because VC funds are partnerships, capital gains flow directly to investors without being taxed.

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AND HISTORICAL PERSPECTIVES ON THE ELECTRICAL, ELECTRONICS, AND COMPUTER INDUSTRIES 75, 75 (William Aspray ed., 1993).

<sup>59</sup> Small Business Investment Act of 1958, Pub. L. No. 85-699, §§ 501-02, 72 Stat. 689, 689-90, 696-97, (2010) (codified at 15 U.S.C. § 631) (establishing conditions for federal loans for state development companies); Amendment of Small Business Investment Act, Pub. L. No. 86-502, § 304, 74 Stat. 196 (1960) (establishing conditions by which SBICs can provide equity capital to small businesses); Small Business Investment Act Amendments of 1963, Pub. L. No. 88-273, § 303(b), 78 Stat. 146 (1964).

<sup>60</sup> Kenney, *Venture Capital*, *supra* note 49, at 1692; Klinger-Vidra, *supra* note 18; Ian Hathaway, *The New Business Preservation Act and the Tradition of U.S. Federal Government Support for Entrepreneurship and Venture Capital*, CTR. FOR AM. ENTREPRENEURSHIP (Mar. 31, 2020), <https://startupsusa.org/the-new-business-preservation-act-and-the-tradition-of-u-s-federal-government-support-for-entrepreneurship-and-venture-capital> [<https://perma.cc/CRB5-3CKA>].

<sup>61</sup> Kenney, *Venture Capital*, *supra* note 49, at 1694.

<sup>62</sup> *Id.* at 1695-97.

<sup>63</sup> *Id.* at 1697-1703.

Furthermore, if investors are tax-exempt, such as non-profit pension funds or foundations, they do not pay any taxes at all.<sup>64</sup> The VC limited partnership thus represented an attractive vehicle for a broad class of institutional investors.

Federal tax law benefitted the VC industry in other ways as well. Seeking to push for more favorable legislation, VC industry representatives launched the National Venture Capital Association (NVCA) in 1973. An important legislative priority for the NVCA has been lowering tax rates. While nonprofit LPs are tax-exempt, individual VCs themselves and VC-backed companies are sensitive to tax rates. The NVCA successfully lobbied for cuts to the capital gains tax rate in 1978; this and another tax cut in 1981 helped bolster the VC industry.<sup>65</sup> Among other effects, these cuts enhanced the attractiveness of equity and stock-option compensation, which are common for VC-backed startups.<sup>66</sup> In 1981, the Incentive Stock Option Law shifted the time at which capital gains are taxed in a way that further benefitted stock-option compensation.<sup>67</sup>

The federal government also significantly subsidized the VC industry through reforming pension regulations. In 1979, the Department of Labor clarified the “prudent man” rule under the Employee Retirement Income Security Act (ERISA) to allow private pension fund managers to invest in risky asset classes such as venture capital.<sup>68</sup> This regulatory change (for which the NVCA lobbied) led to a massive increase in capital

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<sup>64</sup> *Id.* at 1703.

<sup>65</sup> William Lazonick, *The New Economy Business Model and the Crisis of U.S. Capitalism*, 4 CAPITALISM & SOC'Y 1, 9 (2009); Revenue Act of 1978, Pub. L. No. 95-600, § 403(a), 92 Stat. 2763, 2868 (1978); Economic Recovery Tax Act of 1981, Pub. L. No. 97-34, § 102, 95 Stat. 172, 186 (1981).

<sup>66</sup> Kenney, *Venture Capital*, *supra* note 49, at 1707-08.

<sup>67</sup> Incentive Stock Options, 26 U.S.C. § 422 (1981); Lerner & Tag, *supra* note 45, at 171.

<sup>68</sup> Rules and Regulations for Fiduciary Responsibility: Investment Duties, 29 C.F.R. § 2550.404a-1 (1979); Employee Retirement Income Security Act of 1974, Pub. L. No. 93-406, 88 Stat. 829, 877 (1974); GOMPERS & LERNER, *supra* note 50, at 7; Klinger-Vidra, *supra* note 18; Lazonick, *supra* note 65, at 9. A decade later, public pension funds also started investing in venture capital. Lerner & Nanda, *supra* note 21, at 239.

for VC markets. In 1978, the year before the “prudent man” change, pension funds accounted for \$481 million and 15% of VC investments. By 1986, they accounted for \$4.8 billion and more than half of all VC investments.<sup>69</sup>

Federal laws, regulations, and funding continue to support the VC industry in myriad ways.<sup>70</sup> Congress has enacted less stringent business regulations to promote VC activity.<sup>71</sup> Rules governing pension fund management continue to allow billions of dollars to flow into VC markets every year. As noted, reducing capital gains tax rates encourages VC activity.<sup>72</sup> Furthermore, federal tax law subsidizes risky investments in startups by granting tax-loss carryforwards over several years.<sup>73</sup> The adoption and expansion of the Qualified Small Business Stock exemption to the capital gains tax provides a significant tax subsidy for VC investments.<sup>74</sup> In 2011, former President Obama created the “Startup America” program, which provided \$2 billion in federal VC matching funds.<sup>75</sup> In 2012,

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<sup>69</sup> GOMPERS & LERNER, *supra* note 50, at 7.

<sup>70</sup> Lehoux et al., *supra* note 6, at 375; James A. Brander et al., *The Effects of Government-Sponsored Venture Capital: International Evidence*, 19 REV. FIN. 571, 577-79 (2015).

<sup>71</sup> Klinger-Vidra, *supra* note 18; *see* Small Business Investment Incentive Act of 1980, Pub. L. No. 96-477, § 101, 94 Stat. 2275, 2276 (1980); *see* Reginald L. Thomas & Paul F. Roye, *Regulation of Business Development Companies Under the Investment Company Act*, 55 S. CAL. L. REV. 895, 912 (1982) (describing the Small Business Investment Incentive Act); James D. Miller, *Small Business Investment Companies: Licensing Tax and Securities Considerations*, 36 BUS. LAW. 1679, 1679 (1981).

<sup>72</sup> *See* Lerner & Tag, *supra* note 45, at 158-60.

<sup>73</sup> Gantenbein et al., *supra* note 24, at 745; *see* Tax Cuts and Jobs Act, Pub. L. No. 115-97, § 11,011, 131 Stat. 2054 (2017).

<sup>74</sup> Manoj Viswanathan, *The Qualified Small Business Stock Exclusion: How Startup Shareholders Get \$10 Million (Or More) Tax-Free*, 120 COLUM. L. REV. F. 29, 30-32 (2020); Lemley & McCreary, *supra* note 41, at 50-52.

<sup>75</sup> Abby Phillip, *Obama Boosts Entrepreneurs*, POLITICO (Feb. 1, 2011), <https://www.politico.com/story/2011/02/obama-boosts-entrepreneurs-048557> [<https://perma.cc/F4YW-WJES>]; *Fact Sheet: White House Launches “Startup America” Initiative*, OBAMA WHITE HOUSE, <https://obamawhitehouse.archives.gov/startup-america-fact-sheet> [<https://perma.cc/9TAR-4ZNJ>] (last visited Oct. 1, 2022); Russell Nichols, *State Governments: The Latest Venture Capitalists*, GOVERNING MAG.

Congress enacted the Jumpstart Our Business Startups (JOBS) Act.<sup>76</sup> While the JOBS Act is best known for promoting crowd-funding, it also eased startups' pathway to IPOs, which are the most lucrative form of VC exit.<sup>77</sup> Not surprisingly, the VC industry lobbied vigorously for the act.<sup>78</sup> Recently, a group of U.S. Senators led by Amy Klobuchar introduced the New Business Preservation Act, which would allocate \$2 billion to aid startup investments in undercapitalized regions.<sup>79</sup>

Beyond direct support, the government indirectly supports the VC industry by subsidizing the R&D that undergirds many VC-backed companies.<sup>80</sup> As of 2013, the federal government provided \$130-40 billion per year in R&D funding.<sup>81</sup> Furthermore, the government offers R&D tax incentives collectively worth several billion dollars.<sup>82</sup> Technology transfer laws such as

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(Mar. 2011), <http://www.governing.com/State-Governments-Latest-Venture-Capitalists.html> [<https://perma.cc/7DDY-PFCG>].

<sup>76</sup> Jumpstart Our Business Startups Act, Pub. L. No. 112-106, § 302(c), 126 Stat. 306, 320 (2012) (codified at 15 U.S.C. § 77b(a)).

<sup>77</sup> Press Release, Nat'l Venture Capital Assoc., NVCA Marks Fifth Anniversary of JOBS Act with Calls for Additional Reforms, <https://nvca.org/pressreleases/nvca-marks-fifth-anniversary-jobs-act-call-additional-reforms/> [<https://perma.cc/Z5UG-NTKC>] [hereinafter NVCA, JOBS Act Press Release]; Martin Kenney & John Zysman, *Unicorns, Cheshire Cats, and the New Dilemmas of Entrepreneurial Finance*, 21 VENTURE CAPITAL 35, 37 (2019).

<sup>78</sup> NVCA, JOBS Act Press Release, *supra* note 77.

<sup>79</sup> New Business Preservation Act, H.R. 6403, 116th Cong. (2020); see Amy Klobuchar, *Klobuchar, Coons, Kaine, King Introduce Legislation to Protect and Strengthen Young Businesses Across the Country*, KLOBUCHAR.SENATE.GOV (Mar. 19, 2020), <https://www.klobuchar.senate.gov/public/index.cfm/2020/3/klobuchar-coons-kaine-king-introduce-legislation-to-protect-and-strengthen-young-businesses-across-the-country> [<https://perma.cc/X5XN-XTUR>].

<sup>80</sup> See, e.g., Bhaven Sampat & Michael Drummond, *Another Special Relationship? Interactions between Health Technology Policies and Health Care Systems in the United States and the United Kingdom*, 36 J. HEALTH POL., POL'Y & L. 119, 120 (2011).

<sup>81</sup> Daniel J. Hemel & Lisa Larrimore Ouellette, *Beyond the Patents-Prizes Debate*, 92 TEX. L. REV. 303, 320-21 (2013).

<sup>82</sup> *Id.* at 321-26.

the Bayh-Dole Act,<sup>83</sup> which allows recipients of federal funds to take title to taxpayer-funded patents, also promote entrepreneurial activity.<sup>84</sup> More generally, strong protection and enforcement of intellectual property rights has been shown, in some contexts, to promote entrepreneurship.<sup>85</sup> The federal Small Business Innovation Research (SBIR) program provides public funds to help technology startups bridge the gap to VC financing.<sup>86</sup> President Biden has signaled a willingness to increase high-skilled immigration, which helps startups and has been a significant legislative priority for the VC industry.<sup>87</sup> The NVCA continues to lobby on several fronts for legislation that advances its interests, including “foreign investment legislation, capital markets reform, high-skilled immigration, and new regulatory proposals.”<sup>88</sup>

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<sup>83</sup> Bayh-Dole Act, Pub. L. No. 96-517, 94 Stat. 3015, 3019 (1980) (codified as amended at 35 U.S.C. §§ 200-212 (2012)).

<sup>84</sup> Lerner & Tag, *supra* note 45, at 161-62, 173.

<sup>85</sup> Gantenbein et al., *supra* note 24, at 758. *But see* Ronald J. Mann, *Do Patents Facilitate Financing in the Software Industry?*, 83 TEX. L. REV. 961, 997 (2005) (“Much remains unclear about the ability of patents to induce commercialization in the software industry. For example, although the ability of small firms to use patents to protect themselves is important, it is difficult to tell from the available data how widespread that benefit is.”).

<sup>86</sup> Hall & Lerner, *supra* note 45, at 633; MAZZUCATO, *supra* note 19, at 81-82; *see generally* *About SBIR*, SBIR/STTR, <http://www.sbir.gov/about/about-sbir> [<https://perma.cc/9D2A-M58E>] (last visited Oct 1, 2022).

<sup>87</sup> Alex Gangitano, *Silicon Valley Eager for Biden to Reverse Trump Visa Rules*, THE HILL (Nov. 15, 2020), <https://thehill.com/business-a-lobbying/525898-silicon-valley-eager-for-biden-to-reverse-trump-visa-rules> [<https://perma.cc/ZAF7-XBYK>].

<sup>88</sup> NVCA, 2020 YEARBOOK, *supra* note 41, at 4 (“Critical to the growth and health of VC is public policy that encourages new company formation and makes the US the most attractive place to start and grow a business.”); *id.* at 38-40 (documenting numerous lobbying efforts by the venture capital industry over the past decade); *see also* STUART ANDERSON, AMERICAN MADE 2.0: HOW IMMIGRANT ENTREPRENEURS CONTINUE TO CONTRIBUTE TO THE U.S. ECONOMY 21-27 (2019) (reporting study commissioned by the NVCA containing several recommendations for immigration reform).

C. *The Increasing Importance of Venture Capital to National Innovation Policy*

While the federal government supports VC markets for several reasons, prominent among them is the objective of advancing innovation. Economists observe that “the VC industry is an integral part of the growth engine of the US economy and has played a causal role in the rise of the Apples, Googles, and hundreds of other innovative companies in the US . . . over the past several decades.”<sup>89</sup> VC-backed companies such as Apple, Google, Intel, and Microsoft are among the most innovative in the world and account for 44% of total R&D spending by U.S. public companies.<sup>90</sup> Empirical evidence suggests that VC funding has a strong positive impact on innovation.<sup>91</sup> Quite simply, “technologies developed by VC-backed firms have changed the world.”<sup>92</sup> VC-backed innovation also provides the important benefits of economic growth and new jobs.<sup>93</sup> As of 2020, VC financing has helped produce 925 public companies, which comprise 26% of all public companies and 41% of total market capitalization.<sup>94</sup> A related empirical examination of

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<sup>89</sup> Gornall & Strebulaev, *supra* note 3, at 5.

<sup>90</sup> *Id.* at 3; see also Anat Alon-Beck, *The Coalition Model, a Private-Public Strategic Innovation Policy Model for Encouraging Entrepreneurship and Economic Growth in the Era of New Economic Challenges*, 17 WASH. U. GLOB. STUD. L. REV. 267, 297 (2018) (discussing the importance of the VC industry to innovation).

<sup>91</sup> Hall & Lerner, *supra* note 45, at 632.

<sup>92</sup> Gornall & Strebulaev, *supra* note 3, at 6; see also Lerner & Tag, *supra* note 45, at 156.

<sup>93</sup> Lerner & Tag, *supra* note 45, at 156. Although VCs invest in a tiny fraction of all businesses, they have enormous impact. Kenney, *Venture Capital*, *supra* note 49, at 1680; Steven N. Kaplan & Josh Lerner, *If It Ain't Broke: The Past, Present, and Future of Venture Capital*, 22 J. APPLIED CORP. FIN. 36, 37 (2010). Only about 1,000 of the 600,000 (0.167%) new businesses started every year in the U.S. receive their initial round of funding from a VC firm. *Id.* at 37. However, VC-backed companies accounted for over 60% of IPOs from 1999 to 2009. *Id.*

<sup>94</sup> Gornall & Strebulaev, *supra* note 3, at 16. By only focusing on VC-backed companies that have gone public, this analysis underestimates the impact of all VC-backed companies, many of which are acquired by industry incumbents or remain private. *Id.*

4,109 initial public offerings of nonfinancial firms from 1995-2018 revealed that 47% received VC funding prior to IPO.<sup>95</sup> As of the end of 2019, 1,044 of these VC-backed firms were still publicly traded.<sup>96</sup> High-growth businesses—some of which are targets of VC funding—account for almost 50% of gross job creation.<sup>97</sup>

Over the past several decades, VC has helped catalyze several waves of technological innovation. These include: the semiconductor revolution and rise of mainframe computing in the 1960s; the widespread emergence of personal computing and biotechnology in the 1980s; the rise of the Internet and e-commerce in the 1990s; the emergence of “smart” mobile communications technologies and cloud computing in the 2000s; and the proliferation of innovations related to the “sharing economy,” software-as-a-service, fintech, and mobile apps in the 2010s.<sup>98</sup>

VC plays a central role in the modern innovation economy.<sup>99</sup> VC has had an enormous impact in financing IT and Internet-based companies: seven of the largest eight firms by market capitalization are VC-backed IT companies (Alphabet, Apple, Amazon, Facebook, Microsoft, Alibaba, and Tencent).<sup>100</sup> Although the share of total VC investments devoted to biotech has decreased in recent years, in absolute terms VC investments represent a major source of funding, and they have recently increased.<sup>101</sup> As one commentator remarked, “Many

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<sup>95</sup> Lerner & Nanda, *supra* note 21, at 239-40.

<sup>96</sup> *Id.* at 240.

<sup>97</sup> Ryan Decker et al., *The Role of Entrepreneurship in US Job Creation and Economic Dynamism*, 28 J. ECON. PERSPS. 3, 3-4 (2014).

<sup>98</sup> Lerner & Nanda, *supra* note 21, at 241-42.

<sup>99</sup> *Id.* at 240 (describing studies showing that “venture capital increases firm sales and lowers the likelihood of firm failure”).

<sup>100</sup> *Id.* at 237.

<sup>101</sup> See Bruce Booth, *Booming VC-Backed Biopharma: Strong Market Despite Pandemic*, FORBES (Apr. 8, 2020) (reporting that the first quarter of 2020 was the largest quarter ever for biopharma VC financing in the U.S. but that biotech’s share of total VC financing had fluctuated over several years); *American Biotechnology is Booming*, ECONOMIST (Aug. 11, 2021),



biotechs wouldn't exist without venture money and support, making these investors a powerful force over the drugs that could become available in the future."<sup>102</sup> Recent examples of notable VC-backed biotech firms include Moderna, the developer of a key mRNA-based COVID-19 vaccine,<sup>103</sup> and Allogene Therapeutics, which received \$412 million of VC funding in 2018.<sup>104</sup> Between 2006 and 2011, VCs invested \$25 billion in cleantech.<sup>105</sup> Even after sustaining significant losses, they continued to provide about \$2 billion per year in funding until a recent uptick.<sup>106</sup> Examples of successful cleantech companies arising from VC financing include Tesla and Nest.<sup>107</sup>

Notably, the importance of VC to funding innovation only promises to grow. As Robyn Klinger-Vidra observes, "venture capital funding is increasingly seen as a substitute for other forms of R&D spending that are in decline, especially research directly funded by governments."<sup>108</sup> A 2019 analysis found that federal R&D spending as a percentage of GDP had fallen to

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<https://www.economist.com/business/american-biotechnology-is-booming/21803495> [<https://perma.cc/C23R-BVH7>].

<sup>102</sup> Jacob Bell, *Venture Capital Found Its Footing in Biotech. Then Came the Virus*, BIOPHARMADIVE (May 26, 2020), <https://www.biopharmadive.com/news/venture-capital-biotech-coronavirus/577644> [<https://perma.cc/9Q2F-PRK4>].

<sup>103</sup> Jeff Farah, *Creating the Next Moderna: What VC Offers the World and 3 Public Policy Lessons*, NVCA (Nov. 29, 2020), <https://nvca.org/creating-the-next-moderna-what-vc-offers-the-world-and-3-public-policy-lessons> [<https://perma.cc/GYJ7-3VK8>].

<sup>104</sup> *Id.*

<sup>105</sup> BENJAMIN GADDY ET AL., VENTURE CAPITAL AND CLEANTECH: THE WRONG MODEL FOR CLEAN ENERGY INNOVATION 2 (2016); Wal van Lierop, *Silicon Valley Is Back In Cleantech. Will This Time Be Different?*, FORBES (July 5, 2021), <https://www.forbes.com/sites/walvanlierop/2021/07/05/silicon-valley-is-back-in-cleantech-will-this-time-be-different> [<https://perma.cc/9J27-3PJP>].

<sup>106</sup> Gaddy et al., *supra* note 105, at 2; van Lierop, *supra* note 105.

<sup>107</sup> Gaddy et al., *supra* note 105, at 4-5.

