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Recommended Citation
Lital Helman, Innovation Funding and the Valley of Death, 76 SMU L. Rev. 263 (2023)

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INNOVATION FUNDING AND THE VALLEY OF DEATH

Lital Helman*

ABSTRACT

Innovation is a public good. As with other public goods, it is expected to be underproduced if only private incentives are present. Therefore, the law strives to encourage innovation via an array of stimulus mechanisms. The law offers three main mechanisms: intellectual property (IP), cash transfers—mainly prizes and grants—and tax incentives.

Vast literature analyzes and compares these innovation stimuli in search of the optimal mix to boost innovation. Yet a key problem is largely overlooked: together, the existing stimuli do not cover the lion’s share of the innovation lifecycle. At the beginning of the innovation process, companies can win grants or prizes to cover research & development (R&D) expenses. When the company is already selling, it can enjoy IP payoffs and tax credits. In between, no targeted stimuli exist. This is an incongruity because most innovative endeavors struggle neither in the R&D phase nor at the sales stage. In particular, for startups in the high-tech sector, it is precisely the phases between R&D and sales that prove fatal. This phenomenon is so well-known that the market has created a nickname for it: “the valley of death.”

The gap in funding yields high costs. First, underfunding yields an exorbitant startup failure rate, which represents innovation loss and harms the incentive to engage in innovation. Second, the dearth of funding produces inferior innovation and imposes competitive harm against well-funded incumbents. Third, distributive concerns arise because the current regime disproportionately affects entrepreneurs with less access to capital on the free market.

This Article considers three main ways to alleviate these concerns. The first way is to “stretch” the existing stimuli to cover the post-R&D-pre-market stage of companies. The second possibility is to improve the private market for startup funding. Finally, a third solution consists of discrete policies to address the costs that the stimulus gap imposes without directly

https://doi.org/10.25172/smulr.76.2.4

* Professor of Law, Ono Academic College. The author thanks Yifat Aran, Michael Birnack, Rochelle Dreyfuss, Nizan Geselvich-Packin, Gideon Parchomovsky, Betsy Rosenblatt, and Ofer Tur-Sinai for helpful insights and advice. The author is also grateful for input received in the 2021 Intellectual Property Scholars Conference and the 2022 faculty seminar at Ono Academic College.
addressing this gap. For example, it is possible to conceive of ways to tackle distributive concerns of startup funding.

This Article makes at least three novel contributions to the literature: first, it analyzes the gap in inducement tools in the innovation lifecycle, which is largely overlooked. Second, it explores the inefficiencies of stimuli shortages in terms of innovation policy. Finally, this Article takes the first step in exploring potential solutions.

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I. INTRODUCTION

INNOVATION is the holy grail of development. The economic and social promise of innovation is virtually undisputed in terms of progress, growth, competition, and efficiency. At the same time, it is well-established that innovation cannot flourish in the free market alone. Innovation presents a risk of market failure: because innovators do not capture the entire value of their innovation, but bear most of the expenses and risks, it would presumably be underproduced in a free market.

To address this concern, the law strives to spur innovation with an array of stimulus mechanisms. The most fundamental stimulus is intellectual property (IP). The IP regime grants exclusive rights to inventions or works, allowing inventors and authors to recoup their investments. IP is complemented with two supplementary mechanisms: cash transfers, such

1. See, e.g., Startup America, The White House, https://obamawhitehouse.archives.gov/economy/business/startup-america [https://perma.cc/ZN2V-VAX5] (statement by President Barack Obama) (“Entrepreneurs embody the promise of America: the idea that if you have a good idea and are willing to work hard and see it through, you can succeed in this country. And in fulfilling this promise, entrepreneurs also play a critical role in expanding our economy and creating jobs.”).


3. See, e.g., Joseph E. Stiglitz, Economic Foundations of Intellectual Property Rights, 57 DUKE L.J. 1693, 1697 (2008) (noting that research has to be financed, not merely encouraged); Adam B. Jaffe, Building Programme Evaluation Into the Design of Public Research-Support Programmes, 18 OXFORD REV. ECON. POL’Y 22, 22 (2002) (“It is widely accepted that, in the absence of policy intervention, the social rate of return to R&D expenditure exceeds the private rate, leading to a socially suboptimal rate of investments in R&D.”).


6. See infra note 37 and accompanying text.

7. See infra note 37 and accompanying text.
as grants and prizes, and tax incentives for firms that engage in innovation.\textsuperscript{8}

These instruments complement each other, among other things, with regard to the stage of innovation that they cover.\textsuperscript{9} Thus, cash transfers are typically granted at the research and development (R&D) stage of innovation. IP can be secured at the R&D stage of ventures, but it typically pays off when the firm begins to commercialize its products. Finally, tax incentives are relevant for the later stages of innovation, when firms commercialize their products and begin to pay taxes.\textsuperscript{10}

The problem is that the stage that is most challenging for innovation is neither the R&D stage that cash transfers target nor the post-commercialization stage when tax incentives and IP materialize. In particular, for startups in the high-tech sector, it is typically the phases between R&D and commercialization that prove fatal. This phenomenon is so well-known that the market has created a nickname for it—"the valley of death."\textsuperscript{11} In these phases, startups need to transfer their inventions into products that would sell competitively in the marketplace. This task is long and resource intensive. It requires, \textit{inter alia}, product development, marketing, pricing, and often turning back to the lab for tweaking the underlying product and technology.\textsuperscript{12}

During these phases, the law takes a curious approach: despite the general understanding that innovation is unlikely to occur in an optimal scope absent legal incentives, incentives hardly aim at this period.\textsuperscript{13} Indeed, grants and prizes that the startup may have gotten at the invention stage have already been spent, while tax benefits and IP payoffs have not yet materialized. In the absence of incentives that aim at this period, ventures fall back to the market economy for funding.\textsuperscript{14} This is an incongruity because the law constantly renders the market economy inadequate for funding innovation.