<sup>108</sup> Klinger-Vidra, *supra* note 18.

the level it was in 1957.<sup>109</sup> Support for VC markets as a substitute for federal funding is consistent with prevailing neoliberal skepticism of government “picking winners” and a belief in markets as efficient mechanisms for allocating social resources.<sup>110</sup> VC markets are also displacing in-house R&D by large corporations. Increasingly, large corporations are reducing internal R&D and essentially outsourcing innovation by contracting with or acquiring small, research-intensive firms, many of which are VC-backed.<sup>111</sup> The importance of VC to national innovative output will increase as it displaces funding by government and large corporations.

Further reflecting the centrality of VC to innovation policy, governments are increasingly looking to VC-funded innovation to address pressing social priorities. As Andrew Hargadon and Martin Kenney observe, “[o]f particular interest to policy makers is how venture capital can be harnessed and directed toward public goals of solving persistent social ills—such as revolutionizing particular industries, bolstering national competitiveness, driving local economic development, and creating jobs.”<sup>112</sup> Particularly in an era where growth in federal research funding is not guaranteed, policymakers will increasingly look to VC markets to finance innovations that address important social challenges—from new diseases to climate change.

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<sup>109</sup> ROBERT D. ATKINSON & CALEB FOOTE, U.S. FUNDING FOR UNIVERSITY RESEARCH CONTINUES TO SLIDE 1 (2019), <https://www2.itif.org/2019-university-rd.pdf> [<https://perma.cc/S9VE-QCC5>].

<sup>110</sup> Cf. F.A. Hayek, *The Use of Knowledge in Society*, 35 AM. ECON. REV. 519, 526 (1945) (arguing that one of the great benefits of markets is their ability to collect and distill information from a wide range of unconnected individuals).

<sup>111</sup> See Kaplan & Lerner, *supra* note 93, at 46 (describing open innovation); Peter Lee, *Innovation and the Firm: A New Synthesis*, 70 STAN. L. REV. 1431, 1457-60 (2018) (describing practices by which large pharmaceutical companies externally source innovation by partnering with or acquiring biotech firms).

<sup>112</sup> Hargadon & Kenney, *supra* note 6, at 122.

In sum, VC plays a central role in this country's national innovation system.<sup>113</sup> While VC markets embody private ordering, they are in a meaningful sense products of deliberate public policy.<sup>114</sup> For decades, federal laws, regulations, and policy have supported what is now the modern VC system of entrepreneurial finance. The government does so for several reasons, but prominent among them is the objective of promoting innovation. Additionally, the importance of VC to financing innovation only promises to grow. Given that VC represents an important component of innovation law and policy, it is incumbent to better understand VCs' particular approaches to funding innovation.

The next three Parts draw upon theoretical and empirical sources to elucidate the incentives and constraints of VCs as financiers of innovation. In so doing, they report the findings of original interviews with thirty-two early-stage investors, entrepreneurs, technology lawyers, and other innovation professionals based in Northern California.<sup>115</sup> These qualitative accounts provide policymakers with a more textured understanding of how VC markets operate and their limitations in funding a wide range of important innovations. This understanding, moreover, can inform legal and regulatory reforms to improve the ability of VC markets to finance innovation and supplement those markets in areas where they cannot.<sup>116</sup>

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<sup>113</sup> See Kenney, *Venture Capital*, *supra* note 49, at 1677-78 (“[VC] has become an important financial intermediary for, and component of, the US national system of innovation (NSI).”).

<sup>114</sup> Of course, numerous other factors, such as technological advances, the coevolution of numerous institutions, and sheer entrepreneurial drive, contributed to the emergence of VC. See Kenney, *Venture Capital*, *supra* note 49, at 1678.

<sup>115</sup> See *infra*

Methodological Appendix.

<sup>116</sup> See *infra* Part V.

## II. Social Capital Leading to Venture Capital

“I think it’s more about connections and who you know than about the actual idea.”<sup>117</sup>

### A. *The Importance of Social Connections in Accessing Venture Capital*

Arguably the most important factor determining the innovative capacity of venture capital markets is the ability of VCs to find promising ventures in which to invest. Talented entrepreneurs come from all backgrounds, and prior scholarship suggests that VCs cast a wide net. VCs formally operate in “open networks” and consider ideas from varied sources.<sup>118</sup> They hold meet-and-greet events and open pitch days and “are all open to receiving business proposals from unknown entrepreneurs.”<sup>119</sup> This Part argues, however, that pre-existing social ties play a crucial role in connecting entrepreneurs with venture capital. The importance of social connections in meeting VCs narrows the pool of entrepreneurs with a realistic chance of obtaining funding. In so doing, reliance on social connections can hamper the ability of VCs to identify and finance the most promising innovations.

Empirical evidence suggests that VCs spend considerable effort screening potential deals.<sup>120</sup> One study found that the average VC firm screens 200 companies and makes only four investments per year.<sup>121</sup> The receptivity of VCs to entrepreneurs from varied backgrounds is further corroborated by the fact

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<sup>117</sup> Respondent 6 (startup founder).

<sup>118</sup> Brian Broughman, *Relational Contracting and Business Norms in Entrepreneurial Finance* 8, (Indiana Legal Studs., Rsch. Paper No. 402, 2018) [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3196033](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3196033) [<https://perma.cc/7QXC-8H9Q>] [hereinafter Broughman, *Relational Contracting*].

<sup>119</sup> *Id.* at 8.

<sup>120</sup> See Kaplan & Lerner, *supra* note 93, at 36-37 (“VCs systematically evaluate the attractiveness and risks of the opportunity, considering factors that include market size, strategy, technology, customer adoption, competition, and the quality and experience of the management team.”).

<sup>121</sup> Gompers et al., *supra* note 36, at 170.

that about 25% of founders of VC-funded U.S. startups from 1990 to 2005 were immigrants,<sup>122</sup> which suggests minimal anti-foreign bias. Indeed, the Economist observed that “Silicon Valley likes to think of itself as the very embodiment of meritocracy.”<sup>123</sup>

However, social connections play a critical role in enabling entrepreneurs to access venture capital, which belies this meritocratic perception.<sup>124</sup> A comprehensive survey of VCs found that most deal flow comes from VCs’ networks and that few investments arise from entrepreneurs lacking prior connections.<sup>125</sup> According to Jing Zhang et al.: “Social networks work

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<sup>122</sup> Jing Zhang et al., *Ethnic Enclave and Entrepreneurial Financing: Asian Venture Capitalists in Silicon Valley*, 10 STRATEGIC ENTREPRENEURSHIP J. 318, 318 (2016).

<sup>123</sup> *Valley of the Dudes*, ECONOMIST (Apr. 4, 2015), <https://www.economist.com/business/2015/04/04/valley-of-the-dudes> [<https://perma.cc/Y2RW-4N5M>]; cf. NVCA, 2020 YEARBOOK, *supra* note 41, at 9 (“Team, business model, product, market, valuation, fit, ability to add value, and industry are all important factors venture investors consider when evaluating investments into startups.”).

<sup>124</sup> JMG CONSULTING & WYCOFF CONSULTING, VENTURE CAPITAL, SOCIAL CAPITAL AND THE FUNDING OF WOMEN-LED BUSINESSES 4 (2013); David H. Hsu, *Experienced Entrepreneurial Founders, Organizational Capital, and Venture Capital Funding*, 36 RSCH. POL’Y 722, 723-24 (2007); Yael V. Hochberg et al., *Whom You Know Matters: Venture Capital Networks and Investment Performance*, 62 J. FIN. 251, 251-52 (2007); Scott Shane & Daniel Cable, *Network Ties, Reputation, and the Financing of New Ventures*, 48 MGMT. SCI. 364, 366-70 (2002); Ralston, *supra* note 23 (“Besides a demo[nstration] day, by far the best way to meet a venture capitalist or an angel is via a warm introduction.”) (quoting a representative of Y Combinator, a leading Silicon Valley accelerator); *The bright new age of venture capital*, ECONOMIST (Nov. 25, 2021), <https://www.economist.com/finance-and-economics/2021/11/23/the-bright-new-age-of-venture-capital/21806438> [<https://perma.cc/5L54-YKUS>] [hereinafter *New Age*] (“The industry’s reliance on personal connections made it rather like an old boys’ club.”).

<sup>125</sup> Gompers et al., *supra* note 36, at 175 (reporting that 30% of VC deals arise from VCs’ professional networks, with another 20% referred by other investors, and 8% referred by portfolio companies). Broughman acknowledges this to a certain extent, noting that “[w]hile a blind submission from an unknown entrepreneur may be less likely to receive funding, there is at least a formal avenue encouraging outsiders to enter the VC’s network.” Broughman, *Relational Contracting*, *supra* note 118, at 8-9.

as information conduits between VCs and entrepreneurs; they provide information about the quality of ventures and the entrepreneurs and, thus, reduce the problem of information asymmetry.”<sup>126</sup> Entrepreneurs’ social connections are correlated not only with a greater likelihood of obtaining funding, but also with higher valuations for their startups.<sup>127</sup> Due to greater uncertainty, VC firms are particularly likely to rely on social connections and other proxies for quality when evaluating investments in newly created industries.<sup>128</sup>

The importance of social ties in connecting entrepreneurs to VCs reflects the centrality of networks in the day-to-day work VCs. At root, VCs are intermediaries linking investors and entrepreneurs, and much of their work involves making connections.<sup>129</sup> Furthermore, they tend to invest locally, where their connections are strongest.<sup>130</sup> VCs are well connected to other VCs, who often share investment opportunities.<sup>131</sup> The common practice of syndication, or joint investment by several VCs, both reflects and reinforces connections between investors.<sup>132</sup> Empirical research demonstrates that the more connections a VC has to other investors, the more funding his or her portfolio companies tend to receive in a given round of financing.<sup>133</sup>

Intermediaries can play an important role in establishing connections between entrepreneurs and VCs. For example, pioneering work by sociologists Marc Suchman and Mia Cahill

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<sup>126</sup> Zhang et al., *supra* note 122, at 321.

<sup>127</sup> Hsu, *supra* note 124, at 724.

<sup>128</sup> *Id.* at 729.

<sup>129</sup> On average, VCs devote seven hours per week to networking. Gompers et al., *supra* note 36, at 188.

<sup>130</sup> Darian Ibrahim, *Public or Private Venture Capital?*, 94 WASH. L. REV. 1137, 1165 (2019) [hereinafter Ibrahim, *Public or Private*]. In similar fashion, “[a]ngels economize on screening through investments that are highly local and relationship-driven.” Ibrahim, *Angels*, *supra* note 27, at 1408.

<sup>131</sup> Ibrahim, *Angels*, *supra* note 27, at 1408.

<sup>132</sup> Oliver T. Alexy et al., *Social Capital of Venture Capitalists and Start-up Funding*, 39 SMALL BUS. ECON. 835, 847-49 (2012).

<sup>133</sup> *Id.* at 846.

revealed the value of Silicon Valley lawyers in connecting entrepreneurs to venture capital.<sup>134</sup> In similar fashion, legal scholar Brian Broughman argues that third-party intermediaries, such as lawyers or other entrepreneurs, act as “matchmakers” that connect founders and VCs.<sup>135</sup>

As recent media and scholarly commentary has revealed, the subjective, relational nature of VC funding can also facilitate discrimination.<sup>136</sup> Ellen Pao’s high-profile discrimination lawsuit against her former employer, leading VC firm Kleiner Perkins Caulfield & Byers, has drawn attention to gender bias in venture capital firms.<sup>137</sup> Beyond gender discrimination within VC firms, scholars have observed pervasive discrimination by VCs against female entrepreneurs seeking funding.<sup>138</sup> Furthermore, notwithstanding the perceived willingness of VC firms to fund immigrant entrepreneurs, empirical research reveals that Asian entrepreneurs often face heightened challenges when trying to obtain venture financing.<sup>139</sup> In general, minority-led startups are much less likely to obtain financing

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<sup>134</sup> Mark C. Suchman & Mia L. Cahill, *The Hired Gun as Facilitator: Lawyers and the Suppression of Business Disputes in the Silicon Valley*, 21 LAW & SOC. INQUIRY 679, 682-83 (1996).

<sup>135</sup> Broughman, *Relational Contracting*, *supra* note 118, at 13.

<sup>136</sup> Ibrahim, *Public or Private*, *supra* note 130, at 1165; *cf.* Schwartz, *supra* note 4, at 621 (“This lack of access to financing disproportionately affects certain types of entrepreneurs, namely those that are ‘out of the loop’ for one reason or another and do not have connections with angel investors or other wealthy financiers.”). Illustrating the intersection of social ties and gender bias, a trusted social tie to a VC is more important for evaluating female founders compared to male founders. Justine E. Tinkler et al., *Gender and Venture Capital Decision-Making: The Effects of Technical Background and Social Capital on Entrepreneurial Evaluations*, 51 SOC. SCI. RSCH. 1, 11 (2015).

<sup>137</sup> Jennifer S. Fan, *Innovating Inclusion: The Impact of Women on Private Company Boards*, 46 FLA. ST. U. L. REV. 345, 346 (2019); *Valley of the Dudes*, *supra* note 123.

<sup>138</sup> *See, e.g.*, Benjamin P. Edwards & Ann C. McGinley, *Venture Bearding*, 52 U.C. DAVIS L. REV. 1873, 1881-900 (2019); *see generally* EMILY CHANG, BROTOPIA: BREAKING UP THE BOYS’ CLUB OF SILICON VALLEY (2018).

<sup>139</sup> AnnaLee Saxenian, *Silicon Valley’s New Immigrant High-Growth Entrepreneurs*, 16 ECON. DEV. Q. 20, 23-24 (2002).

from angel investors and VCs.<sup>140</sup> Additionally, minority-led VC firms suffer from lower perceived status. One study found such firms must pay premiums (in the form of inflated valuations) to invest in non-minority-led startups.<sup>141</sup> Exacerbating explicit and implicit bias<sup>142</sup> is a “clubby” culture throughout Silicon Valley that encompasses the “frat-boy club of money and the geek club of computer programmers.”<sup>143</sup>

### 1. Empirical Findings

This Article’s interviewees confirm the importance of social connections in obtaining venture capital. While this study of thirty-two innovators in Northern California can only support limited claims of generality, respondents add important qualitative nuance regarding the innerworkings of VC markets.<sup>144</sup> 69% of interview respondents stated that the most effective way for founders to meet a VC was through a connection, such as a “warm introduction” from a trusted intermediary.<sup>145</sup> They describe the process of soliciting venture capital as highly personal and relational. According to one university technology transfer official, “[Y]ou can’t do the shotgun approach because there’s no love and there’s no relationship. And everything in life is about relationship ... Finances don’t kill deals; emotions kill deals. So it’s all about that relationship.”<sup>146</sup> A lawyer at a technology company observed, “I think

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<sup>140</sup> Carlos Berdejo, *Financing Minority Entrepreneurship*, 2021 WIS. L. REV. 41, 74.

<sup>141</sup> Zhang et al., *supra* note 122, at 319.

<sup>142</sup> Anthony G. Greenwald & Linda Hamilton Krieger, *Symposium on Behavioral Realism: Implicit Bias: Scientific Foundations*, 94 CALIF. L. REV. 945, 946 (2006).

<sup>143</sup> *Valley of the Dudes*, *supra* note 123.

<sup>144</sup> *See infra*

Methodological Appendix.

<sup>145</sup> *See, e.g.*, Respondent 6 (startup founder); Respondent 7 (startup founder); Respondent 12 (startup founder) (“I found that my network has been the most valuable resource for me as I’ve gone through this building process.”).

<sup>146</sup> Respondent 1 (university technology transfer official).



it's much more about being connected to the system or knowing somebody who's connected to the system than it is about a good idea in and of itself."<sup>147</sup> Respondents also described a “snowballing” effect in which initial introductions to investors led to more introductions and contacts.<sup>148</sup>

Additionally, study participants revealed new insights about the importance of connections not widely recognized in the literature. For instance, the theme of connections extends to the internal dynamics of VC firms; if an entrepreneur builds a relationship with one VC partner, that investor may be very valuable in convincing his or her partners to invest in a startup.<sup>149</sup> Conversely, attempts to secure VC funding without a shared context—such as cold calls and open pitch days—are not only largely ineffective, they may be actually harmful. Respondents noted that cold calls are rather off-putting.<sup>150</sup> Furthermore, open pitch days at VC offices rarely lead to financing; some even have a “predatory aspect” by charging participants fees without offering a realistic chance of obtaining funding.<sup>151</sup>

Respondents emphasized that entrepreneurs not only use connections to access VCs, but that investors also rely on connections to find entrepreneurs. For investors, the quality of startup referrals from another VC tends to be considerably higher than unsolicited submissions.<sup>152</sup> One VC described such referrals as “curated” deals,<sup>153</sup> and they proceed quite

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<sup>147</sup> Respondent 29 (technology company attorney).

<sup>148</sup> See, e.g., Respondent 6 (startup founder); see also Respondent 9 (startup founder) (noting that an introduction to a “super connector” led to more introductions to various investors).

<sup>149</sup> Respondent 22 (venture capitalist) (“Find the right VC firm, find what you like and make sure that you connect with a partner and make them part of your team because once you connect with a partner and make him part, they’ll sell you to their partner because it’s a process of selling.”).

<sup>150</sup> Respondent 14 (industry trade group official).

<sup>151</sup> Respondent 13 (startup founder) (“I think those pitch days, unless they’re connected to a powerful network, are almost worthless.”).

<sup>152</sup> Respondent 19 (angel investor).

<sup>153</sup> Respondent 22 (venture capitalist); *id.* (“You have to have multiple of these concentric circles where you trust that main network and then you can

informally.<sup>154</sup> A startup accelerator official observed, “It comes back more to network. And network is a vetting heuristic, right? If I’ve relied on this person and he or she has fed me a good entrepreneur before, I’m more likely to rely on them again.”<sup>155</sup> The close-knit nature of the VC community also prevents bidding wars for particular startups. According to a technology transfer official and former entrepreneur, “These guys play poker together, they’re talking, they’re communicating. You can’t leverage one VC against the next.”<sup>156</sup>

Study participants confirmed the importance of intermediaries in connecting entrepreneurs and VCs<sup>157</sup> and highlighted the importance of a relatively new intermediary: the startup accelerator. Organizations like Y Combinator, 500 Startups, and Plug and Play Tech Center provide capital, a stamp of approval, and access to networks of investors and other professionals.<sup>158</sup> Such institutions “cast a really wide net” and decrease the need for entrepreneurs to have pre-existing social connections to raise capital.<sup>159</sup> According to one former entrepreneur and current accelerator official, “I do think that the path, if you’re not connected, is to try to up your network instantly by getting into Y Combinator tech starters. You know it’s like getting a brand. You get a Harvard degree, somehow that impresses people. It opens doors.”<sup>160</sup> Interestingly, while

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expand on that, but typically what comes out of the core trusted network are usually very, very good deals, and then you expand out.”).

<sup>154</sup> See Respondent 24 (Silicon Valley law firm attorney) (“[S]omebody says, ‘Hey, I have this friend of a friend, and I think that your VC firm who specializes in biotech or ag tech, or whatever, I think that you should talk to them.’”).

<sup>155</sup> Respondent 17 (startup accelerator official).

<sup>156</sup> Respondent 1 (university technology transfer official).

<sup>157</sup> Respondent 25 (Silicon Valley law firm attorney) (“[W]hen I first started meeting VCs, I realized that they were looking at me as a source of companies as much as I was looking at them as a source of alliance.”).

<sup>158</sup> Respondent 6 (startup founder).

<sup>159</sup> Respondent 9 (startup founder); *see also* Respondent 7 (startup founder) (emphasizing the value of joining an accelerator “to be able to have access to capital, being introduced to different venture capital and basically venture firms [sic]”).

<sup>160</sup> Respondent 18 (startup accelerator official).

study respondents stressed the importance of social connections, a few pointed out that entrepreneurs could overcome a lack of connections through diligence and “hustle.”<sup>161</sup>

Interviewees paint a portrait in which social connections, credentials, and personal attributes play a substantial role in accessing capital. When asked if “cream rises to the top”—meaning that the ventures based on the best technical ideas regardless of social connections ultimately get VC funding—15 of 32 respondents answered no, 2 respondents provided a rather clear yes, and the balance of respondents offered qualified support for the proposition or did not express a view. Many respondents explained the lack of correlation between venture funding and the quality of technical ideas by the importance of social connections. A technology transfer administrator and former VC observed that “there’s just countless examples of that, where poor quality innovation is what actually makes it to market, ’cause of the team, the network, the location, the hype, the everything.”<sup>162</sup> According to another respondent, “The

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<sup>161</sup> Respondent 17 (startup accelerator official) (“So I wouldn’t say you have to have those connections, but if you don’t have those connections then you can’t just rely on your idea. You need to add hustle.”); Respondent 18 (startup accelerator official) (“[I]t’s certainly hard. You would have to be the right kind of person who is persistent and also has the interpersonal skills to network and try to forge connections.”); Respondent 25 (Silicon Valley law firm attorney) (“I don’t think you need the connections . . . the connections obviously help you but if you’re persistent and can get in front of people, you ought to be able to get in front of people, I don’t think that you need to have a connection if you’re a start-up.”); Respondent 12 (startup founder) (“I don’t think it’s necessary to have connections in order for your idea to be spotted, but the network effect allows you to be in front of more eyeballs who are potentially going to give your idea a shot or will, in fact, maybe even nurture you through that process.”).

<sup>162</sup> Respondent 20 (university technology transfer official); *id.* (“[T]he right people can make all the difference in the world. So anyways it’s not necessarily about the innovation. Which is frustrating because I deal with so much innovation out of the university that is really cutting edge and is really exciting but it will get passed over for something that’s ten years old all the time. Because it’s got the right connections. It’s got the right people on it.”).

people that are cream of the crop will rise. . . . Technology that's the cream of the crop? Not necessarily."<sup>163</sup>

Some respondents stated that the subjective, relational nature of raising capital created significant opportunities for discrimination.<sup>164</sup> Invoking the concept of implicit bias, one former entrepreneur, who now directs a startup accelerator, noted:

I think that it's still extremely hard to get access to resources as a woman or as a member of a minority. So much of this world . . . is who you know. Then beyond that people feeling comfortable working with you and unfortunately people like to work with who others that look like them or remind them of themselves or whatever [sic]. There is a lot of discrimination I think. Maybe not conscious, but certainly in practice about who gets funded and who doesn't.<sup>165</sup>

More broadly, the clubby, insular culture of Silicon Valley—in which connections and credentials hold significant sway—substantially increases capital acquisition costs for outsiders.<sup>166</sup>

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<sup>163</sup> Respondent 1 (university technology transfer official).

<sup>164</sup> Respondent 9 (startup founder) (discussing the “power imbalance between investors and founders. Everyone talks about it. Female co-founders are being exploited by VCs because of the power imbalance.”).

<sup>165</sup> Respondent 18 (startup accelerator official).

<sup>166</sup> Respondent 9 (startup founder) (“Silicon Valley paradoxically has become close-minded in a different way. While we're open-minded on things like gender and race and things like that, there is a sort of cliquey effect that has started. And the background of it is clear in my mind at least. If you're from MIT or Stanford, or you've been part of the Google mafia or PayPal mafia, the way in which you get funded is different. We used to pride ourselves on egalitarianism, and we used to pride ourselves on equal opportunity, but it's become very, very clubby.”).

*B. Normative Analysis*

At first glance, the central role of social ties in connecting startups with venture capital is not surprising and may even be beneficial. For the harried VC who receives hundreds of proposals a year, some filtering mechanism is necessary to winnow down proposals to a manageable number for serious consideration.<sup>167</sup> Relying on a warm introduction from a trusted associate, particularly one with a track history of successful referrals, significantly reduces search and vetting costs. When asked to evaluate the importance of connections, one VC responded, “At least for me, it’s working fine right now. Getting the introduction from somebody that I know that I trust, that’s good.”<sup>168</sup> It bears emphasizing that social connections do not solely determine who gets to meet a VC and who gets funding; VCs are connected to many entrepreneurs but only invest in a small fraction of startups.<sup>169</sup>

To some extent, relying on social connections to select entrepreneurs may also be “efficient” given the relational nature of business.<sup>170</sup> VC financing is a “high-touch” form of investing in which venture capitalists and founders work together closely.<sup>171</sup> Empirical research reveals that VCs spend an average of 18 hours per week working with portfolio companies.<sup>172</sup> Given the close working relationships between VCs and founders, receiving a warm introduction from a trusted intermediary can be a good proxy for ensuring that the VC and management team can work well together.<sup>173</sup> Furthermore, it may also signal that the founders will acquit themselves well in interactions

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<sup>167</sup> See Hsu, *supra* note 124, at 726-27.

<sup>168</sup> Respondent 23 (venture capitalist).

<sup>169</sup> My thanks to Martin Kenney for emphasizing this distinction.

<sup>170</sup> Cf. Granovetter, *supra* note 20, at 495 (“[T]here is evidence all around us of the extent to which business relations are mixed up with social ones.”).

<sup>171</sup> Gornall & Strebulaev, *supra* note 3, at 2.

<sup>172</sup> Gompers et al., *supra* note 36, at 188.

<sup>173</sup> Cf. NVCA, 2020 YEARBOOK, *supra* note 41, at 9 (“With a startup, daily interaction with the management team is common.”).

with members of the VC's network, thus bolstering (and at least not damaging) the VC's reputational capital.

More fundamentally, the importance of social connections in accessing venture capital reveals that VC markets significantly select for personal attributes alongside technical and business qualities.<sup>174</sup> A comprehensive empirical study found that VCs place greater emphasis on the management team than a startup's strategy and business model when making investment decisions.<sup>175</sup> Relatedly, interviewees in this study overwhelmingly emphasized that VCs invest in people as much or more than technologies.<sup>176</sup> Although the importance of social connections undercuts the notion of Silicon Valley as operating as a meritocracy,<sup>177</sup> perhaps it reflects a different conception of merit that encompasses the ability to develop social ties, present well, and communicate effectively.<sup>178</sup> Even outside of soliciting venture capital, such attributes are important to growing a business and obtaining later rounds of financing.<sup>179</sup> Several respondents stated that pre-existing social connections

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<sup>174</sup> See MacBride, *supra* note 12 (suggesting that VCs focus on finding founders capable of building companies and achieving a successful exit rather than investing in the most innovative ideas).

<sup>175</sup> Gompers et al., *supra* note 36, at 177-78. Interestingly, the team is particularly important for investments in early-stage ventures, while for late-stage ventures, business-related factors assume greater importance. Business-related factors are also more important for healthcare versus IT investments. *Id.*

<sup>176</sup> See, e.g., Respondent 1 (university technology transfer official) ("They're always gonna invest in the people over the technology."); Respondent 15 (national laboratory official) ("I'd say from the VC point of view, it's gotta be one, the team.").

<sup>177</sup> See Packer, *supra* note 18.

<sup>178</sup> Cf. Janine Nahapiet & Sumantra Ghoshal, *Social Capital, Intellectual Capital, and the Organizational Advantage*, 23 ACAD. MGMT. REV. 242, 243-45 (1998) (discussing several benefits of social capital).

<sup>179</sup> Cf. Baum & Silverman, *supra* note 45, at 414 (noting that mobilizing resources to build a business is "an inherently social process because entrepreneurs must access financial and social capital and other types of resources through relationships with parties beyond the boundaries of their organizations"); see *id.* at 416 (noting the importance of alliances to biotech startups).

were not required to obtain venture capital, particularly if a founder exhibited the “hustle” and personal attributes to create connections.<sup>180</sup> It should be noted that while this can be understood as a “meritocratic” system, it deviates from traditional conceptions of merit in innovative contexts that emphasize technical merit.

Furthermore, from the public policy perspective of advancing innovation, the centrality of social connections to accessing venture capital is highly problematic. The importance of social connections asymmetrically raises capital acquisition costs for those lacking such connections and thereby decreases the pool of entrepreneurs who can realistically obtain financing. Talented individuals create entrepreneurial opportunities through complex cognitive processes.<sup>181</sup> However, much of that potentially valuable effort will go unrealized if individuals with promising ideas never get an audience with investors. In addition to increasing barriers to accessing financing, a lack of social connections also depresses valuations that novice entrepreneurs receive for their startups, thus diminishing their potential for success.<sup>182</sup> The missed innovation opportunities from such a “clubby” system of private ordering are all the more concerning given the significant public support bolstering the VC industry.<sup>183</sup>

Overreliance on social connections undermines innovation in other ways as well. In addition to narrowing the pool of viable entrepreneurs, it skews capital flows within that pool toward founders with better connections rather than the most promising technical ideas. An empirical study of VC investments in the biotechnology industry found that “VCs’ financing decisions appear to be affected by cognitive tendencies that lead them to overemphasize startups’ human capital when

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<sup>180</sup> See *supra* note 161

<sup>181</sup> D. Gordon Smith & Darian M. Ibrahim, *Law and Entrepreneurial Opportunities*, 98 CORNELL L. REV. 1533, 1546-48 (2013) (describing the “incubation” stage of creativity).

<sup>182</sup> Hsu, *supra* note 124, at 728.

<sup>183</sup> See *supra* Part I.B.

making their investment decisions.”<sup>184</sup> This can lead VCs to make bets based on incorrectly weighted criteria and to misallocate valuable capital. The centrality of social connections also engenders groupthink that shuns more radical forms of innovation. As legal scholar Brian Broughman observes, tightly-knit network structures limit interactions with entities outside of a network and inhibit innovative thinking.<sup>185</sup> The “clubby” nature of Silicon Valley—wherein entrepreneurs and VCs are embedded in overlapping networks—is not conducive to Apple’s famous admonition to “Think different.”

The importance of social connections also increases the likelihood that bias will distort investment decisions, further hampering innovation. Reliance on social ties is particularly likely to raise capital acquisition costs for women, minorities, and those from underprivileged backgrounds. Focusing on gender discrimination, commentators note, “When these biases affect capital allocation decisions, venture capitalists may not succeed at selecting the most profitable investment opportunities.”<sup>186</sup> Such narrowing of the investment pool inhibits efficient capital allocation and social welfare. According to legal scholars Benjamin Edwards and Ann McGinley, “[a]s transaction costs and the cost of capital increase, overall economic efficiency declines. . . . High capital costs undercut real investment, leading to a reduction in job creation, innovation, and development.”<sup>187</sup> To the extent that entrepreneurs are particularly attuned to the needs of the communities of which they are members, greater capital acquisition costs for underrepresented entrepreneurs may lead to fewer innovations that serve the needs of women, minorities, disabled individuals, rural populations, and those from underprivileged backgrounds.<sup>188</sup>

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<sup>184</sup> Baum & Silverman, *supra* note 45, at 433.

<sup>185</sup> Broughman, *Relational Contracting*, *supra* note 118, at 5; *cf.* Nahapiet & Ghoshal, *supra* note 178, at 245 (noting that close-knit groups can limit openness to information and produce “collective blindness”).

<sup>186</sup> Edwards & McGinley, *supra* note 138, at 1897.

<sup>187</sup> *Id.* at 1902.

<sup>188</sup> *Cf.* Fan, *supra* note 137, at 352 (“[F]or all the wonderful new technology and innovations that have been brought by such companies, how many



While this Article focuses on the objective of promoting innovation, it is important to recognize that relying on social connections also entails significant distributive harms. Such reliance amplifies opportunities for personal bias to influence who gets capital.<sup>189</sup> It establishes higher hurdles for members of outgroups to obtain financing and reinforces structures of domination and privilege, with literally billions of dollars at stake. Venture capital markets receive significant legal and regulatory support, and they generate enormous amounts of wealth. Due in part to the importance of social capital, a disproportionate amount of that wealth goes to well-connected individuals. Empirical studies confirm that women and minorities face greater challenges obtaining venture capital, due in part to their lack of requisite social ties.<sup>190</sup> Beyond undermining innovation, reliance on social ties also exacerbates inequity in the distribution of capital.

### III. Herd Mentality and Trends

“If [VCs] see other people doing things with their money, they’re gonna follow.”<sup>191</sup>

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more could we have had if entrepreneurs and investors came from different backgrounds?”); *id.* at 390-91.

<sup>189</sup> John Doerr, a leading Silicon Valley VC, once famously remarked that the world’s greatest entrepreneurs “all seem to be white, male, nerds who’ve dropped out of Harvard or Stanford and they absolutely have no social life. So when I see that pattern coming in—which was true of Google—it was very easy to decide to invest.” Scott Austin, *Doerr and Moritz Stir VCs in One-on-One Showdown*, WALL ST. J. (May 8, 2008), <https://www.wsj.com/articles/SB121025688414577219> [<https://perma.cc/AM6G-9DAT>].

<sup>190</sup> JMG CONSULTING & WYCOFF CONSULTING, *supra* note 124, at 4; Mary Ann Azevedo, *Untapped Opportunity: Minority Founders Still Being Overlooked*, CRUNCHBASE NEWS (Feb. 27, 2019), <https://news.crunchbase.com/news/untapped-opportunity-minority-founders-still-being-overlooked> [<https://perma.cc/2YHF-DT6X>].

<sup>191</sup> Respondent 3 (startup founder).

*A. Conservatism and a Following Mentality in Markets to Fund Innovation*

In addition to the pervasive role of social connections, the tendency of VCs to cluster investments in trendy technologies also depresses their ability to drive innovation. A significant academic literature—as well as popular perception—associates venture capital with individualism and radical innovation. This Part, however, explores a surprising conservative streak in VC investing. Many VC firms exhibit a “herd mentality” by investing in the same “hot” firms and technological fields. In some ways, such a herding mentality may be an outgrowth of the close-knit, highly socially connected nature of the VC-startup landscape.<sup>192</sup> Related to herding, VC firms often eschew the most radical technologies in favor of those poised to achieve broad acceptance.

Scholars and the VC industry itself routinely tout the innovative nature of venture capital.<sup>193</sup> Commentators argue that the high degree of individualism in American culture contributes to the robustness of VC investments in this country.<sup>194</sup> As Gilson notes in a classic study of VC-backed firms, “these firms have been a major force in commercializing cutting-edge science, whether through their impact on existing industries as with the radical changes in pharmaceuticals catalyzed by venture-backed firms’ commercialization of biotechnology, or by their role in developing entirely new industries as with the emergence of the Internet and World Wide Web.”<sup>195</sup> Other commentators emphasize that VC-backed companies such as

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<sup>192</sup> See *supra* Part II.

<sup>193</sup> See, e.g., NVCA, 2020 YEARBOOK, *supra* note 41, at 5 (“Many of the companies that will be making headlines ten years from now for their innovation, disruption, and value creation and the ones being funded today.”).

<sup>194</sup> Gantenbein et al., *supra* note 24, at 746; *id.* at 768 (“Individualism, which is intrinsically related with values of individual freedom, personal responsibility, and reward, is a driving factor of entrepreneurial spirit and, thus, venture-capital investments.”).

<sup>195</sup> Gilson, *Engineering*, *supra* note 4, at 1068; see, e.g., Ibrahim, *Public or Private*, *supra* note 130, at 1167-68 (“The U.S. venture capital system . . . brings cutting-edge science to the marketplace.”).

Alphabet, Amazon, Apple, Facebook, Microsoft, and Tesla “are among the most innovative and most influential companies in a generation.”<sup>196</sup> Empirical evidence also associates VC with innovation. One study found that innovator firms are more likely than imitator firms to obtain VC financing.<sup>197</sup> Another study found that VC investments are about three times more effective at producing patents relative to comparable investments in traditional corporate research.<sup>198</sup> Furthermore, patents from VC-backed firms tend to be cited more often than patents from firms that did not receive VC funding.<sup>199</sup>

Notwithstanding this reputation for innovation, however, VC investing exhibits a notable conservative streak.<sup>200</sup> Economists have long observed the phenomenon of herd mentality in investing.<sup>201</sup> In such scenarios, many individuals “follow the herd” and invest in popular assets that lack sound economic fundamentals, often with no or limited due diligence.<sup>202</sup> While seemingly irrational, such activities have a sound behavioral basis.<sup>203</sup> As John Maynard Keynes famously observed, “[w]ordly wisdom teaches that it is better for reputations to fail

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<sup>196</sup> Gornall & Strebulaev, *supra* note 3, at 3.

<sup>197</sup> Thomas F. Hellman & Manju Puri, *The Interaction Between Product Market and Financing Strategy: The Role of Venture Capital*, 13 REV. FIN. STUDS. 959, 980 (2000).

<sup>198</sup> Samuel Kortum & Josh Lerner, *Assessing the Contribution of Venture Capital to Innovation*, 31 RAND J. ECON. 674, 675 (2000).

<sup>199</sup> *Id.*

<sup>200</sup> See Lemley & McCreary, *supra* note 41, at 11 n.28.

<sup>201</sup> See generally Morris Altman, *Behavioral Economics, Thinking Processes, Decision Making, and Investment Behavior*, in INVESTOR BEHAVIOR: THE PSYCHOLOGY OF FINANCIAL PLANNING AND INVESTING 43, 51-52 (H. Kent Baker & Victor Ricciardi eds., 2014) (discussing herding).

<sup>202</sup> See, e.g., David S. Scharfstein & Jeremy C. Stein, *Herd Behavior and Investment*, 80 AM. ECON. REV. 465, 466 (1990) (“We find that, under certain circumstances, managers simply mimic the investment decisions of other managers, ignoring substantive private information.”).

<sup>203</sup> Altman, *supra* note 201, at 51-52; cf. Granovetter, *supra* note 20, at 506 (“What looks to the analyst like nonrational behavior may be quite sensible when situational constraints, especially those of [social] embeddedness, are fully appreciated.”).

conventionally than to succeed unconventionally.”<sup>204</sup> Examples of herding abound, such as the “irrational exuberance” fueling the dot.com bubble, the housing bubble precipitating the Great Recession, and, more recently, meme stocks. Legal scholars have long cautioned against herding in capital markets. They have particularly warned of herd mentality among unsophisticated investors,<sup>205</sup> such as retail investors engaged in crowd-funding.<sup>206</sup> In theory, VCs, who are sophisticated investors,<sup>207</sup> should be less likely to engage in herding. Furthermore, they should even discipline herding by exploiting pricing irregularities and arbitrage opportunities to turn a profit.<sup>208</sup> However, even sophisticated institutional investors engage in herding.<sup>209</sup>

Indeed, theory and evidence suggest that VCs exhibit herding behavior as well.<sup>210</sup> VC funding often focuses on the “hot” industries of the day. For example, semiconductor manufacturers were hot in the 1960s and 70s, and personal computer firms received significant VC funding for about ten years starting in the mid-1970s before cooling off.<sup>211</sup> Between the periods of 1985-89 and 2015-19, empirical research reveals a “large shift in focus of venture capital firms away from

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<sup>204</sup> JOHN MAYNARD KEYNES, *THE GENERAL THEORY OF EMPLOYMENT, INTEREST AND MONEY* 58 (1936).

<sup>205</sup> See, e.g., Stewart E. Sterk, *Rethinking Trust Law Reform: How Prudent is Modern Prudent Investor Doctrine*, 95 *CORNELL L. REV.* 851, 875 (2010).

<sup>206</sup> See, e.g., Darian M. Ibrahim, *Crowdfunding Without the Crowd*, 95 *N.C. L. REV.* 1481, 1492 (2017) [hereinafter Ibrahim, *Crowdfunding*]; Schwartz, *supra* note 4, at 668-69.

<sup>207</sup> Pollman, *supra* note 32, at 211 (describing VCs as “knowledgeable, savvy investors”).

<sup>208</sup> Sterk, *supra* note 205, at 875.

<sup>209</sup> See, e.g., Vance H. Fried, *Private Equity Funding for Minority Media Ownership*, 51 *FED. COMM. L.J.* 609, 616 (1999) (“Retail and institutional investors may have a herd mentality in viewing the prospects of particular industrial sectors.”).