No good theory explains why the fundamental assumption that innovation should not depend solely on the private market applies to the invention stage of innovation, ceases to apply in the post-invention phase, and then re-initiates when the surviving firms enter the market. Why is it that innovation should \textit{not} rely on the market economy in its earliest and latest stages but \textit{must} rely on the market economy in the long time in be-

\textsuperscript{8} See infra Part II.A.
\textsuperscript{10} See infra Part II.A.
\textsuperscript{11} See Albert C. Lin, \textit{Lessons from the Past for Assessing Energy Technologies for the Future}, 61 UCLA L. Rev. 1814, 1819 (2014) ("The so-called valley of death describes the struggle of some innovators to obtain funding to advance a technological breakthrough from the research stage to proof of concept, and ultimately to full-scale commercialization."). See also Jesse Jenkins & Sara Mansur, \textit{Breakthrough Inst., Bridging the Clean Energy Valleys of Death} 5–6 (2011).
\textsuperscript{12} See infra Part II.A.
\textsuperscript{13} See infra Part II.A.1.
\textsuperscript{14} See, e.g., sources cited supra note 3 and accompanying text.
Part of the story may be that the law still puts the premium of innovation on the invention phase and expects entrepreneurs to leap from invention to profits at a relatively linear path, which does not require much investment.\footnote{See, e.g., Ted Sichelman, \textit{Commercializing Patents}, 62 Stan. L. Rev. 341, 347–48 (2010) (discussing startup funding).}

Or perhaps justifications can be raised for the private ordering of post-invention innovation funding. One such justification may be that private investors can provide expertise and mentorship to companies, which could improve innovation. A second theory that may justify such a policy is that the “valley of death” serves as an efficient way to filter out unworthy companies and clear resources that can be used in other areas of the economy.\footnote{See Stiglitz, supra note 3, at 1697 (“Our innovation system rests on foundations of basic research . . . .”).}

My answers to these hypotheses are set forth in the remainder of this Article.\footnote{See infra Part II.C.1.} In short, the problem with the first proposition is that the assumption regarding no-monetary contributions of investors is speculative. While such contributions may sometime occur, they are not substantial enough to justify the entire reliance on the private market at the post-R&D-pre-sale stage. What is more, investors have interests of their own that do not always align well with the best interest of society in innovation or even with those of the startup itself. The main problem with the second hypothesis is that access to capital is not a good proxy for great innovation. Capital markets have certain characteristics that skew funding towards specific geographies, particular areas of innovation, quick and high returns, and undiversified teams. In other words, the valley of death \textit{does} serve the function of filtering out companies. But there is no good reason to believe that the best companies are vetted or that the worst companies are the ones filtered out.

The gap in incentives for innovation, particularly in the high-tech startup sector, generates severe social costs. First, the dearth of legal incentives contributes to an incredibly high failure rate of startup firms.\footnote{See Erin Griffith, \textit{Why Startups Fail, According to Their Founders}, Fortune (Sept. 25, 2014, 2:00 PM), http://fortune.com/2014/09/25/why-startups-fail-according-to-their-founders [https://perma.cc/7YFY-FVW7] (noting that only 10% of startups succeed); Lital Helman, \textit{Decentralized Patent System}, 20 Nev. L.J. 67, 82 (2019) (noting that a large share of patents are never commercialized).} The thriving of startup firms that do succeed and the fact that successful firms create technologies that change the world should not blind us from noticing the extreme failure rate at the startup scene. At least some of the failed startups represent a missed opportunity for economic and social progress.\footnote{See infra Part II.C.} Also, the resources spent on ventures that never materialize create waste and opportunity costs. Despite the experience that was obtained and the lessons learned from each failure, a high probability of
failure generates an overall adverse dynamic effect by stifling the incentive to engage in innovation. The second cost of the extant regime is inferior innovation. This effect stems from both financial difficulties and the dependency on market financing, which together push companies to increase cash flow at the expense of furthering innovation. Finally, the third cost of the funding gap is distributive because this gap disproportionately affects entrepreneurs with inferior access to capital markets.21

Three groups of solutions can address this problem. The first, and perhaps most intuitive, solution is to “stretch” the existing stimuli and tailor them to the post-invention, pre-market stages of innovation. An example is enabling more “ex-ante tax credits” or targeted uses of prizes.22 A second group of solutions concerns improving the funding mechanisms of the private market. A leading example of such an attempt is the enactment of the Jumpstart Our Business Startups Act of 2012 (the JOBS Act), which was designed to boost the crowdfunding instrument.23 Finally, a third group of solutions concerns addressing the costs of the financing gap separately without addressing their common root cause—the shortage of incentive instruments. Thus, for example, it is possible to design policies to tackle innovation’s distributive concerns or to help develop a market for technologies that fail at the pre-market stage to alleviate waste.