<sup>210</sup> Klonowski, *supra* note 18, at 41 (“VCs often exhibit herd mentality when generating deals. If deals in a specific sector become successful, or other expert VCs identify a particular sector of the economy as attractive, VCs uncritically pursue these opportunities by flooding the market with capital.”).

<sup>211</sup> Hargadon & Kenney, *supra* note 6, at 125.

hardware and towards software and service businesses.”<sup>212</sup> One empirical study of VC investments found that “there was a prevalent notion that one is less likely to be mistaken if other individuals think the same way.”<sup>213</sup> Furthermore, echoing Keynes’s sentiment, if a trendy class of VC investments failed, “there would be comfort in numbers — how bad could they look if everyone else had suffered the same fate?”<sup>214</sup> Prior qualitative research also provides some evidence of herding behavior. Several VCs reported that “they looked for hot sectors in which to invest because they believe that is what their LPs pay them to do.”<sup>215</sup> However, several other VCs stated that they had an explicitly contrarian investment strategy and tried to avoid hot sectors.<sup>216</sup>

VCs have a mixed pattern of conducting independent due diligence, which can safeguard against investment herding. Empirical research suggests that VCs spend considerable time and effort on due diligence. A survey of VCs revealed that the average deal takes 83 days to close, during which time the average VC firm spends 118 hours on due diligence and checks ten references of the startup in question.<sup>217</sup> However, that same research also noted that “almost half of VCs, particularly the early-stage, IT, and smaller VCs, admit to often making gut investment decisions.”<sup>218</sup> Masayoshi Son, head of VC firm SoftBank, famously invested \$4.4 billion in WeWork based on a brief tour of the firm’s headquarters and his perception of the company’s “energy and spirituality.”<sup>219</sup> Such behavior is

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<sup>212</sup> Lerner & Nanda, *supra* note 21, at 247-48.

<sup>213</sup> Lehoux et al., *supra* note 6, at 378-79.

<sup>214</sup> Scharfstein & Stein, *supra* note 202, at 465.

<sup>215</sup> Gompers et al., *supra* note 36, at 177.

<sup>216</sup> *Id.*

<sup>217</sup> *Id.*

<sup>218</sup> *Id.* at 179. Interview research revealed that several VCs, particularly those that invested in early-stage ventures and were located in the Northern California Bay Area, did not build formal revenue models. *Id.* at 181. See also Klonowski, *supra* note 18, at 42 (“VCs use cognitive shortcuts rather than relying on systematic, extensive, and in-depth research based on scientific evidence.”).

<sup>219</sup> Duhigg, *supra* note 19.

troubling given that relying on emotions and intuitions often produces biases and errors leading to suboptimal long-term outcomes.<sup>220</sup> Empirical research also reveals that 20% of VC firms do not forecast company cashflows, which diverges from best practices for corporate finance.<sup>221</sup>

Certain structural features of VC investing contribute to herding behavior. For example, financing risk—the risk that a promising venture will fail because of lack of future funding—exacerbates herding. Because of financing risk, VCs tend to focus on sectors that will be popular with subsequent investors, thus increasingly the likelihood that present investments will continue to receive financing in the future.<sup>222</sup>

In VC investing, information signals from only a few sources can trigger cascades that motivate significant investment. In some ways, this may reflect the highly socially connected nature of VCs.<sup>223</sup> Further exacerbating herding is significant concentration in the VC industry; in 2019, the ten largest firms raised a third of all new VC funds.<sup>224</sup> Given that only a limited number of actors are necessary to initiate a cascade, such cascades “will often occur in the ‘wrong’ area, i.e., the area where investors as a group are worse off.”<sup>225</sup> Furthermore, when signals are based on little information, they are quite fragile, and new information can initiate a new cascade in another direction. Scholars note that “this type of logic has been used to explain drastic changes in fads” in investing.<sup>226</sup>

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<sup>220</sup> Altman, *supra* note 201, at 45.

<sup>221</sup> Gompers et al., *supra* note 36, at 180.

<sup>222</sup> Ramana Nanda & Matthew Rhodes-Kropf, *Financing Risk and Innovation*, 63 MGMT. SCI. 901, 908 (2017) (“In a world with financing risk, investors face a concern other than just choosing the ‘better’ sector: they are also interested in how many other investors choose, and will choose, to search in the same area.”).

<sup>223</sup> See *supra* Part II.

<sup>224</sup> Duhigg, *supra* note 19; Lerner & Nanda, *supra* note 21, at 248 (“The top 50 investors, or about 5 percent of the venture capital firms, raised half of the total capital over this period.”).

<sup>225</sup> Nanda & Rhodes-Kropf, *supra* note 222, at 908.

<sup>226</sup> *Id.*

Empirical research on unicorns—private companies with implied valuations of over \$1 billion—is consistent with herding behavior among VCs. Tellingly, approximately 40% of VCs had invested in a unicorn, and over 90% of VCs believe that unicorns were overvalued.<sup>227</sup> While numerous theories could explain why many VCs seem to be investing in companies that they believe are overvalued, such behavior is consistent with herding.

The history of VC financing in cleantech illustrates the boom-bust nature of funding trends. In the mid-2000s, a constellation of factors, including Al Gore’s 2006 movie, *An Inconvenient Truth*, and endorsement by leading VC John Doerr, helped spur a significant increase in cleantech VC financings.<sup>228</sup> As noted, between 2006 and 2011, the VC industry invested \$25 billion in cleantech.<sup>229</sup> However, VCs lost over half of their investments during that period, and a new constellation of factors, including falling natural gas prices and a glut of inexpensive Chinese solar panels, led to a significant decline in cleantech investments.<sup>230</sup> Recently, VCs have begun to significantly increase their cleantech investments, due in part to the availability of “impact” capital and funds to address environmental, social, and governance issues.<sup>231</sup> Interestingly, this new generation of cleantech funding has moved away from wind, solar, and biofuels to embrace a broader range of fields such as agriculture, food, green hydrogen, and carbon capture, utilization, and storage.<sup>232</sup> It remains to be seen, however, if “cleantech 2.0” will

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<sup>227</sup> Gompers et al., *supra* note 36, at 182.

<sup>228</sup> Gaddy et al., *supra* note 105, at 2-3. Other factors included rising fossil fuel prices and significant government subsidies. *Id.* at 4.

<sup>229</sup> *Id.* at 2.

<sup>230</sup> *Id.*

<sup>231</sup> van Lierop, *supra* note 105; Nathaniel Bullard, *Climate Startups Are Booming as VCs Throw Money at Cleantech*, BLOOMBERG (Sept. 2, 2021), <https://www.bloomberg.com/news/articles/2021-09-02/climate-startups-are-booming-as-vcs-throw-money-at-cleantech> [https://perma.cc/C3HE-AGN9]; Zoe Corbyn, *This Time Is Different: The Resurgence of Clean Tech VC Funding*, FORTUNE (Sept. 28, 2021), <https://fortune.com/2021/09/28/this-time-is-different-the-resurgence-of-cleantech-vc-funding> [https://perma.cc/GR7M-BGUZ].

<sup>232</sup> Corbyn, *supra* note 231; Bullard, *supra* note 231.

unfold similarly and represent a rather short-lived trend like its predecessor.<sup>233</sup>

Related to herding, commentators have also challenged the notion that venture capitalists seek out and invest in truly revolutionary technologies.<sup>234</sup> While VC is associated with ventures that create entirely new markets, oftentimes VC-backed companies do not create new markets but rather exploit rapid customer growth in existing industries.<sup>235</sup> Furthermore, contrary to popular perception, VCs are drawn to firms that offer “incremental modifications” to existing products and services that “‘plug holes’ in specific sectors of the marketplace,” provided that returns seem promising.<sup>236</sup> Previous qualitative research has revealed a “risk-averse” dimension to VCs that conflicts with the notion that they seek “‘disruptive’, ‘transformational’ or other ‘path-breaking’ technologies where ‘there’s no competition’”<sup>237</sup>

### 1. Empirical Findings

Interview subjects provided some confirmation for the importance of herding and presented a more nuanced account of its operation and effects. Although not part of the prepared questions, a quarter of respondents mentioned the prominence of trends and “herd mentality” among Silicon Valley venture capitalists.<sup>238</sup> According to one entrepreneur, if a technology or business idea “is too different from what everyone else is already doing, what the general shift is doing, you’re not gonna get funding.”<sup>239</sup> According to respondents, VCs’ herd mentality

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<sup>233</sup> van Lierop, *supra* note 105; Corbyn, *supra* note 231.

<sup>234</sup> Cf. Klonowski, *supra* note 18, at 43 (“[I]t is important to note that, despite frequent claims by VCs, they do not create innovation in entrepreneurial firms. VCs follow innovation rather than precede it, and perpetuate innovation that already exists in entrepreneurial firms.”).

<sup>235</sup> Hargadon & Kenney, *supra* note 6, at 123-24.

<sup>236</sup> Klonowski, *supra* note 18, at 43.

<sup>237</sup> Lehoux et al., *supra* note 6, at 383 (quoting Investor 4).

<sup>238</sup> See, e.g., Respondent 3 (startup founder) (noting the “herd mentality” within VC investing).

<sup>239</sup> *Id.*



belies their innovative image.<sup>240</sup> According to another technology lawyer, “You see a lot of companies are kind of like Hollywood movies, where there’s a movie about a volcano, then this other studio makes a movie with a volcano.”<sup>241</sup> Several respondents noted that the conservatism of the VC community had increased over time.<sup>242</sup>

Study participants describe herding as a sociological phenomenon that often entails following recognized leaders. According to a scientist who has worked with several startups, “I will tell you, from my perspective, there’s a few probably lead venture capitalists, then a lot who follow. And some people will come in early and are risk-takers on things like that. Others will kinda wait and see how things develop.”<sup>243</sup> One software entrepreneur noted that his fundraising efforts were initially stymied, but after a VC “thought leader” touted his category of technology, he received numerous unsolicited inquiries from potential investors.<sup>244</sup> Part of this following mentality arises from a desire to free-ride on the due diligence that lead VC firms have already conducted. One technology transfer official noted that “nobody wants you ‘til one actually is ready to take the lead, then all of a sudden they’re all, all there. Somebody did all the diligence.”<sup>245</sup> This follow-the-leader mentality particularly applies to corporate VCs, which are venture capital funds administered by large corporations. According to one entrepreneur, corporate VCs will say ““We’re interested, but we

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<sup>240</sup> Respondent 24 (Silicon Valley law firm attorney) (“VC firms claim to be very innovative, but they’re all very conservative in that they all want to go with the same ... Looking for the same unicorn company.”); *see id.* (“VCs, they like to look for the hot new thing, but they all jump on the same things. [chuckle].”).

<sup>241</sup> Respondent 25 (Silicon Valley law firm attorney).

<sup>242</sup> *See, e.g.*, Respondent 1 (university technology transfer official) (“[I]t used to be that the venture community was a lot less risk-averse, so they invest a lot earlier.”).

<sup>243</sup> Respondent 2 (national laboratory scientist and official).

<sup>244</sup> Respondent 3 (startup founder).

<sup>245</sup> Respondent 1 (university technology transfer official).

don't even participate unless you have a private VC leading."<sup>246</sup>

Study respondents identified several once-hot technologies that had fallen out of favor as well as new fields attracting significant investment. While biotech was the "darling" of VCs several decades ago, "now it's not, with the exception of a few venture capitalists that are run by strong scientists."<sup>247</sup> According to one Silicon Valley attorney:

I've been doing this for about seven years now, working in big law and Silicon Valley and working with tech clients. And things tend to go in trends. When I first started in 2010, I would say alternative energy was in fact very, very big. A lot of VCs were investing in them, and then all of a sudden that dried up. And so there isn't that much money now going into alternative energy, and I don't think we're seeing quite as much innovation. On the other hand, there's a lot of money going into battery technology. So we're seeing quite a bit of innovation there. And then of course you have things like automated vehicles, which is the current huge trend.<sup>248</sup>

Another Silicon Valley attorney voiced a similar sentiment while identifying a slightly different mix of technological trends.<sup>249</sup> Turning to areas that are now hot, one entrepreneur

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<sup>246</sup> Respondent 3 (startup founder).

<sup>247</sup> Respondent 4 (startup founder). It should be noted that these interviews occurred between 2017 and 2019, before the recent uptick in biotech VC investing became widespread. *See infra* Methodological Appendix.

<sup>248</sup> Respondent 24 (Silicon Valley law firm attorney).

<sup>249</sup> Respondent 25 (Silicon Valley law firm attorney) ("[T]here's always something that's hot. Right now, what's hot is VR, AI/machine learning/deep learning in networks, and autonomous vehicles. There's a little bit of overlap between the last two. Five years ago, big data was the big thing. Using a ton of data for serving ads to people or for doing genetic research or for drug research. Before that, nano tech and green tech were huge. There's always a field of the day that every lawyer, every VC, everyone

stated that investors have “dogpiled” into the fintech industry.<sup>250</sup> Another noted the resurgence of investment in devices.<sup>251</sup>

Some interviewees decried the significant waste entailed by herd investing. A Silicon Valley attorney remarked, “I think there’s a lot more waste and a lot more redundancy and duplicity ... there’s a lot of following. So, if somebody’s made a lot of money in this thing, then we’re going to put our lunch money in that kind of thing.”<sup>252</sup> While an entrepreneur acknowledged that some companies will eventually succeed, he decried “the amount of capital that will have gotten wasted, poured into one particular sector. So there’s definitely that herd mentality.”<sup>253</sup>

In a surprising finding, herding also creates waste by inducing entrepreneurs to unnecessarily engineer their products to appear part of the latest trend. According to one founder:

So when you’re trying to innovate or whatever, people are always trying to insert a Blockchain angle or insert a machine learning angle, or insert one of these trendy angles into it. That sometimes limits their ability to, in my personal opinion, be as innovative as possible. . . . Blockchain has a, there’s really great applications of it, there’s really great use cases for it. But then

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retools themselves as . . . the VC money is going into this, so this is now what we’re doing.”). Echoing the former trendiness of cleantech, one scientist observed, “I think a lot of hype went into [it] early on, and a lot of people didn’t really understand what they’re getting into.” Respondent 2 (national laboratory scientist and official).

<sup>250</sup> Respondent 9 (startup founder).

<sup>251</sup> Respondent 3 (startup founder) (“Yeah, GoPros. Like ten years ago if you went to a venture capitalist and told them you’re gonna make a hardware product they would, there might be some of them that’d be open to it, but most of them would be like no, hardware’s bad, software is where all the money is. I don’t want to fund that. But now, like you just mentioned, with the GoPros and the Fitbits and the Apple Watches, it’s a very hot space and maybe to some extent a lot of these companies that were pioneers in that area solved a lot of the challenges.”).

<sup>252</sup> Respondent 25 (Silicon Valley law firm attorney).

<sup>253</sup> Respondent 9 (startup founder).

you end up seeing some people make companies or maybe just products or innovations that leverage it just for the sake of doing that. I think it tends to limit the full potential of what they're doing.<sup>254</sup>

### B. Normative Analysis

From the perspective of individual VCs, the tendency to invest in trendy technologies and avoid truly revolutionary innovations is highly rational, at least to a certain extent. In some sense, markets are herds, and if market demand shifts toward the latest “hot” technology, such as blockchain or AI, it makes sense for VCs to invest in those areas. Investing in widely accepted technologies is particularly understandable given financing risk. If a VC's return on investment depends on a venture obtaining funding in the future, VCs are prudent to invest in ventures expected to have wide market appeal going forward. Investing in trendy technologies with broad acceptance is also sensible given that the most likely exit for a VC is the sale of a portfolio company to a large incumbent.<sup>255</sup> Established incumbents may shy away from truly radical, unproven innovations, which diminishes the incentives for VCs to invest in them.

Additionally, VCs' preference to follow the investment decisions of other VCs is, in many cases, efficient. If one firm has performed the due diligence to identify a promising investment, other firms can freeride on that work. Herding also reflects the enduring importance of social connections in VC investing. VCs are nodes in vast information networks that can transmit information about trends quickly. Herding thus represents another way in which VCs can economize on search costs

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<sup>254</sup> Respondent 3 (startup founder).

<sup>255</sup> As Mark Lemley and Andrew McCreary argue, this represents another conservative element of VC financing. VCs actively seek to have their portfolio companies acquired by incumbents rather than pursue an IPO and operate as independent companies. For their part, incumbents often acquire VC-backed startups to eliminate potential competitive threats, thus reducing innovation and increasing industry consolidation. Lemley & McCreary, *supra* note 41, at 8-10; 26-36, 55-58.

by relying more on social information rather than on wholly independent due diligence to find and evaluate investment opportunities. To a certain extent, a “following” mentality is endemic to the structure of venture financing, which often involves syndication. As with herding more generally, following someone else’s investment decision also provides safety in numbers and guards against criticisms if investments ultimately fail.

Even from a private perspective, however, the trendiness and “herd mentality” of VCs can create troubling inefficiencies. Herding artificially inflates prices, which can force VCs to offer higher valuations than economically justified to invest in trendy startups. Economic theory suggests that “the most attractive VC returns may actually be generated from the outlier sectors of the economy.”<sup>256</sup> However, VCs engaged in herding will likely miss those opportunities and therefore depress returns for limited partners. In this manner, herding can leave significant economic value unrealized.

From the perspective of public policy to advance innovation, moreover, herding by VCs is troubling.<sup>257</sup> To be sure, herding may be beneficial in some contexts; massive investment in promising areas like AI and blockchain could provide the “critical mass” of resources, talent, and capital to fuel breakthroughs. However, there is also significant reason for concern. In many cases, publicly supported VC markets are concentrating significant capital in a few hot fields while largely overlooking others. Such behavior reduces investment in potentially valuable technologies outside of the mainstream. Scholars note that investors’ willingness to experiment helps fuel technological progress and industrial evolution.<sup>258</sup> However, such experimentation is depressed when VCs follow herds and trends. Such following behavior undermines the

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<sup>256</sup> Klonowski, *supra* note 18, at 41.

<sup>257</sup> See Duhigg, *supra* note 19 (“V.C.s today aren’t interested in the public good. They’re not interested in anything except optimizing their own profits and chasing the herd, and so they waste billions of dollars that could have gone to innovation that actually helps people.” (quoting Steve Blank)).

<sup>258</sup> Nanda & Rhodes-Kropf, *supra* note 222, at 902.

independent investment analysis and due diligence that could lead individual firms to see beyond trends to fund more innovative technologies. Social, reputational, and financial pressures to conform to prevailing technological trends limit investments in truly radical innovations.<sup>259</sup>

Herding also depresses innovation by facilitating overinvestment in mainstream technologies and generating significant waste. Patent scholars recognize that the enticement of exclusive rights can produce wasteful “patent races” where excessive resources are committed to obtaining a valuable patent.<sup>260</sup> In analogous fashion, the rush to invest in “hot” technologies produces significant redundancy and waste. Herding leads VCs to allocate significant amounts of capital to the development of a limited number of trendy technologies. Furthermore, the tendency of venture capital to fund “hot technologies” can lead entrepreneurs to conform their ventures to prevailing trends in ways that undermine innovation. As interview respondents noted, some startups will artificially insert a blockchain or AI component in their technology to attract investment, even though such insertion offers marginal functionality relative to its cost, an observation that warrants further empirical exploration. While VCs’ herding tendencies may be individually expedient (most of the time), on a social level, they can lead to suboptimal capital allocations and limit innovation.<sup>261</sup>

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<sup>259</sup> Cf. THOMAS KUHN, *THE STRUCTURE OF SCIENTIFIC REVOLUTIONS* 24 (4th ed. 2012) (“Nor do scientists normally aim to invent new theories, and they are often intolerant of those invented by others. Instead, normal-scientific research is directed to the articulation of those phenomena and theories *that the paradigm already supplies.*” (emphasis added)).

<sup>260</sup> See e.g., Michael Abramowicz, *Perfecting Patent Prizes*, 56 VAND. L. REV. 115, 183-90 (2003). But see Mark A. Lemley, *The Myth of the Sole Inventor*, 110 MICH. L. REV. 709, 713 (2012) (noting the benefits of patent races and parallel technological development by multiple parties).

<sup>261</sup> In their pioneering work on herd behavior in investing (which, as we will see, also applies to VC investments), Scharfstein and Stein captured this intuition: “Although this behavior is inefficient from a social standpoint, it can be rational from the perspective of managers who are concerned about their reputations in the labor market.” Scharfstein & Stein, *supra* note 202, at 466.

#### IV. The VC Business Model and Technological Discrimination

*“It’s not about innovation, it’s about making money.”*<sup>262</sup>

##### A. Investment Criteria as Constraints on Venture Capital’s Innovative Capacity

In addition to herding, the specific incentives and constraints of the VC business model limit the ability of VC markets to fund broad classes of innovation. Venture capital is associated with a wide array of innovative industries. It is particularly associated with long-term investments in R&D that bear significant risk. While this is true to some extent, theory and evidence indicate that VC markets allocate capital to a rather limited set of innovative fields that align with the VC business model.<sup>263</sup> VC markets select for innovations that scale rapidly and promise enormous returns over a medium-term timeframe. While this is unsurprising on one level, it belies the perception of VC markets as investing in a wide range of technologies over long periods of time. Among other implications, such investment criteria deprioritize large swaths of socially valuable innovations with longer, riskier development profiles.

Within private financing, venture capital is uniquely associated with innovation, long-term timeframes, and risk. Many VC-backed companies—from Amazon to Facebook to Genentech—are highly innovative. VC investments have longer time horizons than other investments, and the VC industry itself states that “[v]enture capital is a long-term investment.”<sup>264</sup> For instance, the biotechnology industry, which features high R&D costs and long development timelines, received significant VC financing during its infancy and continues to receive substantial

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<sup>262</sup> Respondent 7 (startup founder).

<sup>263</sup> See Hargadon & Kenney, *supra* note 6, at 127.

<sup>264</sup> NVCA, 2020 YEARBOOK, *supra* note 41, at 8.

funding.<sup>265</sup> Relatedly, VC-backed companies have a high failure rate, and VC financing is synonymous with risk capital.<sup>266</sup>

While VC funds a broad array of innovations, the incentives and constraints of the VC business model naturally favor certain innovations and industries over others. First, an important criterion determining VC decisions is return on investment. VCs are not interested in funding local clothing stores and hair salons. Rather, they focus on a fundamentally different kind of enterprise: scalable, high-growth ventures.<sup>267</sup> VCs commonly evaluate investments based on multiple on invested capital (MOIC), and they typically seek at least a 10x return.<sup>268</sup> Such high returns are necessary in part to subsidize numerous investments that inevitably fail.<sup>269</sup> As commentators note, VCs seek to maximize their returns, naturally drawing them to certain industries.<sup>270</sup>

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<sup>265</sup> Michael S. Mireles, *An Examination of Patents, Licensing, Research Tools, and the Tragedy of the Anticommons in Biotechnology Innovation*, 38 U. MICH. J.L. REFORM 141, 162-64 (2004) (indicating that the biotech industry received considerable VC funding in its early years); Booth, *supra* note 101 (indicating a recent resurgence in VC investments in biotech); *American Biotechnology is Booming*, *supra* note 101 (same).

<sup>266</sup> GOMPERS & LERNER, *supra* note 50, at 5 (“Venture capitalists represent one solution to financing these high-risk, potentially high-reward projects.”); Gantenbein et al., *supra* note 24, at 744 (describing venture capital as “intrinsically risky due to the large number of potential pitfalls that can jeopardize a steady growth path of start-ups and which ultimately results in very high failure rates”); Gornall & Strebulaev, *supra* note 3, at 2; Ibrahim, *Public or Private*, *supra* note 130, at 1138 (noting that VCs invest in “speculative, high-risk” startups); NVCA, 2020 YEARBOOK, *supra* note 41, at 8.

<sup>267</sup> Respondent 19 (angel investor); Hargadon & Kenney, *supra* note 6, at 125-26.

<sup>268</sup> Hargadon & Kenney, *supra* note 6, at 126.

<sup>269</sup> *Id.* at 127.

<sup>270</sup> Gornall & Strebulaev, *supra* note 3, at 29 (observing that “many of the investments in the VC industry’s early era were concentrated in broadly defined technology or biotechnology sectors”); see MacBride, *supra* note 12 (“Venture capitalists look for companies that can reach IPO size, which means they need an idea that can find a big market. These factors combine to produce a very specific set of requirements . . .”).



Second, VCs seek these large returns within a limited time frame.<sup>271</sup> A medium-term time horizon is hardwired into the structure of venture financing. As noted, VCs raise capital through periodic funds organized as limited partnerships.<sup>272</sup> The vast majority of funds are not ongoing concerns. A fund typically has a ten-year lifespan, after which the VC must liquidate the fund and return assets to investors.<sup>273</sup> Within this finite lifespan, “the VC partnership is under great pressure to invest the funds in the first 3 to 4 years.”<sup>274</sup> As Gilson notes, “While these are not short-term investments, neither are they expected to be long-term. Because venture capital limited partnerships have limited, usually ten-year terms, GP’s [sic] have a strong incentive to cause the fund’s portfolio company investments to become liquid as quickly as possible.”<sup>275</sup> Similarly, as economist Josh Lerner observes, while VCs “may style themselves as long-run investors, they are at best providers of medium-term capital. The need to return capital to their limited partners and to get back on the fundraising trail drive venture investors to start thinking about exit investments after only a few years.”<sup>276</sup> The pressure to realize returns quickly has increased as the time to reach an exit has increased. Between 2004 and 2019, the

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<sup>271</sup> See Lerner & Nanda, *supra* note 21, at 245.

<sup>272</sup> GOMPERS & LERNER, *supra* note 50, at 5; Ibrahim, *The New Exit*, *supra* note 31, at 11 (“Because VCs will push for start-ups to exit through IPOs and trade sales before their funds expire, investor lock-in does not last indefinitely.”).

<sup>273</sup> GOMPERS & LERNER, *supra* note 50, at 19 (“Almost all venture and buy-out funds are designed to be ‘self-liquidating,’ that is, to dissolve after ten or twelve years.”); Gompers et al., *supra* note 36, at 185 (“Because VCs invest in private companies through funds that are usually structured as ten-year vehicles and because VCs receive their profit share or carry only when they return capital to their investors, the timing and type of exit is critical to VC investment success.”).

<sup>274</sup> Kenney, *Venture Capital*, *supra* note 49, at 1703.

<sup>275</sup> Gilson, *Engineering*, *supra* note 4, at 1074.

<sup>276</sup> Andrew W. Lo & Gary P. Pisano, *Lessons From Hollywood: A New Approach To Funding R&D*, MIT SLOAN MGMT. REV. (Dec. 14, 2015), <https://sloanreview.mit.edu/article/lessons-from-hollywood-a-new-approach-to-funding-rd/> [<https://perma.cc/F5MP-QVT5>] (see Josh Lerner’s commentary on Lo and Pisano’s proposal).

average time for a VC-backed company to reach an exit grew from 3.9 to 6.3 years.<sup>277</sup>

Third, while seeking to maximize returns in a medium-term timeframe, VCs naturally seek to mitigate risk.<sup>278</sup> Startups face numerous risks regarding technological uncertainty, market demand, government regulation, and future financing. Financing risk is particularly acute for products with long development times that require future funding for successful commercialization.<sup>279</sup> Such risk impacts the kinds of firms that VCs are willing to fund.<sup>280</sup> For example, capital-intensive biotechnology and cleantech ventures bear more financing risk and are less attractive investments (all things being equal) than low-cost consumer Internet startups.<sup>281</sup> Furthermore, risk affects *how* VCs fund. VCs mitigate risk through tranche investing, in which they disburse funds in stages upon a portfolio company achieving certain milestones. Not surprisingly, tranching is more common in biotech and cleantech.<sup>282</sup> VCs also mitigate financing risk by syndicating with other VCs and providing larger up-front investments.<sup>283</sup> However, for particularly innovative startups facing great uncertainty, investors may shy away from providing large initial investments, thus leaving such ventures “to the whims of the financial market.”<sup>284</sup>

Given these criteria, VCs naturally gravitate to investments with high upside, relatively short time frames, and less

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<sup>277</sup> NAT’L VENTURE CAPITAL ASSOC., 2020 YEARBOOK: DATA PACK 23 (2020) [hereinafter NVCA, DATA PACK].

<sup>278</sup> Jonathan J. Fleming, *The Decline of Venture Capital Investment in Early-Stage Life Sciences Poses a Challenge to Continued Innovation*, 34 HEALTH AFFS. 271, 272 (2015) (“[VCs] naturally favor those [investments] with lower costs and less perceived uncertainty and risk.”).

<sup>279</sup> Nanda & Rhodes-Kropf, *supra* note 222, at 901.

<sup>280</sup> *Id.*

<sup>281</sup> *Id.* at 906.

<sup>282</sup> *Id.* at 913.

<sup>283</sup> *Id.* at 912.

<sup>284</sup> *Id.*

risk.<sup>285</sup> These parameters strongly favor certain classes of technology over others. This model works well for software, which helps explain why that sector receives so much VC funding.<sup>286</sup> A comprehensive survey of VC firms found that 20%—the largest proportion—focused on the IT sector, which encompasses software, IT, and consumer Internet companies.<sup>287</sup> As seen in Fig. 1, software dominates VC investments. Software comprised 34% of VC investments in 2019, which is consistent with its share over the previous decade.<sup>288</sup>

<b>Sector</b>	<b>Investments</b>	<b>Percent of Total</b>
Software	\$44.78	34%
Other	\$30.56	23%
Pharmaceuticals and biotech	\$16.72	13%
Commercial services	\$14.00	10%

<sup>285</sup> See MAZZUCATO, *supra* note 19, at 41; Hargadon & Kenney, *supra* note 6, at 123 (“Successful firms and sectors for venture capital investing can be reduced to three interdependent conditions—rapidly growing markets, scalable technologies and ventures, and large and rapid pay-offs.”); MacBride, *supra* note 12 (“Money is going to flow where returns are. If software continues to have returns, that’s where it will flow” (quoting Asheem Chandna, partner at VC firm Greylock)).

<sup>286</sup> Lerner & Nanda, *supra* note 21, at 246 (“Software and service businesses—which are typically based on proven technologies, often have short development times, and can benefit from quick market feedback—are amenable to this approach.”); *cf.* NVCA, 2020 YEARBOOK, *supra* note 41, at 25 (noting that the “software sector’s dominance continued in 2019” and that its 34% share of total venture capital invested was relatively consistent over the past decade).

<sup>287</sup> Gompers et al., *supra* note 36, at 174.

<sup>288</sup> NVCA, 2020 YEARBOOK, *supra* note 41, at 25.

Healthcare services and systems	\$7.10	5%
Consumer goods and recreation	\$6.26	5%
Healthcare devices and supplies	\$5.69	4%
IT hardware	\$3.87	3%
Media	\$2.91	2%
Energy	\$1.54	1%
<b>Total</b>	<b>\$133.43</b>	<b>100%</b>

**Figure 1:** 2019 U.S. VC Investments by Sector (\$B)<sup>289</sup>

The growth-at-all-costs dynamic characteristic of technology industries further favors focusing on innovations where VCs can get the most bang for their buck. As business scholar Darek Klonowski observes, “VCs often look for entrepreneurial firms where they can ‘unnaturally’ accelerate their development, which is driven by VCs’ short-term orientation.”<sup>290</sup> This is more likely to be the case for software-based ventures than for more capital-intensive fields like drugs or cleantech. Indeed, in trying to “accelerate” value creation, VCs often overfund their portfolio companies.<sup>291</sup> Additionally, VC-backed startups often compete in platform markets where early success is critical to prevailing in winner-take-all contests.<sup>292</sup> They therefore require massive capital infusions early in their development. Furthermore, VC investments are subject to economies of scale; given that it requires a similar amount of work to manage small and large investments, VCs have incentives to

<sup>289</sup> NVCA, DATA PACK, *supra* note 277, at 14 and author’s calculations.

<sup>290</sup> Klonowski, *supra* note 18, at 41.

<sup>291</sup> *Id.*

<sup>292</sup> Kenney & Zysman, *supra* note 77, at 43; Lemley & McCreary, *supra* note 41, at 4.

make fewer investments of larger magnitude.<sup>293</sup> Such overfunding skews capital allocations even more, as it concentrates investments in fields like software while leaving even less funding for other sectors. VCs' structural preference for software is borne out in financial performance data; empirical analysis of VC investments from 1991 to 2019 reveals that investments in software would yield a gross return of 24% per year, compared to 17% for hardware, 13% for healthcare, and 2% for cleantech.<sup>294</sup>

At a practical level, technologies with faster, less expensive product development cycles confer tangible advantages in obtaining venture capital. Establishing a software enterprise requires relatively little cost.<sup>295</sup> Furthermore, as indicated above, securing venture capital is a social process in which interpersonal interactions are critical.<sup>296</sup> Along those lines, in-person demonstrations of new innovations are important for convincing VCs to invest.<sup>297</sup> Prototyping and demonstrations are clearly easier for products like software than for medicines.<sup>298</sup> Additionally, many VCs consider whether a startup already has "traction"—paying customers—as an important factor in determining whether to invest.<sup>299</sup> Demonstrating traction in software innovations is much easier compared to pharmaceuticals, which require significant time, cost, and regulatory approval to commercialize.<sup>300</sup>

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<sup>293</sup> Kenney & Zysman, *supra* note 77, at 41; Duhigg, *supra* note 19.

<sup>294</sup> See Lerner & Nanda, *supra* note 21, 246.

<sup>295</sup> *Id.* at 243.

<sup>296</sup> See *supra* Part II.

<sup>297</sup> Ralston, *supra* note 23 (“[D]emos are almost a requirement nowadays.”).

<sup>298</sup> *Id.* (“Luckily, the software development ecosystem today is such that a sophisticated web or mobile product can be built and delivered in a remarkably short period of time at very low cost. Even hardware can be rapidly prototyped and tested.”).

<sup>299</sup> See *id.* (suggesting that startups show a 10% increase in customer base per week for several weeks to impress investors).

<sup>300</sup> Cf. Kenney & Zysman, *supra* note 77, at 39 (noting the dramatic decrease in the cost of establishing an Internet-based start-up offering a digital service). *But see* Lerner & Nanda, *supra* note 21, at 246 (noting that the drug approval and reimbursement system allows investors to project the market

The role of the VC business model in dictating investment decisions is perhaps best illustrated in the healthcare industry. In one survey, approximately two-thirds of VCs investing in healthcare reported that “increases in risk would lead them to shift investments within or across health care sectors or to reduce health care investments altogether.”<sup>301</sup> Empirical analysis from 2008 reported increased investments in medical devices compared to biotechnology based on the former’s “lower development costs, shorter development times, and reduced regulatory hurdles.”<sup>302</sup> Similarly, VC markets have disfavored other healthcare fields with high uncertainty and large capital requirements, such as infectious diseases, neurology, and mental health.<sup>303</sup> As seen in Figure 2, the percentage of venture capital invested in life science has decreased steadily from 2004 to 2019. While VC investments in biopharma have recently increased in absolute terms,<sup>304</sup> it remains to be seen whether the share of VC dollars devoted to biopharma will increase given that total VC investments have grown substantially.<sup>305</sup>

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value of a drug relatively early in its development, which may encourage VC investments in drug-development research that is capital- and time-intensive).

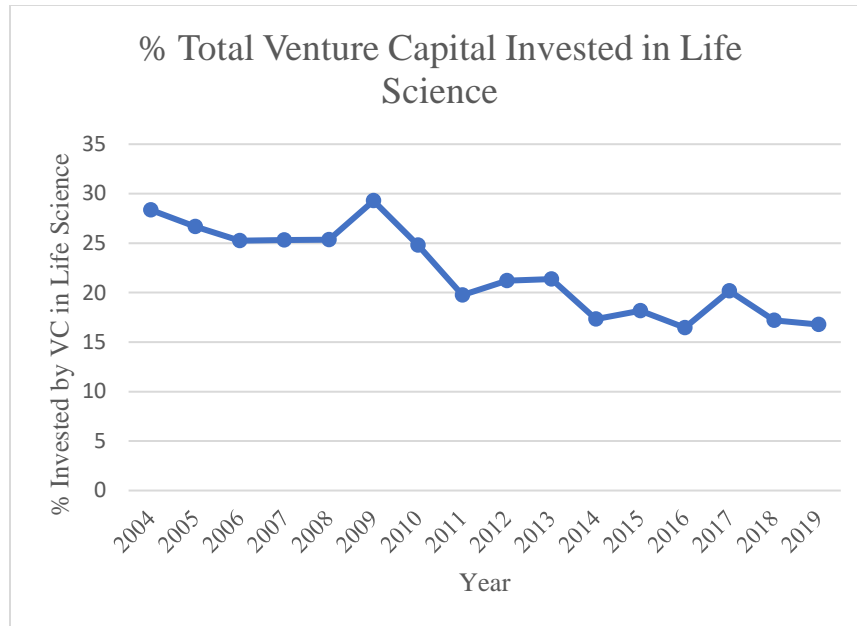
<sup>301</sup> Ackerly et al., *supra* note 6, at 72-73.

<sup>302</sup> *Id.* at 71.

<sup>303</sup> Fleming, *supra* note 278, at 273.

<sup>304</sup> Booth, *supra* note 101.

<sup>305</sup> *Cf. New Age, supra* note 124 (indicating that total VC investments in 2021 were 50% higher than 2020).



**Figure 2:** Percentage of Total Venture Capital Invested in Life Science<sup>306</sup>

Commentators observe that the VC business model “wasn’t designed to deal with the costs, risks, and slow payout of science-based industries.”<sup>307</sup> Whereas Google’s search engine was operational after about a year, developing a biotechnology drug and bringing it to market can take ten to twenty years.<sup>308</sup> Although biotechnology continues to receive VC, investments have shifted away from biotech ventures in the earliest stages of R&D.<sup>309</sup> One scholar writing in 2015 noted that “for at least the past five years venture capitalists have been moving away from investing in early-stage life science projects in favor of early-stage Internet and consumer-oriented startups.”<sup>310</sup> It is important to acknowledge that VC investments in biotech have recently increased, due to new scientific

<sup>306</sup> NVCA, 2020 YEARBOOK, *supra* note 41, at 18.

<sup>307</sup> Lo & Pisano, *supra* note 276.

<sup>308</sup> *Id.*; *cf.* Baum & Silverman, *supra* note 45, at 423 (noting that commercialization is particularly difficult in human therapeutics and vaccines due to stringent regulatory requirements relative to nonmedical sectors).

<sup>309</sup> Lo & Pisano, *supra* note 276.

<sup>310</sup> Fleming, *supra* note 278, at 272-73.

advances, the wide availability of capital, and depressed scientific productivity from large pharmaceutical companies.<sup>311</sup> The persistence of this trend is unclear, however, and from a structural perspective, the high risk and long time horizons of biotech create tensions with the VC investing model.

The role of the VC business model in dictating VC investments is also evident in cleantech. As noted, from 2006 to 2011, the VC industry poured \$25 billion into cleantech.<sup>312</sup> However, VCs lost over half of their investments, and they significantly retreated from cleantech until recently.<sup>313</sup> Many early cleantech investments focused on solar, wind, and biofuels. However, “cleantech companies developing new materials, hardware, chemicals or processes were poorly suited for VC investment because they required significant capital, had long development timelines, were uncompetitive in commodity markets, and were unable to attract corporate acquirers.”<sup>314</sup> Empirical analysis revealed that compared to software and biotech investments, VC-backed cleantech companies were more likely to fail and yielded lower returns.<sup>315</sup> Ultimately, the study authors concluded that “cleantech clearly does not fit the risk, return, or time profiles of traditional venture capital investors.”<sup>316</sup> During this early period of cleantech investments, VCs began to shift away from capital-intensive materials and hardware enterprises to low-cost cleantech software and finance firms.<sup>317</sup> Ultimately, cleantech investment decreased substantially. As noted, after several years in the doldrums, cleantech has recently experienced a resurgence of VC investment.<sup>318</sup> Notably, “cleantech 2.0” features a different mix of investments that

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<sup>311</sup> Bell, *supra* note 102; Booth, *supra* note 101.