This Article makes at least three novel contributions to the literature. First, it analyzes the existing innovation landscape and highlights the gap in innovation-inducement tools in most of a venture’s lifetime. The existing literature on innovation-incentive mechanisms focuses on analyzing the effectiveness of these instruments individually or measuring them against each other.24 To the best of my knowledge, this Article is the first to offer a broad outlook of these instruments through the lens of the innovation lifecycle. Second, this Article analyzes the costs of the extant regime of innovation stimuli in terms of innovation policy. Scholars commonly celebrate the market of startup funding as efficient and well-functioning and overlook its drawbacks.25 This Article explores how, despite its considerable virtues, relying exclusively on the private market for innovation funding leads to unignorable costs. Third, this Article takes the

22. See infra Part III.A.
24. See sources cited infra notes 32, 40 and accompanying text.
first step in exploring potential solutions to the innovation stimuli gap. The discussion of solutions is designed to be illustrative rather than exhaustive and to pave the path for future research in this field.

This Article unfolds as follows. The second Part of this Article explores the insufficiency of current innovation stimulus instruments in promoting socially desirable levels of tech innovation. This Part then analyzes the considerable welfare loss that this funding gap yields. The third Part of this Article explores possible solutions to the innovation stimuli gap. As a first step, this Part establishes how existing instruments for encouraging innovation can be tailored to bridge the “valley of death.” This Part then considers the option to improve the private market for startup investments. Finally, this Part portrays how the costs of the current regime can be addressed separately. A short conclusion ensues.

II. THE EXTANT REGIME

Innovation is a widely desired phenomenon. Yet, innovation is unlikely to occur in the private market at optimal levels in the absence of designated encouragement systems. The first reason for that is that the information underlying innovation and much of the products of the innovative process carry the characteristics of public goods—they are nonrivalrous and nonexcludable. It is widely accepted that because of these characteristics, innovation is at risk of being underproduced if only private incentives are present. The second reason is that firms engaging in innovation take a considerable risk and assume substantial costs. In case of failure, innovators bear their losses themselves. The success of innovation, however, produces spillovers—value that the innovator only partially internalizes. In the absence of systems that induce innovation, the market would fall prey to a free-rider problem: companies would be better off avoiding the costs and risks associated with innovation and either copy successful products of innovation or simply enjoy the spillovers that successful innovation creates. Either way, the incentive to engage in innovation would be stifled.

To overcome the free-rider problem and boost innovation, the law has crafted three main schemes: IP protection, cash transfers—mainly prizes and grants—and tax incentives.

Vast literature today discusses the legal stimuli for innovation. Mostly, the literature analyzes and compares the available mechanisms in

26. See, e.g., Startup America, supra note 1.
27. See sources cited supra notes 3–4 and accompanying text.
28. See sources cited supra notes 3–4 and accompanying text.
30. See generally Hemel & Ouellette, supra note 9.
31. See infra note 32 and accompanying text.
an attempt to find the optimal mix to boost innovation.\textsuperscript{32} Yet a key problem with the extant regime is largely overlooked: together, the existing instruments do not cover the lion’s share of the innovation lifecycle. As the first Section below analyzes, cash transfers typically aim at the R&D stage of innovation. Tax incentives are relevant when companies enter the market and start making money. IP can (and often must) be secured at the invention stage, but—like tax incentives—pays off only at the commercialization stage, when the IP monopoly generates commercial value. The stages between invention and market penetration have no designated coverage.

The irony is that, in reality, the stages between invention and profit comprise the central and the most challenging part of the innovation endeavor in terms of length, risks, and expenses.\textsuperscript{33} In another article, I described innovation as a process that “initiates with an idea, continues with a long experimental stage with quite a few iterations, and progresses to diffusion into the market, continuous adaptation to competition, and changing market trends.”\textsuperscript{34} Ted Sichelman explains the innovation process as moving “from identifying a problem[,] . . . to conceiving a solution, to making, building, and selling a commercial embodiment.”\textsuperscript{35} Others portray the stages of innovation somewhat differently.\textsuperscript{36} One thing, how-


\textsuperscript{35} Sichelman, \textit{ supra} note 15, at 347.

ever, is clear: ideas, even great ideas, are not followed by market dissemination and profits as a natural next step. 37

The first Section below discusses the existing innovation stimulus instruments and explores their inapplicability to the post-invention, pre-market stages of tech innovation. The second Section analyzes the main costs that the extant regime produces. Finally, the third Section explores the private market for innovation funding that is cultivated in the vacuum of government incentives.

A. EXISTING INSTRUMENTS TO ENCOURAGE INNOVATION

To encourage innovation, the current regime builds predominantly on patent law and complementary mechanisms such as prizes, grants, and tax incentives. 38 In recent years, literature has sprung up to analyze these instruments and assess their effectiveness individually, as well as to compare their relative social welfare benefits. 39 My intention in this Section is to do neither. Rather, I analyze the points in the lifecycle of innovation where each of these instruments applies and unmask the fact that, taken together, these instruments do not cover the post-invention, pre-market stages of tech firms.

1. Intellectual Property Rights (IP)

IP, in particular patents, is the prime legal vehicle to encourage innovation. 40 The leading theory behind the IP regime is that in the absence of IP, inventors would be unable to benefit from their inventions and would thus be discouraged from developing inventions in the first place. The theory supposes that, in an IP-free world, competitors would be able to sell copies of others’ inventions without incurring the associated development costs, and the prices of inventions would then fall to marginal cost, as prices do in a free market. Under this scenario, inventors would be

37. See, e.g., Steven Shavell & Tanguy Van Ypersele, Rewards Versus Intellectual Property Rights, 44 J.L. & ECON. 525, 529 (2001) (assuming that “research” culminates in “innovation,” such that if the “innovation” were made freely “available to competitors” that it would “sell at marginal cost”).