<sup>312</sup> Gaddy et al., *supra* note 105, at 2.

<sup>313</sup> *Id.*

<sup>314</sup> *Id.*

<sup>315</sup> *Id.* at 7.

<sup>316</sup> *Id.* at 11.

<sup>317</sup> *Id.* at 9.

<sup>318</sup> See *supra* notes 231-233 and accompanying text.



deprioritizes capital-intensive solar, wind, and biofuels enterprises.<sup>319</sup>

It bears mentioning that in addition to the VC business model, other factors, such as macroeconomic conditions, also influence VC financing decisions. Empirical research shows that a growing economy and more money available for investment leads VCs to experiment with financing more novel and unproven ventures.<sup>320</sup> Presently, given the strong performance of financial markets and unprecedented amounts of investable capital, VCs seem willing to take more chances. According to Josh Lerner, while software remains a popular investment choice, VCs have broadened their investments in other fields.<sup>321</sup> It remains the case, however, that the VC business model still constrains investment decisions, and such constraints are likely to become stricter if and when the economy contracts.

### 1. Empirical Findings

This Article's interview respondents confirm that the desire to achieve large, quick returns while minimizing risk favors some technological fields over others. An angel investor noted, "We're investing in things that we see could get a 10x scale within some reasonable period of time."<sup>322</sup> According to another respondent, accelerator programs tell entrepreneurs "don't bother to spend the time building something unless you have some sort of plausible claim. It used to be \$100 million market, now it's a billion some market."<sup>323</sup> Several respondents emphasized the importance of realizing such large returns in a short timeframe, such as three to five years.<sup>324</sup> An entrepreneur

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<sup>319</sup> Corbyn, *supra* note 231; Bullard, *supra* note 231.

<sup>320</sup> Nanda & Rhodes-Kropf, *supra* note 222, at 902.

<sup>321</sup> *New Age*, *supra* note 124 (quoting Professor Josh Lerner).

<sup>322</sup> Respondent 19 (angel investor).

<sup>323</sup> Respondent 18 (startup accelerator official).

<sup>324</sup> Respondent 7 (startup founder) ("Short term outcome is the biggest factor for raising capital."); *id.* ("So at the end of the day, a lot of it is just calculation on the paper that how big that this company can get [sic], how fast it can get big."); Respondent 4 (startup founder); *see also* Respondent 9 (startup founder) (noting "the desire for instant gratification and quick

remarked, “I moved to the Silicon Valley because I thought everyone is hungry for innovation and as long as you have a good idea and everyone is interested and it works and you can solve a problem, then you’re good to go. But after a while I realized, no, it’s just all about making money and hopefully in the short term.”<sup>325</sup>

Seven respondents emphasized the advantages of software as favored investment of VCs. A technology transfer official characterized investment decisions in this manner: “A software company, we’re gonna look at you ‘cause there’s a really low overhead.’ . . . Anything else you almost have to have a product already before the venture funds will fund you.”<sup>326</sup>

In a notable finding, the need to satisfy VC desires for quick, cheap hits can impact how entrepreneurs shape their ventures. One biotech entrepreneur explained that the long time and significant capital necessary to create integrated biotech companies scared off investors, and “as a business manager, recognizing those kinds of hurdles, I brought it down to a much shorter timeframe where I can talk about a return on investment in a couple years.”<sup>327</sup> That same entrepreneur described a VC who forced another biotech startup to focus on only one product to the exclusion of others to economize on cost and accelerate time to market; ultimately, however, that product failed.<sup>328</sup>

Respondents noted that the pressures of the VC business model had intensified over time, constraining investment in once-popular areas. Several respondents noted that biotech, which has long been associated with venture capital, had fallen out of favor due in part to long product development times.<sup>329</sup>

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wins. And that’s why . . . we expect our flying cars and we’ve got 140 characters. And that’s going on a lot.”).

<sup>325</sup> Respondent 7 (startup founder).

<sup>326</sup> Respondent 1 (university technology transfer official).

<sup>327</sup> Respondent 4 (startup founder).

<sup>328</sup> *Id.*

<sup>329</sup> *Id.* (“Venture’s moved out of biotech for the most part. They want the quicker hit, they want the less risk. Angels are still taking that risk.”).

Furthermore, VC interest in early-stage university inventions has waned. One technology transfer administrator remarked, “it’s more and more challenging to find capital for all of our start-ups because everything has gotta be much closer to commercialization to realize return. And, the nature of university research, is it’s early, early stage.”<sup>330</sup> Additionally, VC investment in cleantech had “pulled back” considerably in favor of software and IT.<sup>331</sup> Large capital requirements and long time horizons had also led to decreased VC funding for semiconductors.<sup>332</sup> One venture capitalist and former semiconductor executive remarked:

[I]f you think about creating a software company here, with a \$50 million investment you could probably create or fund probably 20 or 30 small software companies here. They may or may not be ultimately successful but actually at least you can start it. If you think about how many semiconductor company [sic] can start, you probably can start one or two. That’s really the difference between what has happened in the industry.<sup>333</sup>

Ultimately, the incentives and constraints of the VC business model tend to limit investments in several innovative fields.

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<sup>330</sup> Respondent 20 (university technology transfer official).

<sup>331</sup> Respondent 2 (national laboratory scientist and official); *see id.* (“It comes and goes, there were a lot of people who lost their shirts, and people will tell you the only successful cleantech exit was Tesla. There might have been a few others here or there along the line. A lot of this winds up being M&As instead. But venture capitalists have pulled back quite a bit in the energy space.”).

<sup>332</sup> Respondent 22 (venture capitalist) (“[T]he amount of investment that you have to make in these companies have [sic] now become very hard. If you look at a typical semiconductor, a pure semiconductor, not IoT, not consumer, but a pure semiconductor. A networking chip company, CPU computing company. The investment that you have to make to be competitive is in hundreds of millions of dollars [sic].”).

<sup>333</sup> *Id.*

*B. Normative Analysis*

It is, of course, not surprising that the VC business model dictates the kinds of innovations that receive funding. VCs aim to maximize returns and therefore focus on scalable, high-growth ventures. Furthermore, they seek investments where limited capital injections can significantly accelerate product development. The structure of VC funds typically provides for a medium-term horizon for exiting investments. Software meets many of these parameters, and it is not surprising that software has received a significant share of VC funding.

However, the constraints of the VC business model are concerning from the policy perspective of relying on VC markets to drive innovation.<sup>334</sup> VC markets are a key component of the national innovation system, but they tend to concentrate large amounts of capital in a relatively few areas. From a social welfare perspective, VCs markets may be allocating too much capital to software to the exclusion of other innovations of greater social value.<sup>335</sup> As Professor Martin Kenney observes:

[T]he historical record suggests VC has significant limitations in terms of the types of innovative activity that it can support. VC has found deals intermittently in a variety of industries, but during the last 50 years investments have been concentrated in only two industrial fields, ICT and biomedicine. Large systems innovations, such as new generations of transportation equipment, appear to be too capital intensive for VC investment, though recently VCs have invested in the development of all-electric vehicles. Also, many incremental innovations for

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<sup>334</sup> Lerner & Nanda, *supra* note 21, at 248 (arguing that while venture funding is effective in stimulating certain kinds of innovation, and that concentration of VC funds in particular fields may be privately optimal, such concentration has troubling social implications).

<sup>335</sup> *Cf.* Packer, *supra* note 18 (“[Silicon Valley is] a group of powerful corporations and wealthy individuals with their own well-guarded interests. Sometimes those interests can be aligned with the public’s, sometimes not.”).

existing products may not offer sufficiently great returns to attract VC funding for entrepreneurs. This suggests that VC cannot replace other innovation funding sources.<sup>336</sup>

Many areas of significant economic or social value, such as capital-intensive clean technologies and semiconductor manufacturing, are a poor fit for the VC business model, particularly compared to low-cost Internet startups.<sup>337</sup>

The potential gap between VC funding and social priorities is illustrated by the evolution of VC investments in healthcare. For several years before the recent uptick, VC investments shifted out of biotechnology and toward Internet startups, which raises normative questions over whether this was the ideal allocation of capital for technological development. Within the healthcare sector, VC investments shifted from drugs to medical devices because of more favorable risk-return profiles, raising similar concerns. Commercial potential, rather than public health need or innovation, is the driving force behind VC funding in the life sciences.<sup>338</sup> In one study, 19 of 20 VC fund managers ranked “potential return given the risk of the portfolio” as a factor that either mattered “very much” or was “all that mattered” to investors in their funds.<sup>339</sup> “[P]ublic health impact of portfolio companies” ranked last out of seven factors in importance.<sup>340</sup>

This publicly supported system of private ordering has significant implications for innovation policy given that “life sciences projects selected for investment might not reflect

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<sup>336</sup> Kenney, *Venture Capital*, *supra* note 49, at 1713.

<sup>337</sup> See Hargadon & Kenney, *supra* note 6, at 128-31 (discussing the generally poor fit between VC investing and the energy sector, though identifying a few fields that match the VC business model).

<sup>338</sup> Lehoux et al., *supra* note 6, at 382 (“Our findings also show that certain technological solutions are abandoned in favour of applications that can be commercialised more easily within already established clinical markets.”).

<sup>339</sup> Ackerly et al., *supra* note 6, at 71.

<sup>340</sup> *Id.* at 72 exhibit 2.

society's most urgent public health priorities."<sup>341</sup> The constraints of VC markets are particularly important given that from 2009 to 2018, 42% of FDA-approved drugs and biologics originated from VC-backed deals.<sup>342</sup> The social inefficiency of VC investments is one species of a broader phenomenon in which markets and the maximization of private value will not necessarily produce innovations that maximize social value. As Professor Amy Kapczynski has described, reliance on markets to generate technical and cultural goods entails inefficiencies and distributive inequities, which she calls the "cost of price."<sup>343</sup> Ultimately, the critical role of venture capital in funding technologies of significant social need raises important innovation policy concerns: "VCs' short term determinism, focus on profit (the 'tyranny of the bottom line'), and quick-exit orientation often results in less innovation, commercialization, and investment in long-term R&D."<sup>344</sup>

The obvious response to this line of reasoning is that VCs seek to maximize returns for themselves and their partners, not to achieve the objectives of innovation policy.<sup>345</sup> Furthermore, the VC industry enhances social welfare immensely not only by funding innovation but also by driving economic growth and job creation. While this is true, it is worth keeping in mind that laws, regulations, and federal funding significantly support the VC industry. These public investments are made with the expectation that VC markets will fund innovations that substantially benefit social welfare, but such benefits should be scrutinized rather than assumed. At the very least, policymakers must understand how the VC business model limits the range

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<sup>341</sup> Fleming, *supra* note 278, at 273.

<sup>342</sup> SILICON VALLEY BANK, TRENDS IN HEALTHCARE INVESTMENTS AND EXITS 2019 MID-YEAR REPORT 29 (2019).

<sup>343</sup> Amy Kapczynski, *The Cost of Price: Why and How to Get Beyond Intellectual Property Internalism*, 59 UCLA L. REV. 970, 1006 (2012).

<sup>344</sup> Klonowski, *supra* note 18, at 43; *see also* MAZZUCATO, *supra* note 19 (noting observations that investor speculation has undermined biotech innovation).

<sup>345</sup> *Cf.* Lehoux et al., *supra* note 6, at 376 ("[H]andling the subtleties associated with the fulfillment of health policy goals is neither part of the capital investors' mandate, nor their worldview.").

of innovations attracting venture capital so that they can craft laws and regulations to accommodate these limitations.

## V. Prescriptions

This Article has argued that VC markets play a critical role in the U.S. innovation system. It has explored the myriad ways in which laws, regulations, and policies have supported the VC industry, and it has also shown how VC financing advances important innovation policy objectives. Integrating scholarly commentary and original empirical evidence, it has examined three interrelated structural features that limit the capacity of VC markets to finance a wide range of innovative ventures: reliance on social connections to find entrepreneurs, herd mentality, and the constraints of the VC business model. As noted, these structural deficits are problems not only for entrepreneurs who cannot get financing, but also for innovation law and policy more generally. This Part examines the role of law and policy in mitigating these deficits and enhancing the innovative capacity of venture capital.

Before turning to public policy reforms, it is useful to address how these practices can harm VCs themselves and yet persist even when VCs have incentive to change them. As mentioned, relying on social connections, herding, and the VC business model to guide investment decisions is expedient in many circumstances and can lower costs for VCs. However, such practices can also leave substantial value unrealized. In this regard, it is in VC firms' self-interest to reach beyond traditional social connections to find neglected (and undervalued) enterprises.<sup>346</sup> Similarly, contrarian VC firms stand to profit by investing in alternative ventures, thus exploiting herding to their advantage. However, rational actors do not always maximize utility.<sup>347</sup> Expedience and the gravitational pull of social influences can sometimes lead economic actors to "satisfice" by accepting an available option as satisfactory while leaving

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<sup>346</sup> See Edwards & McGinley, *supra* note 138, at 1921-22.

<sup>347</sup> See generally Altman, *supra* note 201 (discussing several biases that impair decision making).

potential profits (and innovation) on the table.<sup>348</sup> Furthermore, as history makes clear, markets (and market actors) can be irrationally exuberant, and investors may seek safety in numbers by engaging in herding even when doing so does not maximize profits.<sup>349</sup> From a private perspective, some external intervention may be warranted to nudge VCs toward more profit-maximizing behavior.

Even if investors maximized profits, moreover, such allocations would not maximize social value to the extent that markets and prices are imperfect proxies for social welfare. All other things being equal, an inexpensive videogame startup will tend to be a more attractive investment than a capital-intensive cleantech venture, even though the latter may have much greater social value. Public intervention can help alter incentives and nudge VCs toward increasing investments in certain innovations of high social value.

This Part proposes prescriptions to enhance the innovative capacity of venture capital. In so doing, it emphasizes the need for an integrated, holistic approach encompassing numerous intertwined reforms. It sketches the contours of such a macroscopic approach, and its discussion of individual prescriptions will be necessarily brief, leaving more detailed articulation to subsequent treatments. First, it argues for enhancing access to capital, notably by expanding diversity and inclusiveness in the VC-startup ecosystem. Second, it argues for legal and policy reforms to induce greater VC investment in a wide range of socially valuable innovations.<sup>350</sup>

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<sup>348</sup> See *id.* at 44 (“A boundedly rational individual does the best she can, given her physiological, psychological, and institutional decision-making parameters.”).

<sup>349</sup> See *supra* notes 200-233 and accompanying text.

<sup>350</sup> This Part focuses on prescriptions addressing the limitations described in this Article, and more comprehensive prescriptions for innovation policy lie beyond the scope of this inquiry. As a general consideration, however, this Article advocates for robust federal funding of upstream basic research. Such research is too remote from commercialization to attract sufficient private investment, but it is crucial to establishing the scientific and technological base undergirding many innovations that do attract VC funding. See



A. *Expanding Diversity and Inclusiveness in the VC-Startup Ecosystem*

The centrality of social ties to obtaining venture capital hampers innovation, which suggests a need to make VC financing more inclusive. Several respondents advocated expanding access to capital for entrepreneurs. At the same time, they recognized the deeply relational nature of VC financing and the hazards of trying to interfere with private ordering.<sup>351</sup> This section proposes several mechanisms to enhance access to capital, including: wider antidiscrimination enforcement at VC firms, application of insights from the literature on implicit bias, contractual demands by public and quasi-public investors, greater government involvement in credentialing entrepreneurs, alternative financing regimes such as crowdfunding, and increasing the geographic diversity of VC investments through government grants and incentives.

First, antidiscrimination enforcement at VC firms can help expand the pool of entrepreneurs with a realistic chance of

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MAZZUCATO, *supra* note 19, at 19. Additionally, this Article argues that even with improvements to VC financing, such financing is inherently limited in scope. For instance, in areas of time-sensitive, mission-oriented research, there is simply no substitute for government-funded technological development. This was the case, for instance, in the federal government's provision of over \$18 billion as part of Operation Warp Speed to help develop COVID-19 vaccines in record time. HHS, *Fact Sheet: Explaining Operation Warp Speed*, <https://www.hhs.gov/coronavirus/explaining-operation-warp-speed/index.html> [<https://perma.cc/U2RM-A9XP>] (last visited Oct. 1, 2022).

<sup>351</sup> Respondent 13 (startup founder) (“I think VC needs to change. I think a lot of them really rely, over rely on the warm introduction. I understand there is real value to that, somebody has vouched for this thing that you’re about to see, you’re going to be more interested.”); Respondent 20 (university technology transfer official) (“Yeah, it’s a challenging problem to overcome, I think ultimately it’s just the nature of this is just very inherent to human nature [sic], and how we network and how we connect and how things actually . . . How things happen. So it’s more of a sociological phenomenon.”).

obtaining funding.<sup>352</sup> A significant mechanism for enhancing VC firms' openness to entrepreneurs lacking social connections is to increase diversity within VC firms themselves.<sup>353</sup> Such firms are notoriously nondiverse; a 2015 study found that senior investment teams at top-tier VC firms were 92% male and 78% white (see Fig. 3).<sup>354</sup> A more recent study of partners at top VC firms who sit on at least one corporate board revealed that 91% are male.<sup>355</sup>

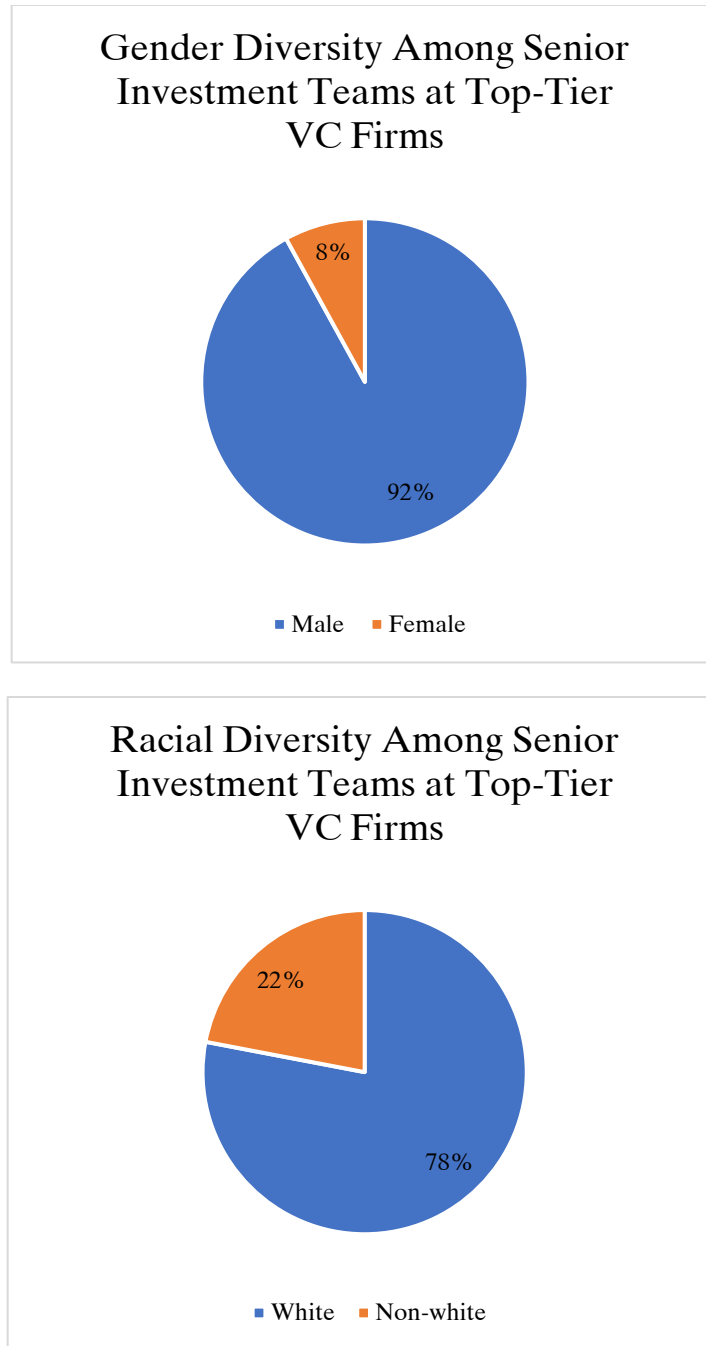
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<sup>352</sup> As noted, although this Article focuses on the objective of promoting innovation, expanding access to capital also serves important distributive ends.