38. See sources cited supra note 32 and accompanying text.

39. See sources cited supra note 32 and accompanying text.

unable to sell at a supracompetitive price and recoup their development costs.41 The inability to compete with copiers who have not incurred R&D costs and profit from inventions ex post would stifle the incentive to invest the resources needed for developing inventions ex ante.42

Based on this incentive theory for IP as described above, IP law addresses the concern of undersupply of innovation by providing inventors with exclusive rights in their inventions.43 Exclusivity generates a monopoly, which allows inventors and authors to be the only ones who sell the invention, and thus sell at a supracompetitive price and recoup the costs of R&D.44 Specifically, patents allow inventors to block competition to their inventions for twenty years from the filing date of the patent application.45

As this explanation shows, the straightforward value of patents occurs when the invention is on the market for a supracompetitive price. This is when the inventor can cash in on their investment in developing the invention.46

Yet, recent literature contends that patents provide value to inventors even before the invention is on the market.47 Supposedly, the patent monopoly protects patentees against competitors who could otherwise be quicker to market.48 Besides raising the said competitive barrier, patents also allegedly facilitate fundraising before market entry by signaling to investors technological superiority and business savviness.49 Likewise,

41. See generally DIRECT PROTECTION OF INNOVATION, supra note 32, at 2.
44. See sources cited supra note 42.
46. See Clarisa Long, Patent Signals, 69 U. CHI. L. REV. 625, 632 (2002) (“[I]t is difficult to find a model or theory that describes the private benefits of patents as based on anything other than the capture of rents in the relevant product market for the technology or an improvement on the technology.”).
49. See Mark A. Lemley, The Surprising Resilience of the Patent System, 95 TEX. L. REV. 1, 52–53 (2016) (suggesting that patents facilitate venture funding); Long, supra note

Notwithstanding this impressive body of literature, this Article maintains that the pre-market benefits of patents are of little avail for early-stage firms in the tech space. The first reason is that young firms lack both the resources and the know-how to form a strategy around patents or to convincingly assert their IP against infringers. The patent prosecution process is notoriously expensive.\footnote{See Graham et al., supra note 47, at 1311 (finding that patent acquisition costs over $38,000); Gene Quinn, \textit{Patent Search 101: Why US Patent Searches are Critically Important}, IPWATCHDOG (Jan. 13, 2018, 9:45 AM), https://ipwatchdog.com/2018/01/13/patent-search-101-patent-searches/id=92305 [https://perma.cc/D2GD-H8MP] (“[B]efore spending thousands of dollars to obtain a patent you should obtain a professional patent search and patentability opinion.”).} In fact, despite lower filing fees for small and micro entities,\footnote{See 35 U.S.C. § 41(h)(1); 37 C.F.R. § 1.16 (2022). But see Mirit Eyal-Cohen, \textit{Legal Mirrors of Entrepreneurship}, 55 B.C. L. REV. 719, 741–47 (2014) (criticizing the “historical preference for small firms” across regulation).} the process may even be more costly for early-stage firms, partially because they do not have in-house patent attorneys.\footnote{Graham et al., supra note 47, at 1311–12 (quoting a technology executive).} It is also hardly realistic to form an IP strategy around one single patent. Vast empirical research shows that the value of patents lies in their aggregation into a patent portfolio—a collection of related patents—rather than in their individual worth.\footnote{See generally Gideon Parchomovsky & R. Polk Wagner, \textit{Patent Portfolios}, 154 U. PA. L. REV. 1 (2005).} Yet for young firms, even filing one patent is often cost prohibitive.\footnote{See Sichelman & Graham, supra note 50, at 115 (reporting surveys revealing that cost is the main reason startups avoid patenting); Susan C. Morse, \textit{Entrepreneurship Incentives for Resource-Constrained Firms} 4 (Handbook L. & Entrepreneurship, U. Tex. L., Pub.}
the very early stages of development intensifies firms’ inability to use patents strategically.56 At such early stages, new industry players lack technical and market information and cannot be expected to design their patents for best strategic value.57

Quite often, patenting is not even a wise move for early-stage tech startups, which typically face severe resource constraints.58 The first reason for that is that patents offer high present spending for a future speculative benefit. These benefits, if they indeed occur, would come at the expense of current pressing uses of the startup’s scarce resources.59 Financial constraints further reduce the value of patents by making it financially difficult to commercialize the patent. Uncommercialized patents not only have a low market value, but they also feedback to patentability analyses: commercial success forms an important factor to determine patent validity in courts.60 The result is that firms that cannot commercialize their patents face a heightened risk that their patents will be invalidated in court. The third way that limited resources reduce the worth of patents stems from the fact that enforcing patents is often cost prohibitive for early-stage firms.61 The inability to enforce patents obviously reduces their value. As Clarissa Long has put it, “[a] patentee who is unwilling or unable to enforce her property rights might as well not obtain them in the first place.”62

Resource constraints thus adversely affect the value of patents and make it less worthwhile for early-stage firms to obtain patents in the first place. Consider also that the rise of trade secrets provides an alternative, cheaper protection that often better suits young firms’ financial capabilities, focus, and business.63 The point is that because it is fully rational for early-stage tech startups to refrain from patenting, patents do not neces-

57. Cotropia, supra note 56, at 69.
58. See, e.g., sources cited supra note 55.
59. See Stiglitz, supra note 3, at 1713 (“[U]nder the patent system research is financed out of monopoly profits.”).
62. See Long, supra note 46, at 630.
sarily signal savviness to investors and other industry players.64

Of course, the game is completely different for incumbents that develop new inventions, even in the tech space. Incumbents easily bear the costs of patent prosecution of their new inventions (and can offset such costs against tax dues).65 Big players can also afford to strategize around patent prosecution. For example, incumbents can file numerous patents and leverage them as shields against competitors’ claims or as means to persuade others to back away from their asserted territory.66 Incumbents can even use the long application process for their benefit: such players can file numerous broad patents, including for very embryonic ideas. They can then make strategic use of the “patent pending” status of their applications during the long examination period, even if the application would eventually be denied or reduced in scope.67 Finally, incumbents can reap the benefits of these strategies because they can afford effective patent enforcement throughout the patent lifetime, including in the pre-market stage of the innovation.68

Indeed, it appears that despite the value that the literature attaches to patents in the pre-market stage, this value is barely accessible to startup tech firms. Indeed, it is well-established empirically that early-stage tech firms rarely hold patents.69 The vast majority of patents are issued to large corporations,70 with some industries featuring an extreme concentration.71 As Dan Burk and Mark Lemley observe, “even those [patents] granted to individuals and small corporations are often incubated in large


65. See infra Part II.A.3.

66. See Alberto Galasso & Mark Schankerman, Patents and Cumulative Innovation: Causal Evidence from the Courts, 130 Q.J. ECON. 317, 321–22 (2015) (finding that innovation by small firms is often triggered by invalidations of large firms’ patents, suggesting that those patents were thwarting innovative efforts).

67. Cf. Lemley, supra note 49, at 53–54 (noting that patent applications may be filed for reasons unconnected to their validity).


70. See, e.g., DAN L. BURK & MARK A. LEMLEY, THE PATENT CRISIS AND HOW THE COURTS CAN SOLVE IT 41 (2009) (“The overwhelming majority of patents today are granted to large corporations, and even those granted to individuals and small corporations are often incubated in large research universities.”).

research universities.”  

At the end of the day, patents primarily offer an upfront investment for a future potential benefit. Early-stage companies are unlikely to make strategic use of the patents to derive pre-market benefits in addition to that. Thus, unlike for incumbents, IP is useful for young tech firms almost exclusively when they bring their invention to market. Ultimately, IP, particularly patents, do not cover the pre-market stages of innovation for early-stage tech startups.

2. Cash-Based Transfers (CBTs)

Cash-based transfers are payments that the government or other institutions grant to fund R&D projects. CBTs foster innovation by providing direct funding for it. CBTs typically come in two types. The first type, grants, are payments that are awarded ex ante to cover R&D costs. The second type, prizes, are granted ex post to winning proposals that meet pre-defined criteria.

Theoretically, CBTs could have replaced IP in many cases and avoided the social losses associated with the patent monopoly power. Indeed, if CBTs could sufficiently reward inventors for their research expenditures, they could require winners to relinquish exclusivity rights and release the innovation to the public in return for the reward. In reality, however, CBTs are typically granted alongside IP as a reward for solving a specified problem.

CBTs have been prominent in promoting R&D activity throughout the years and have only increased in importance since the early 2000s.

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72. See Burk & Lemley, supra note 70, at 41.
73. See generally Stiglitz, supra note 3; see also Morse, supra note 55, at 2.
76. See generally Kremer & Williams, supra note 75.
78. See also OFF. OF MGMT. & BUDGET, EXEC. OFF. OF THE PRESIDENT, THE BUDGET FOR THE FISCAL YEAR 2014, HISTORICAL TABLES 202 tbl.9.7 (2013) (showing that grants and prizes schemes are on the rise); Deborah D. Stine, Cong. Rsch. Serv., R40677, Federally Funded Innovation Inducement Prizes 3–5 tbl.1 (2009) (showing the increase in prizes schemes); Hemel & Ouellette, supra note 9, at 317–18 (noting that since 1999, the U.S. government has made greater use of technology inducement prizes).
specifically, prizes have become a leading tool of government innovation policy thanks to the America COMPETES Reauthorization Act of 2010 (COMPETE Act), which empowers all federal agencies to offer prize competitions. Private market actors participate in the CBT game too, launching competitions and providing awards to winning researchers and inventors. An often-cited example includes a competition that Netflix initiated in 2007 to improve its user suggestion algorithm.

But how helpful are these instruments in supporting early-stage companies beyond the invention stage? CBTs can provide early-stage companies with much-needed financial support. But grants and prizes typically aim at getting to a product, not at funding the ensuing steps of reiteration, design, testing, and diffusion in the market. In fact, the sum of the award normally does not even cover the entire cost of development, and winners cannot use it for market penetration.

More importantly, CBTs are designed as a complementary rather than a main funding source and are an inherently unreliable income stream. There are three reasons for this. First, CBTs are sporadic and depend on specific, and often ad hoc, government decisions. Thus, a company cannot rely on CBTs while planning its finances. Second, CBTs are designed to be competitive. Among all those racing to solve a problem, only a few will win. This function prevents CBTs from becoming a stable revenue scheme that new companies can form around. Third, a long lead time separates the announcement of the available grant or prize and the eventual allocation of the funds. This feature again renders CBTs relevant more for inventors who have other financial sources, such as existing revenues or a university job. Early-stage firms still need to find other funding

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80. See, e.g., Maurer & Scotchmer, supra note 32, at 2 (citing private market prize initiatives).