<sup>353</sup> See Duhigg, *supra* note 19 (indicating that "V.C.s fit a narrow mold" and that just under half of VCs attended Harvard or Stanford).

<sup>354</sup> Peter Schulz, *Introducing The Information's Future List*, THE INFORMATION (Oct. 6, 2015), <https://www.theinformation.com/articles/introducing-the-informations-future-list> [<https://perma.cc/NTU7-LB3M>].

<sup>355</sup> Lerner & Nanda, *supra* note 21, at 250. Furthermore, 75% attended either an Ivy League school or Caltech, MIT, or Stanford, and almost 30% graduated from Harvard Business School or Stanford Graduate School of Business. *Id.* at 250-51.



**Figure 3:** Gender and Racial Diversity Among Senior Investment Teams at Top-Tier VC Firms<sup>356</sup>

<sup>356</sup> Lerner & Nanda, *supra* note 21, at 250.

It may be particularly difficult for women and minority entrepreneurs to cultivate ties with powerful investors in Silicon Valley.<sup>357</sup> Notably, research shows that women and minority entrepreneurs are more likely to receive funding from VCs of similar backgrounds.<sup>358</sup> Additionally, male and female investors tend to have gender-based preferences (or respond to different signals) in terms of where to invest.<sup>359</sup> However, just over 2% of venture capital went to female founders in 2017 and 2018,<sup>360</sup> which suggests the potential for significant gains from increasing diversity among VCs. Aggressive enforcement of antidiscrimination law can reduce discrimination in the hiring, retention, and promotion of individual VCs.<sup>361</sup> Beyond classic discrimination at VC firms, internal firm policies governing compensation and promotion—particularly hypercompetitive “rank-and-yank” systems that disparately harm women and minorities—are promising subjects of antidiscrimination suits.<sup>362</sup> Enhancing diversity among VCs can play an important role in expanding access to venture capital.

Against objections that greater antidiscrimination enforcement represents heavy-handed government intervention, it is worth noting that the VC industry itself recognizes significant benefits to diversity. As mentioned above, it is in VCs’ own

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<sup>357</sup> JMG CONSULTING & WYCOFF CONSULTING, *supra* note 124, at 4 (noting that women’s social networks are likely to be comprised of other women and are thus less likely to include venture capitalists); Azevedo, *supra* note 190.

<sup>358</sup> Heather Somerville, *VC Firms Pledge More Diversity, But Accountability Remains Loose*, MERCURY NEWS (Aug. 17, 2016), <https://www.mercurynews.com/2015/08/04/vc-firms-pledge-more-diversity-but-accountability-remains-loose> [<https://perma.cc/ASV7-L7LE>].

<sup>359</sup> Lerner & Nanda, *supra* note 21, at 251.

<sup>360</sup> MacBride, *supra* note 12.

<sup>361</sup> It bears noting that even outright discrimination by VCs against entrepreneurs seeking funding would likely not implicate traditional antidiscrimination law protections. Title VII applies only to employers in an employment relationship with employees. Edwards & McGinley, *supra* note 138, at 1918.

<sup>362</sup> Naomi Cahn et al., *Gender and the Tournament: Reinventing Discrimination Law in an Age of Inequality*, 96 TEX. L. REV. 425, 479-80 (2018).

self-interest to look beyond traditional social connections,<sup>363</sup> and having greater diversity among VCs can help. Discrimination by VCs leads to economically irrational funding disparities, and investors can exploit such inefficiency by targeting investments toward overlooked founders.<sup>364</sup> Enhancing diversity among VCs also counteracts “groupthink” and leads to better financial performance.<sup>365</sup> As Bobby Franklin, president and CEO of the NVCA observed, “You actually can make better-informed and more profitable investment decisions with a diverse team. . . . This isn’t about social justice alone. This is about social justice and making more money.”<sup>366</sup>

Antidiscrimination suits are notoriously difficult to win,<sup>367</sup> but given the herding mentality that permeates the VC community, even suits that fail may ultimately have significant impact. One of the enduring lessons of this study is that relationships and reputations matter in VC investing. Furthermore, the actions of a few VC thought leaders can initiate behavioral cascades that elicit numerous followers. While a “following” mentality can lead to poor investment decisions, they can also help coalesce the investment community around new, more productive norms. In the wake of Ellen Pao’s high-profile but unsuccessful suit against Kleiner Perkins, a consortium of 45 VC firms pledged to bring more women and minorities into the industry.<sup>368</sup> According to one commentator, “it lit a fire under VC firms to begin addressing their gender problem.”<sup>369</sup> Promising in this regard, the NVCA has recognized the diversity shortfalls

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<sup>363</sup> See *supra* note 346 and accompanying text.

<sup>364</sup> Edwards & McGinley, *supra* note 138, at 1921.

<sup>365</sup> See Fan, *supra* note 137, at 388.

<sup>366</sup> Somerville, *supra* note 358 (quoting Bobby Franklin, president and CEO of the NVCA); see also MacBride, *supra* note 12 (“Investors are leaving money on the table, and they are missing innovation because the people that are running these VCs cannot relate to the preferences of people that are living outside their experiences.” (quoting Susan Choe, founder of Kat-alyst Ventures)).

<sup>367</sup> Edwards & McGinley, *supra* note 138, at 1918.

<sup>368</sup> *Id.*; Jessica Guynn, *Venture Capital to Make Diversity Pledge, USA TODAY* (Aug. 4, 2015).

<sup>369</sup> Somerville, *supra* note 358.

of its industry and has spearheaded an initiative to enhance representation among VCs and companies receiving funding.<sup>370</sup> While early empirical evidence suggests that gender diversity has not yet changed much at VC firms,<sup>371</sup> high-profile litigation can have ripple effects that contribute to lasting cultural change.

It bears emphasizing that increasing diversity at VC firms would address two of the problems highlighted in this Article: overreliance on social connections and herding. Experimental evidence suggests that more diverse market participants engage in greater individual scrutiny of investment decisions and less herding. In particular, experiments reveal that ethnic homogeneity increases the likelihood and magnitude of pricing bubbles.<sup>372</sup> Whereas homogeneity induces confidence and trust in the decisions of others, “in a diverse market, traders are more likely to scrutinize others’ behavior and less likely to assume that others’ decisions are reasonable.”<sup>373</sup> Given that “homogeneity may play a critical role in herding,” enhancing diversity within VC firms and the startups they fund promises greater scrutiny of investments and independent due diligence.<sup>374</sup>

Second, scholarly insights concerning implicit bias can help improve investors’ vetting of nontraditional entrepreneurs. As legal scholars have noted, most discrimination is not explicit, but arises from implicit or unconscious prejudice.<sup>375</sup> While VC

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<sup>370</sup> NVCA, 2020 YEARBOOK, *supra* note 41, at 5.

<sup>371</sup> Fan, *supra* note 137, at 346-47 (reporting that the percentage of women in VC firms with decision making power decreased from 10% in 1999 to 8% in 2017).

<sup>372</sup> Sheen S. Levine et al., *Ethnic Diversity Deflates Price Bubbles*, 111 PROC. NAT’L ACAD. SCI. 18524, 18524 (2014).

<sup>373</sup> *Id.* at 18525.

<sup>374</sup> *Id.* at 18528; *cf.* Packer, *supra* note 18, at 51 (“It suddenly occurred to me that the hottest tech start-ups are solving all the problems of being twenty years old, with cash on hand, because that’s who thinks them up.”).

<sup>375</sup> Christine Jolls & Cass R. Sunstein, *The Law of Implicit Bias*, 94 CALIF. L. REV. 969, 970-71 (2006); Jerry Kang & Kristin Lane, *Seeing Through Colorblindness: Implicit Bias and the Law*, 58 UCLA L. REV. 465, 467-68 (2010).

investing is designed to address information asymmetries, the lack of diversity among fund managers leaves them susceptible to implicit bias.<sup>376</sup> One mechanism for enhancing access to venture capital is for VC firms to adopt blind pitches. Applying insights from the literature on implicit bias, blind pitches would allow entrepreneurs to propose ideas to VCs while concealing aspects of their backgrounds and social connections.<sup>377</sup> One interviewee cited a program in the San Francisco district attorney's office that adopted an algorithm concealing photos and other identifying information of suspects when determining who should get charged. This respondent suggested that a similar program could apply to the "first cut" of VC screenings.<sup>378</sup> Such a mechanism would reduce the influence of social ties and implicit bias and focus evaluations on the merits of an entrepreneurial proposal.

Third, contractual demands by public and quasi-public investors can compel VC firms to increase diversity in both themselves and their portfolio companies.<sup>379</sup> As noted, venture funds are partnerships in which limited partners (LPs) contribute the vast majority of capital. VCs are the agents of LPs, and while LPs generally take a hands-off approach, they can influence the kinds of ventures that VCs fund. LPs typically include foundations, government pension funds, and university endowments,<sup>380</sup> many of which are public and quasi-public entities that might reasonably prioritize diversity and inclusion in their investments.<sup>381</sup> LPs have already pushed VCs to hire more

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<sup>376</sup> Berdejo, *supra* note 140, at 45, 60.

<sup>377</sup> See Greenwald & Krieger, *supra* note 142, at 945.

<sup>378</sup> Respondent 18 (startup accelerator official).

<sup>379</sup> This discussion focuses on private-law contractual claims by institutional investors against VCs. In theory, those investors may also bring fiduciary suits against VCs alleging that discriminatory practices damage the venture capital fund. However, many VC firms organize their funds in a way that limits fiduciary duties, thus frustrating this option. See Edwards & McGinley, *supra* note 138, at 1919-20.

<sup>380</sup> Johannes Lenhard, *The Role of Limited Partners in Investment Inclusivity*, CRUNCHBASE NEWS (Dec. 19, 2019), <https://news.crunchbase.com/diversity/the-role-of-limited-partners-in-investment-inclusivity> [<https://perma.cc/MDU2-85HJ>].

<sup>381</sup> Fan, *supra* note 137, at 398.

women and minorities and to include more diverse directors on the boards of portfolio companies.<sup>382</sup> LPs have even tranced their investments based on VCs and portfolio companies meeting diversity milestones.<sup>383</sup> LPs could contractually mandate that VCs enhance their own diversity and the diversity of the startups they fund.<sup>384</sup> Through leveraging private-law mechanisms, public and quasi-public LPs can demand that VCs cast wider nets when screening entrepreneurs.

Fourth, the government can play a valuable role in credentialing new entrepreneurs to help them access fundraising networks. As previous research and this Article has shown, while social connections may be the gold standard for meeting VCs, institutional stamps of approval—such as from accelerators or Silicon Valley lawyers—can help unproven entrepreneurs meet investors and get financing.<sup>385</sup> The government can also play an important role in credentialing entrepreneurs, thus allowing them to signal technical and business quality to VCs. This function adds a new gloss to existing government practices. For instance, the patent office grants patents to stimulate invention, but commentators recognize that patents also perform a signaling function that helps startups obtain financing.<sup>386</sup> Additionally, empirical research reveals that government research grants play a similar signaling function in allowing startups to attract VC.<sup>387</sup> Building on these practices, government agencies could formalize this signaling function. For instance, the Small Business Administration could couple outreach to underrepresented entrepreneurs with competitive

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<sup>382</sup> Lenhard, *supra* note 380.

<sup>383</sup> *Id.*

<sup>384</sup> *Cf.* Fan, *supra* note 137, at 398. LPs could also refuse to sign nondisclosure agreements that would otherwise prevent them from discussing the investments that GPs make. *Id.* at 399.

<sup>385</sup> *See supra* Part II.

<sup>386</sup> Clarisa Long, *Patent Signals*, 69 U. CHI. L. REV. 625, 627-28 (2002).

<sup>387</sup> Mazhar Islam et al., *Signaling by Early Stage Startups: US Government Research Grants and Venture Capital Funding*, 33 J. BUS. VENTURING 35, 48 (2018).



business plan reviews to provide a valuable “stamp of approval” for entrepreneurs seeking private financing.

Fifth, legal reforms can enhance the effectiveness of alternative forms of financing that cast a wider net than VC, such as crowdfunding. Although a comprehensive evaluation of crowdfunding lies beyond the scope of this Article, one of its benefits is that it widens the universe of funders for entrepreneurs. As noted, the JOBS Act relaxed securities regulations to expand crowdfunding.<sup>388</sup> Several interview respondents mentioned the JOBS Act and crowdfunding as an alternative means for entrepreneurs to obtain funding.<sup>389</sup> Of course, crowdfunding is subject to several critiques, including that “crowds” may allocate capital irrationally and that unsophisticated investors can lose considerable wealth.<sup>390</sup> Additionally, crowdfunding does not provide the hands-on management advice and introductions to business contacts through which VCs add enormous value to new startups. While it raises several complexities that warrant further examination, crowdfunding represents a valuable supplement to traditional VC and lessens the importance of social connections in obtaining funding.

Finally, government intervention can also increase the geographic diversity of VC investments. The VC industry is highly concentrated geographically; three metropolitan

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<sup>388</sup> Jumpstart Our Business Startups Act, Pub. L. No. 112-106, § 302(c), 126 Stat. 306, 320 (2012) (codified at 15 U.S.C. § 77d); see Schwartz, *supra* note 4; Ibrahim, *Crowdfunding*, *supra* note 206; see generally Chris Brummer, *Disruptive Technology and Securities Regulation*, 84 FORDHAM L. REV. 977 (2015).

<sup>389</sup> See, e.g., Respondent 3 (startup founder) (“I guess with the right protections, yes, I’d like to see more things like that. Making funding more accessible. Making it, everything I mentioned with the ecosystem [sic], making that easier and more accessible to do.”).

<sup>390</sup> See, e.g., Jill Fisch, *Can Internet Offerings Bridge the Small Business Capital Barrier?*, 2 J. SMALL & EMERGING BUS. L. 57, 58 (1998) (“Companies with small capitalizations present disproportionate risks of both business failure and fraud. These risks may be magnified by Internet-based securities transactions.”); see also Berdejo, *supra* note 140, at 83-84 (suggesting that implicit bias drives crowdfunding investment away from minority-led ventures).

areas—the San Francisco Bay Area, greater New York, and greater Boston—account for about two-thirds of VC investments every year.<sup>391</sup> While such concentration gives rise to increasing returns to scale—fueling “agglomeration economies” such as Silicon Valley<sup>392</sup>—it also has troubling distributive implications. Geographic concentration in VC funding can promote the “hollowing out” of entrepreneurial activity in other parts of the country, which exacerbates significant geographic inequities.<sup>393</sup> Furthermore, like the lack of diversity among VC investors themselves, such geographic concentration can skew investment decisions toward certain types of innovations. As Josh Lerner and Ramana Nanda note, “Venture firms based in other cities might have chosen very different firms to invest in given their perspectives on their local economies.”<sup>394</sup> Although it is difficult to overcome the entrenched advantages of established VC centers, government action can help enhance geographic diversity in VC investments. As explored further below, the federal government plays a critical role in catalyzing and sustaining many early-stage ventures, particularly through programs like SBIR grants. Greater targeting of such grants to localities overlooked by VCs could enhance the geographic diversity of promising startups and VC investments. Furthermore, as noted, proposed legislation would allocate significant federal funds to promote startup investments in undercapitalized regions.<sup>395</sup> State and local governments can also help attract VCs and the startups they fund. For instance, lower costs of living and favorable regulations in Texas and Florida are helping to attract some members of the VC community to those states, primarily from Silicon Valley.<sup>396</sup>

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<sup>391</sup> Lerner & Nanda, *supra* note 21, at 249.

<sup>392</sup> *Id.*; see ALFRED MARSHALL, PRINCIPLES OF ECONOMICS 222-30 (8th ed. 1920) (describing agglomeration economies).

<sup>393</sup> Lerner & Nanda, *supra* note 21, at 249-50.

<sup>394</sup> *Id.* at 250.

<sup>395</sup> New Business Preservation Act, H.R. 6403, 116th Cong. (2020); see Klobuchar, *supra* note 79.

<sup>396</sup> Cyrus Farivar, *Tech Flight: Why Silicon Valley is Heading to Miami and Austin, Texas*, NBC NEWS (Jan. 24, 2021), <https://www.nbcnews.com/business/business-news/tech-flight-why-silicon-valley-heading-miami-austin->

### B. *Modifying Incentives to Shift Venture Capital Investments*

VCs rely extensively on social connections to find entrepreneurs, engage in herding behavior, and focus on a relatively limited set of innovations that align with the VC business model. These behaviors diminish the overall innovative capacity of VC and can particularly constrain investment in certain technologies of high social value. This Part proposes several ways that the government can alter the incentives facing VCs to increase their investment in more innovative technologies, particularly ones that meet pressing social needs. It argues that government can enhance the attractiveness of certain innovations by “de-risking” them through regulatory reforms and targeted funding. It further argues for changes to tax policy to help shift VC investments toward areas of high social need. Finally, with some caveats, it argues that public entities can more directly impact VC funding priorities by actively investing in venture capital funds themselves.

First, regulatory reforms can “de-risk” technological areas of high policy importance, thus rendering them more attractive to VCs. Investors are sensitive to risk, and government regulations are a significant source of risk.<sup>397</sup> In health care, for example, policymakers can nudge VCs toward investing in pharmaceuticals by reducing the time, cost, and uncertainty of drug development.<sup>398</sup> Along these lines, expedited Food and Drug Administration (FDA) review through mechanisms such as Fast Track, Breakthrough Therapy, Accelerated Approval, and Priority Review significantly reduce risks for private entities.<sup>399</sup> Notably, many VC-backed biopharmaceutical startups

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texas-n1255330; Marc Vartabedian & Isaac Taylor, *Venture-Capital Funding Gets Bigger in Texas*, WALL ST. J. (Mar. 17, 2021), <https://www.wsj.com/articles/venture-capital-funding-gets-bigger-in-texas-11615975200> [<https://perma.cc/Q893-5YDV>].

<sup>397</sup> Ackerly et al., *supra* note 6, at 73; Fleming, *supra* note 278, at 272 (“Policy makers can have a profound influence on both the amount of capital and the types of projects that venture capital firms finance.”).

<sup>398</sup> Fleming, *supra* note 278, at 276.

<sup>399</sup> Jonathan J. Darrow et al., *New FDA Breakthrough-Drug Category—Implications for Patients*, 370 NEW ENG. J. MED. 1252, 1255-57 (2014).

configure their projects to qualify for these programs.<sup>400</sup> This Article proposes more aggressive use of regulatory incentives to accelerate the development of high-value innovations that may not receive adequate private financing, such as diagnostics, therapeutics, and vaccines.<sup>401</sup>

Legal reforms can not only reduce risk, they can also enable viable markets for new technologies. For example, the Orphan Drug Act establishes exclusive rights and other incentives to develop drugs treating “orphan” diseases, typically defined as those affecting less than 200,000 Americans.<sup>402</sup> The Act improves the risk-return profile for developing orphan drugs and has spurred VC funding for such therapeutics.<sup>403</sup> Empirical research reveals that orphan drug designation represents a valuable asset that helps attract IPO investors for firms developing such drugs.<sup>404</sup> Policymakers cannot expect that robust VC markets will adequately fund all technologies of high social importance, but they can nudge those markets to fund certain technologies through regulatory incentives.