82. See Gallini & Scotchmer, supra note 32, at 53; Hemel & Ouellette, supra note 9, at 307, 318–21 (explaining the function of patents and grants in inducing innovation).


84. See generally Conway-Jones, supra note 32.

85. See Stiglitz, supra note 3, at 1722 (“There is obviously, in addition, a concern about ‘capture’ of the research-awarding process, for example by political interests whose agenda may not be the advancement of science and technology.”).
sources.\textsuperscript{86} Finally, finding and applying for grants or prizes require a considerable investment of time and focus. Again, this renders these solutions relevant either for the earliest stages of innovation (e.g., a lone researcher who is not yet a startup), or for innovation within an already operating company, which has more staff and other resources.

In short, despite the increasing use of CBTs, this tool is insufficient to address the problem of startup funding and is not designed to do so. CBTs can only form a complementary, supportive tool for innovation funding at the invention stages of the innovation process.

3. Tax Incentives

The tax system has increasingly emerged as an attractive candidate for innovation inducement.\textsuperscript{87} Tax-based incentives operate either by lowering rates of tax for entrepreneurial income or by offsetting taxes otherwise due on firm profit.\textsuperscript{88} Tax breaks can come in several forms, including various designs of deductions, exclusions, exemptions, credits, tax deferrals, and lower tax rates.\textsuperscript{89} The theory behind tax incentives is that \textit{ex post} tax benefits increase the after-tax return to firms that engage in innovation. In this way, tax incentives subsidize companies’ investment in new products and thus form an \textit{ex ante} mechanism for innovation-intensive firms.\textsuperscript{90}

\textsuperscript{86} See id. at 1721 (“Those who think that they are the best researchers make the decision to undertake the research. They make the investment, risking their own money, in the belief that they have a good chance of winning the prize . . . .”).


\textsuperscript{88} See, e.g., I.R.C. § 382 (providing for deductibility of net operating losses); I.R.C. § 174 (providing for the expensing of certain costs); 26 C.F.R. § 1.861-17 (2021) (providing for the allocation of R&D deductions to foreign income); I.R.C. § 41 (providing for R&D tax credits). \textit{See also} Eric Toder, Taxing Entrepreneurial Income 12 (2017); Shay et al., supra note 87, at 457.


The Achilles Heel of the tax system is that tax breaks are relevant to firms that pay taxes. They mean practically nothing to firms in the pre-revenue stage. As Susan Morse explains, “This is simply a function of how the income tax system works. So long as the firm has not only a loss-making sector but also a profitable business, the losses offset the profits from the other sector and reduce income taxes due.”

Indeed, startups at the pre-revenue stage can theoretically accumulate their losses and use them in the future against imminent profits, but future profits are uncertain and, in any event, do not help pay for present expenses. Startups also have little incentive to invest in expensive tax planning, which reduces the chances that they will be able to enjoy tax benefits even if they eventually succeed.

Granted, the tax system offers a few ex ante deductions. Typically, ex ante tax deductions involve shifting the timing of the tax credit of profit-making firms. For this reason, this mechanism bears little relevance for startups because the profit they may generate is speculative at most. A more promising ex ante tax mechanism concerns the provision that loss-making firms can sell tax benefits to third parties in well-defined cases. As I discuss below, this option may be relevant for early-stage startups, which would be able to sell their losses to partners or investors. Yet this is a very limited solution, which requires investment in tax planning and does not form a solution for the startup funding crisis.

91. See Susan C. Morse & Eric J. Allen, Innovation and Taxation at Start-up Firms, 69 Tax L. Rev. 357, 357 (2016) (“Capital-constrained start-ups will only use conventional income tax breaks in the unlikely event that they succeed and become profitable.”); Shay et al., supra note 87, at 448 (“It is a common feature of business income tax incentives that most of the benefit goes to the largest and most profitable taxpayers who least need assistance.”).

92. See Morse, supra note 55, at 15.

93. See id. See also E. Cary Brown, Tax Incentives for Investment, 52 Am. Econ. Rev. 335, 336–37 (1962) (noting that a small firm faces “considerable uncertainty” over the value of future depreciation deductions).

94. See generally Morse & Allen, supra note 91, at 358 (arguing that “under reasonable assumptions for endowment, burn rate, and probability of success over time, a new start-up would rationally decide not to make a material investment in tax planning to eliminate income tax on any future profits”).

95. See Evsey D. Domar & Richard A. Musgrave, Proportional Income Taxation and Risk-Taking, 58 Q.J. Econ. 388, 388–92 (1944) (proposing a full-offset income tax, in which the government transfers to firms reimbursement for a portion of their operating losses); Hemel & Ouellette, supra note 9, at 311–12 (analyzing the option to use refundable tax credits).

96. See Brown, supra note 93, at 338 (explaining how for a profitable firm, an income tax cut is equivalent to an interest rate cut and would affect the present value calculation for an investment). But see Timothy F. Malloy, Regulating by Incentives: Myths, Models, and Micromarkets, 80 Tex. L. Rev. 531, 574 (2002) (arguing that large firms face internal information and incentive problems).


98. See Morse & Allen, supra note 91, at 360 (analyzing why startup firms are not likely to invest in tax planning).
To conclude, the natural structure of the tax system is an *ex post* relief to offset otherwise due taxes. Tax incentives for innovation can thus be a promising tool to encourage incumbents to engage in innovation. Yet, for early-stage innovative companies, the tax system offers little avail.\textsuperscript{99} After all, the ability to conduct strategic tax planning is not a good proxy for great startups. Various startups that are desirable from a societal point of view would be unable to do that—for lack of resources, skillsets or focus. As a result, the pre-revenue stage of young companies is left largely unassisted by the tax system.

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As discussed above, as far as early-stage tech startups are concerned, the extant incentive mechanisms effectively ignore all but the beginning of the innovation process and its very end. While the invention phase of innovation receives some governmental support via cash transfers, and the commercialization stage of the company receives a generous governmental cushion via tax incentives and IP payoffs, the longest and most critical stages of the innovation lifecycle are not covered. The next Section explores the costs inherent to this regime.

**B. The Costs of the Extant Regime**

The analysis thus far showed that the extant incentive mechanisms for innovation generally overlook the stages between invention and market penetration for early-stage tech companies. As I discuss below, this policy harms innovation in three main ways. First, the lack of support in critical stages of innovation leads to underfunding of early-stage ventures. Underfunding, in turn, leads to a high failure rate of ventures; generates waste, opportunity costs, and competitive harm; and it reduces the incentive to engage in innovation. Second, the lack of funding produces inferior innovation. Third, the reliance on the private market yields distributive concerns. I explore these shortcomings in more detail below.

1. **Underfunding of Early-Stage Innovation**

The most direct effect of the lack of constant innovation stimuli is the underfunding of early-stage innovation. It is anything but surprising that startups have great difficulty obtaining the financing they need on the free market. In fact, the notion that the market is inadequate to fund innovation has been the very foundation of the IP regime, as well as the innovation stimulus packages of CBTs and tax relief.\textsuperscript{100} As discussed below, underfunded businesses have a harder time competing with en-

\textsuperscript{99} See Morse, \textit{supra} note 55, at 3 (“[T]ax policies intended to encourage innovation often require an upfront investment in exchange for an uncertain future payout for a loss-making firm.”).

\textsuperscript{100} See sources cited \textit{supra} note 5 and accompanying text.
trenched incumbents and a higher chance of failure. These dual risks stifle the incentive to engage in innovation.

To begin with, undercapitalization generates an adverse competitive effect. Insufficient resources place early-stage ventures at an inferior position compared to resourceful incumbents. The pseudo-romantic David and Goliath story of startup disruption is not as pretty in reality. In reality, the superiority of incumbents can cause various distortive effects. For example, established firms, rather than new ones, will be able to polish their products, sell them, and hire the best talent.101

Granting incumbents an advantage over newcomers in producing innovation is innovation regressive. Joseph Schumpeter has already recognized that “new production functions do not typically grow out of old businesses.”102 Granted, incumbents do not cease to become innovative, but new firms have a clear advantage in the pursuit of innovation. Yet the current regime adds unnecessary obstacles in their way and structurally favors innovation by incumbents.

Underfunding also leads to a high startup failure rate.103 Admittedly, we have no way to know whether the startup failure rate is too high or too low. After all, no market mechanism screens out patents or ideas, and we may very well have an excessive number of players at the starting line.104 The low patent threshold may imply that the starting bar for innovation is so minimal that the low success rate makes sense on theoretical

101. See Morse, supra note 55, at 11.
102. JOSEPH A. SCHUMPETER, BUSINESS CYCLES: A THEORETICAL, HISTORICAL AND STATISTICAL ANALYSIS OF THE CAPITALIST PROCESS 93 (1939); see also Morse, supra note 55, at 1.
103. See sources cited supra note 19.
grounds. What is more, startups are expected to have high failure rates. By definition, innovation is risky. Startups are testing assumptions that have not been tested before on technology, services, and markets. Some of these assumptions must be wrong. Others are untimely. And the ones that are neither wrong nor untimely are probably addressed by more than one team, generating fierce competition.105

Yet I argue that the extant startup failure rate is too extreme. This argument doesn’t stem from any apriori assessment of what the failure rate should have been (there is admittedly no way to make this assessment). Rather, it stems from the enormous costs of widespread innovation failure. Indeed, even if much of the innovation on the starting line is worthless, a policy that encourages planting seeds but ignores the conditions for the seeds to flourish is deeply flawed.106

The first cost of such a policy is that it is fraught with waste. Innovation is a resource-intensive process. In most cases, failed ventures discard the outputs of their innovation. They abandon their patents and stop developing their product. There is no market for half-baked code or products.107 While failure can produce good outcomes (such as preventing waste by avoiding repeating futile efforts by multiple players),108 resources invested in fruitless innovation are foregone.109 Waste is coupled with considerable opportunity costs because the time, money, and effort invested in failed ventures could have been used for various forgone productive activities.110

107. The common wisdom in the industry is that ideas are cheap, and success depends on the level of execution. See, e.g., Eric Dreyer, How Early- Stage VCs Decide Where to Invest, WIRED (June 4, 2019, 8:00 AM), https://www.wired.com/story/how-early-stage-vc-decide-where-invest [https://perma.cc/Z8VG-3H3Q] (“The fundamental assumption here is that ideas are not proprietary. In fact, VCs assume the opposite—if an idea turns out to be a good one, assume that many other startups will emerge to pursue it.”).
110. Consider also the personal costs borne by the entrepreneurs who sacrifice years of their life for little or no pay. See, e.g., Ryan Howard, What You Need to Know About Being a Founder Before Becoming One, ENTREPRENEUR (June 24, 2022), https://www.entrepreneur.com/leadership/know-the-costs-of-being-a-founder-before-taking-the-plunge/428678 [https://perma.cc/2Z77-H1U7].
A more serious type of opportunity cost concerns the loss of promising innovation. Without financing, even brilliant ideas cannot mature to completion. This is a crucial point. Ideas and technologies do not make an impact just by showing up. The economic power of innovation comes predominantly from its adoption, not from its creation. As Gaia Bernstein explains, “Attaining the progress objective . . . requires not just innovation but also an adoption process. Progress can be attained only if people adopt and use the new technology.”¹¹¹ Yet the current regime renders it cheap to come up with new ideas, but not as likely that they would mature to the point that society would be able to adopt them.¹¹²