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<sup>400</sup> Fleming, *supra* note 278, at 275.

<sup>401</sup> This Section focuses on government support for early-stage ventures that can attract VC financing. Further interventions may be necessary to ensure that such ventures ultimately enjoy some meaningful existence in the marketplace as opposed to, for example, being acquired by industry incumbents that then terminating their innovative projects. See Lemley & McCreary, *supra* note 41, at 61-66.

<sup>402</sup> Orphan diseases are also defined as those for which ordinary market forces are not likely to generate treatments. Orphan Drug Act of 1983, Pub. L. No. 97-414, 96 Stat. 2049 (1983); 42 U.S.C. §236 (1992). See Michael Abramowicz, *Orphan Business Models: Toward a New Form of Intellectual Property*, 124 HARV. L. REV. 1362, 1384-88 (2011); MAZZUCATO, *supra* note 19, at 82-84; see Robert A. Bohrer & John T. Prince, *Tale of Two Proteins: The FDA's Uncertain Interpretation of the Orphan Drug Act*, 12 HARV. J.L. & TECH. 365, 370-71 (1999).

<sup>403</sup> Fleming, *supra* note 278, at 275.

<sup>404</sup> Philippe Gorry & Diego Useche, *Orphan Drug Designations as Valuable Intangible Assets for IPO Investors in Pharma-Biotech Companies*, in ECONOMIC DIMENSIONS OF PERSONALIZED AND PRECISION MEDICINE 305, 328 (Ernst R. Berndt et al., eds. 2019).

Second, in addition to regulatory incentives, governments can directly de-risk technologies through public funding. Between basic scientific discoveries and precommercial technologies that can attract private financing, there is a well-documented “valley of death” where many promising innovations die. Public funding is extremely helpful in filling this gap, particularly given that VC funding is shifting from earlier- to later-stage startups. Government programs such as SBIR grants, which benefit early-stage, technology-based ventures, and the Advanced Technology Program have provided 20-25% of total funding for early-stage technology companies.<sup>405</sup> Expanding funding for such programs would ensure that technologies are more mature before entrepreneurs seek VC financing.<sup>406</sup> By shouldering more of the cost and risk of technological development, federal funding can render innovations more attractive to private investors.

More generally, the government can play a crucial role in “seeding” innovative industries, particularly in areas of high public policy importance.<sup>407</sup> By providing funding and assuming risk, public support can prime these industries for private investment. Instructive in this regard, the first VC firms emerged after World War II to commercialize technologies arising from federal defense spending.<sup>408</sup> DARPA famously catalyzed development of the Internet, which has enabled

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<sup>405</sup> MAZZUCATO, *supra* note 19, at 41; Hargadon & Kenney, *supra* note 6, at 133-34 (noting numerous positive reviews of the SBIR program).

<sup>406</sup> See Brian Kingsley Krumm, *Fostering Innovation and Entrepreneurship: Shark Tank Shouldn't be the Model*, 70 ARK. L. REV. 553, 583 (2017); see also Fleming, *supra* note 278, at 275 (calling for increased SBIR funding in target areas); MAZZUCATO, *supra* note 19, at 19; see NAT'L RSCH. COUNCIL, *supra* note 48, at 3 (calling for increased funding for the SBIR program). *But see* Lerner & Nanda, *supra* note 21, at 257 (reporting research indicating that Phase I awards have a highly positive effect on technology ventures but that Phase II awards have no impact and that some firms operate as “SBIR mills” that obtain multiple awards but commercialize fewer projects than firms receiving fewer awards).

<sup>407</sup> See MAZZUCATO, *supra* note 19, at 23; Gaddy et al., *supra* note 105, at 12 (arguing for greater public investment in funding basic science and early-stage companies).

<sup>408</sup> See *supra* notes 50-51 and accompanying text.

countless VC-backed startups.<sup>409</sup> Following the DARPA model, the Department of Energy established the Advanced Research Projects Agency-Energy (ARPA-E), and President Biden has recently proposed the Advanced Research Projects Agency for Health (ARPA-H).<sup>410</sup> This agency would explicitly pursue risky, “breakthrough” projects that do not fit the business constraints of private investors.<sup>411</sup> By absorbing this risk, this program promises to generate more mature, highly innovative technologies that can attract private investment.

In addition to public funding, the federal government’s procurement power can reduce market risk and create instant demand for certain high-value technologies.<sup>412</sup> The federal government is a massive consumer of innovation, and its procurement of cutting-edge technologies can establish novel industries that attract VC investment. Government funding and procurement were critical to cultivating the nuclear power, computer, semiconductor, and aerospace industries, several of which then became attractive targets for VC financing.<sup>413</sup>

Third, tax policy can also shape the incentives of VCs. As noted, federal tax policy already subsidizes VCs and their portfolio companies in a variety of ways.<sup>414</sup> Empirical research suggests that increasing taxes on VC-backed companies can hamper innovation.<sup>415</sup> Additionally, federal tax law can more directly incentivize (or discourage) investments in particular classes of technology. For example, a higher tax on carbon fuels would increase investment in clean technologies by enhancing

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<sup>409</sup> DARPA, *Paving the Way to the Modern Internet*, <https://www.darpa.mil/about-us/timeline/modern-internet> [<https://perma.cc/HM4U-KCBD>] (last visited Oct. 1, 2022).

<sup>410</sup> Francis S. Collins et al., *ARPA-H: Accelerating Biomedical Breakthroughs*, 373 *SCIENCE* 165, 165 (2021).

<sup>411</sup> *Id.* at 165.

<sup>412</sup> See Hargadon & Kenney, *supra* note 6, at 134.

<sup>413</sup> NAT’L RSCH. COUNCIL, *supra* note 48, at xiv, 8.

<sup>414</sup> See *supra* notes 64-67 and accompanying text.

<sup>415</sup> Ufuk Akcigit & Stefanie Stantcheva, *Taxation and Innovation: What Do We Know?* 9 (Nat’l Bureau of Econ. Rsch., Working Paper No. 27109, 2020).

their attractiveness to VCs.<sup>416</sup> Indeed, VCs indicate that carbon pricing, which usually involves taxes on carbon emissions, can make capital-intensive technologies like direct air-carbon capture more appealing to investors.<sup>417</sup>

Fourth, public and quasi-public entities can more directly impact the investment priorities of VCs by investing in VC funds themselves. One helpful approach is to extend VC investment timelines. As discussed, most VC funds have a ten-year lifespan, which provides a medium-term period for making and liquidating investments. However, most LPs in venture funds are institutional investors such as pension funds, foundations, and university endowments, which can accommodate a longer investment horizon. Extending this horizon can open up more lucrative investment opportunities with longer timelines, such as in biotechnology, clean technology, and other cutting-edge areas.<sup>418</sup> More directly, these public and quasi-public entities can assert their influence to press not only for greater diversity in founders receiving VC financing, but also for more investment in technologies that serve particular innovation objectives. For example, institutional investors such as CalPERS are prioritizing investments in “socially desirable” clean technology funds.<sup>419</sup> More aggressively, some large pension funds are

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<sup>416</sup> Hargadon & Kenney, *supra* note 6, at 133.

<sup>417</sup> James Thorne, *Cleantech Deals Set for Big Shifts under Biden*, *Investors Say*, PITCHBOOK.COM (Nov. 30, 2020), <https://pitchbook.com/news/articles/cleantech-deals-set-for-big-shifts-under-biden-investors-say> [<https://perma.cc/6YMW-RRDB>].

<sup>418</sup> See Gaddy et al., *supra* note 105, at 12 (noting that some institutional investors can wait for decades before realizing returns). Additionally, some VC firms are experimenting with “permanent” funds that are not subject to the typical 10-year liquidation cycle of most VC funds. See *New Age*, *supra* note 124. As Lemley and McCreary observe, individual VCs are likely to favor earlier exits than LPs, which tend to be large, well-resourced, diversified institutions. Lemley & McCreary, *supra* note 41, at 47. LPs must thus be vigilant in overcoming principal-agent problems and asserting their preferred investment priorities and time horizons vis à vis VCs.

<sup>419</sup> See Hargadon & Kenney, *supra* note 6, at 131.

increasingly investing in startups directly, bypassing traditional VC intermediaries.<sup>420</sup>

At the far end of the spectrum, national governments can become VCs themselves. Numerous governments around the world operate sovereign wealth funds that invest venture capital.<sup>421</sup> Countries establish sovereign wealth funds to serve numerous objectives, including to bolster strategic industries that the private sector may neglect.<sup>422</sup>

Of course, any proposal for greater government intervention in VC markets must proceed with caution. Regulatory, funding, and tax subsidies encourage investors and companies to engage in political rent-seeking, which may detract from innovative activity.<sup>423</sup> While VCs have certain biases that skew investment decisions, government agencies also have biases and often lack technical expertise to pick technological winners. For example, the federal government's massive loan guarantees for VC-backed cleantech companies have not been successful.<sup>424</sup> These shortcomings undergird Ronald Gilson's recommendation that any governmental role in engineering a venture capital market must require "allocative passivity."<sup>425</sup> Additionally, government agencies are ill-equipped to provide the value-added services provided by VC firms, such as management advice and introductions to business partners.<sup>426</sup> Historically, however, government support has played a critical role in nurturing both the VC industry and the innovative companies that attract VC investment. And while governments must be

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<sup>420</sup> *New Age*, *supra* note 124.

<sup>421</sup> JOSH LERNER, BOULEVARD OF BROKEN DREAMS: WHY PUBLIC EFFORTS TO BOOST ENTREPRENEURSHIP AND VENTURE CAPITAL HAVE FAILED—AND WHAT TO DO ABOUT IT 134 (2009).

<sup>422</sup> As one interview respondent remarked, sovereign wealth funds are particularly well positioned for long-term investments, such as in clean energy. Respondent 2 (national laboratory scientist and official).

<sup>423</sup> Hargadon & Kenney, *supra* note 6, at 132.

<sup>424</sup> *Id.*

<sup>425</sup> Gilson, *Engineering*, *supra* note 4, at 1100-01.

<sup>426</sup> *Id.* at 1070 (“[A] specialized financial intermediary is a necessary ingredient for which the government is not a substitute.”).



particularly cautious when trying to play venture capitalists themselves, targeted public intervention is a highly valuable complement to a financing ecosystem dominated by the VC business model and its attendant limitations.

### **Conclusion**

Law can play a significant role in helping to translate great ideas into great innovations. While VC markets embody private ordering, they both benefit from significant public support and are important vehicles for effectuating public policy objectives. Accordingly, this Article has examined VC markets through the lens of innovation law and policy. In doing so, it has augmented existing scholarship with original interviews with thirty-two early-stage investors, entrepreneurs, lawyers, and other innovation professionals in Northern California. This study explores three related structural characteristics that limit VC markets' ability to fund a wide range of socially valuable innovations. First, social ties play a key role in connecting entrepreneurs and venture capital. This phenomenon shrinks the pool of entrepreneurs with a realistic chance of obtaining funding and distorts capital allocations in favor of those with greater social capital. Second, VCs exhibit a surprising degree of herd mentality, investing in trendy technologies while shying away from truly radical innovations. Finally, the VC business model favors innovations that promise large returns in a medium time frame with minimal risk. Such criteria necessarily deprioritize large swaths of socially valuable innovations with longer, riskier development timelines.

To address these deficits, this Article has proposed legal and policy prescriptions to help translate great ideas into great innovations. First, it proposes using a variety of legal and regulatory mechanisms to enhance access to venture capital for a wider range of entrepreneurs. Second, it proposes legal and policy reforms to alter the incentives facing VC firms, thus shifting their investments toward certain innovations of high social value. Through such efforts, public intervention can help expand the innovative potential of venture capital.

## Methodological Appendix

This Article presents the findings of an original qualitative empirical study of innovators in Northern California. The sample universe is defined by geography and occupation.<sup>427</sup> It spans the San Francisco Bay Area (including Silicon Valley) to Sacramento, which includes what many consider to be the most innovative region in the world.<sup>428</sup> Given that the study focused on how VCs connect with startups and how they make investment decisions, several types of professionals involved in this process were selected. The target population includes four categories of professionals involved in VC financing: early-stage investors, entrepreneurs and executives, lawyers working at law firms and technology companies, and other innovation facilitators, which include representatives of university technology transfer offices, national laboratories, and industry trade groups.

I utilized several sampling methodologies to identify participants.<sup>429</sup> First, I used convenience sampling based on professional contacts with innovation professionals in Northern California. This method was particularly useful for identifying law-firm and in-house attorneys. To ensure inclusion of participants across all four categories, I utilized purposive sampling for categories in which I had limited pre-existing connections.<sup>430</sup> To supplement my search, I used random sampling to identify early-stage investors and entrepreneurs. To find investors, I identified the top VC firms listed in the Silicon Valley Business Journal in 2016-17.<sup>431</sup> I then reviewed the websites of these firms to obtain contact information for leading officers and

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<sup>427</sup> See Oliver C. Robinson, *Sampling in Interview-Based Qualitative Research: A Theoretical and Practical Guide* 11 QUALITATIVE RSCH. PSYCH. 25-26 (2014) (defining a study's sample population).

<sup>428</sup> As of 2019, there were 1,473 VC firms in California, which is more than twice the number of the next highest state (New York with 525), and far above the national average. NVCA, DATA PACK, *supra* note 277, at 5.

<sup>429</sup> See Robinson, *supra* note 427, at 31-35 (discussing various sampling strategies).

<sup>430</sup> *Id.* at 32 (describing purposive sampling).

<sup>431</sup> SILICON VALLEY BUS. J., 2016-17 BOOK OF LISTS 14 (2016).

contacted them via email. For entrepreneurs, I ran searches on AngelList for companies in biotechnology, pharmaceuticals, and software located in Silicon Valley.<sup>432</sup> For each search, I then used a random number generator to identify a subset of companies and reviewed their websites to identify the founder or chief executive officer. I then utilized VoilaNorbert.com to obtain email addresses and contacted the appropriate corporate officer.

In addition to these approaches, I relied significantly on snowball sampling. This method was particularly useful given that the target population was not likely to respond to general advertisements or cold inquiries.<sup>433</sup> To facilitate snowball sampling, I included a standard question when scheduling and conducting interviews asking respondents to suggest other candidates for this study. Referrals from other interviewees garnered the majority of the subjects in this study. Not surprisingly, the response rate from snowball sampling was much higher than from cold emailing.

The sampling techniques yielded thirty-two innovators. Categorizing these respondents is somewhat difficult given that many of them have worked in several occupational categories during their careers. For instance, one interviewee had worked as an entrepreneur and then as a venture capitalist before becoming a university technology transfer official. I perceived the varied professional backgrounds of respondents as a benefit, as it tended to counter any potential occupational bias that individuals might have if they had only worked, for example, as a VC or entrepreneur.<sup>434</sup> For identification purposes, references to the occupations of the respondents in this study refer to their occupation at the time of the interview (see Table 1).

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<sup>432</sup> ANGELLIST, <https://angel.co/companies>.

<sup>433</sup> Robinson, *supra* note 427, at 37.

<sup>434</sup> *Cf.* Granovetter, *supra* note 20, 486-87 (cautioning against reductionist accounts that attribute individual behavior to demographic categories, such as one's occupation).

<b>Respondent</b>	<b>Occupation at Time of Interview</b>
1	University technology transfer official
2	National laboratory scientist and official
3	Startup founder
4	Startup founder
5	National laboratory scientist and startup founder
6	Startup founder
7	Startup founder
8	Startup founder
9	Startup founder
10	Startup founder
11	Technology executive
12	Startup founder
13	Startup founder
14	Industry trade group official
15	National laboratory official
16	National laboratory official
17	Startup accelerator official
18	Startup accelerator official
19	Angel investor

20	University technology transfer official
21	Startup accelerator official
22	Venture capitalist
23	Venture capitalist
24	Silicon Valley law firm attorney
25	Silicon Valley law firm attorney
26	University technology transfer official
27	Silicon Valley law firm attorney
28	Silicon Valley law firm attorney
29	Technology company attorney
30	Technology company attorney
31	Technology company attorney
32	Technology company attorney

**Table 1.** Interview Participants and Occupations

I personally conducted all interviews between late 2017 and 2019. I conducted thirty interviews in person, generally at the interviewee's place of business, and two over the telephone. Interviews followed a semi-structured format in which I posed a standard set of questions to all respondents but maintained flexibility to ask follow-up questions.<sup>435</sup> Interviews addressed accessing venture capital, drivers of innovation, the importance of intellectual property to innovation, and industry consolidation, but this Article focuses on the portion of interviews dealing with venture capital. Interviews varied in duration but averaged 50 minutes. IRB approval was obtained, and informed consent disclosures were provided to all interviewees. All

<sup>435</sup> See Silbey, *supra* note 13, at 592-93 (describing semi-structured interviews).

interviewees agreed to be audio recorded, and professional transcription services transcribed the recordings. Audio recordings and transcripts were stored in a password-protected account. I coded the interview responses using Atlas.ti.<sup>436</sup> I originally coded responses based on a scheme organized by interview questions. However, consistent with an inductive approach, several codes additional emerged organically during the coding and recoding processes.<sup>437</sup>

This study has several limitations. Of course, a central issue of any qualitative research that utilizes sampling is sample size.<sup>438</sup> Over the course of the interviews, responses reached saturation,<sup>439</sup> with numerous respondents echoing similar views on the processes by which startups obtain venture capital and the factors that guide VC investment decisions. Interviews continued beyond this point, and while it is possible that additional interviews would have yielded new insights, it became apparent that the most common views within the sample population were well represented.<sup>440</sup>

Related to the issue of sample size is generalizability. Due to both the research design and the heavy reliance on convenience and snowball sampling,<sup>441</sup> this Article can only make limited claims of generalizability within and beyond the Northern California VC market. However, it bears mentioning that the

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<sup>436</sup> See *id.* at 593-94 (describing software-based qualitative data analysis).

<sup>437</sup> David R. Thomas, *A General Inductive Approach for Analyzing Qualitative Evaluation Data*, 27 AM. J. EVALUATION 237, 238 (2006) (“[I]nductive analysis refers to approaches that primarily use detailed readings of raw data to derive concepts, themes or a model through interpretations made from the raw data by an evaluator or researcher.”).

<sup>438</sup> See Robinson, *supra* note 427, at 29 (discussing several considerations regarding sample size).

<sup>439</sup> *Id.* at 31.

<sup>440</sup> Cf. Silbey, *supra* note 13, at 592 (noting the importance of continuing interviews beyond a saturation point).

<sup>441</sup> Robinson, *supra* note 427, at 32 (justifying the use of convenience sampling based on restricting generalizations to local levels); Krista J. Gile & Mark S. Handcock, *Respondent-Driven Sampling: An Assessment of Current Methodology*, 40 SOCIO. METHODOLOGY 285, 287 (2010) (noting challenges of statistical inference from snowball sampling).

consistency of these findings with prior empirical work provides a useful robustness check. As noted, interviewees raised several novel claims that warrant further empirical exploration.<sup>442</sup>

As in any study involving sampling, selection bias is a possibility. As mentioned, convenience sampling was used to identify many of the respondents based on professional connections to the author. There might be common traits among respondents selected through such sampling, such as similar educational backgrounds, that skew responses in particular ways. There is also a possibility of self-selection bias, as not all individuals contacted agreed to participate; at the very least, those who agreed to participate may be presumed to be more open and interested in sharing their views than the general sample universe.<sup>443</sup> However, it is difficult to see how a proclivity to participate in this study would bias responses in any meaningful way. All respondents—whether pre-existing contacts or those who did not know me—were aware of my status as a professor focusing on intellectual property law at the time of the interview. This in theory could bias their responses in favor of overstating the importance of intellectual property to obtaining venture capital. However, relatively few respondents addressed this topic, which suggests that such bias played a limited role if any.

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<sup>442</sup> See *supra* Part III.A.1.

<sup>443</sup> Robinson, *supra* note 427, at 36.