This policy is extremely curious. Not only is there no theory that justifies the lack of incentives in the post-invention, pre-market stages of innovation, but there are additional, unique market failures in these stages that are left largely unattended. First and foremost, market penetration must overcome severe information problems. Existing market players cannot be aware of all the new innovative tools in the market, and they may find it rather costly to identify the tools that best suit their needs and adapt them in their production process. Second, market diffusion often falls prey to network externalities, switching costs, and technology lock-in effects, which form serious barriers to entry for innovation. Finally, coordination failures may lead to delayed adaptation of even the most promising technologies because innovative products are often collaborative. To implement them successfully, partnerships between traditional industry, technology, and other service providers are very much required.

Most importantly, underfunding of innovation generates an adverse dynamic effect on entrepreneurship. While potential entrepreneurs may be hopelessly optimistic, the adverse competitive effects and high failure rate that this Section discusses form a dual disincentive for rational actors to engage in early-stage innovation.

2. Inferior Innovation

A second problem of private investment ordering is that it yields an inferior innovation. There are two reasons for this. The first reason concerns selection. The overlap between the societal value of innovation and the benefit innovation generates for investors is not perfect. Therefore, private ordering is expected to over-incentivize innovation that investors want even at the expense of socially desired innovations. The second reason concerns design. Early-stage ventures operate under intense pressure to increase cash flow and to please private investors, and this focus can distort innovation decisions.

¹¹¹. Gaia Bernstein, In the Shadow of Innovation, 31 Cardozo L. Rev. 2257, 2259 (2010). See also Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470, 480 (1974) (holding that patent law’s “positive effect on society [is achieved] through the introduction of new products and processes of manufacture into the economy, and the emanations by way of increased employment and better lives for our citizens”).

¹¹². See generally Bernstein, supra note 111.
Let us address the selection problem first. Naturally, there is no perfect overlap between the interests of profit-maximizing investors and the interests of society in innovation. This is not to say that the interests of society and the interests of investors are detached. Investors’ value eventually depends on the company’s ability to sell in the marketplace, and sales presumably reflect societally desired products and tools. Yet, ventures do not necessarily confer the same value to society and to investors. Profit-maximizing investors invest in ventures when they expect high profits for themselves, regardless of the social benefit of the invention.

In fact, a venture can be worthwhile for an investor but detrimental to society. This condition occurs when the social costs of the innovation exceed the expected profit for the investor. There are many examples of innovation that externalize costs on society. Such examples include artificial intelligence (AI) chatbots that “hallucinate,” computer viruses, malicious software, aggressive spying technologies, and innovation with negative environmental effects. Under the extant regime, such ventures are likely to be funded and externalize costs to society.

Likewise, innovative projects can promise higher societal value than investors can internalize. For example, the societal value may not be reflected in the market because the product concerns credence goods or

113. See Peter S. Menell & Suzanne Scotchmer, Intellectual Property Law, in 2 HANDBOOK OF LAW AND ECONOMICS 1471, 1499 (A. Mitchell Polinsky & Steven Shavell eds., 2007) (“[I]ntellectual property rewards reflect the social value of the contribution, since the profit is determined by demand.”). See also Kapczynski, supra note 40, at 975 (“Price links the production of information to consumer demand, and, by extension, to social welfare.”).

114. See Carol M. Rose, Scientific Innovation and Environmental Protection: Some Ethical Considerations, 32 ENV’R L. 755, 761 (2002) (noting that there is an under-incentive to engage in research when profit is not forthcoming).


116. See Eric A. Posner, Law, Economics, and Inefficient Norms, 144 U. PA. L. REV. 1697, 1723 (1996) (“Groups have a stronger incentive to adopt or develop norms that externalize costs than those that merely maximize joint welfare without producing negative externalities.”).

117. See Michael R. Darby & Edi Karni, Free Competition and the Optimal Amount of Fraud, 16 J.L. & ECON. 67, 68–69 (1973). See also Rudolf Kerschbamer, Daniel Neururer & Matthias Sutter, Insurance Coverage of Customers Induces Dishonesty of Sellers in Markets for Credence Goods, 113 PNAS 7454, 7454 (2016), https://www.pnas.org/doi/epdf/10.1073/pnas.1518015113 [https://perma.cc/LV3Z-6YL5] (“Generally speaking, credence goods have the characteristic that, although customers can observe the utility they derive from the good or service ex post, they cannot judge whether the quality of the good they have received is the ex ante needed one. Moreover, consumers may not even be able to observe ex post the quality they actually received.”); Daniel Carpenter, Confidence Games:
because the project produces spillovers that investors, or even the venture itself, cannot capture. Projects with high societal value and low investor return would not be funded on the private market and would likely be abandoned in the absence of alternative funding. In fact, the current regime may “exacerbate the problem by drawing resources away from such innovations.”\textsuperscript{119} The lack of incentive for investors to internalize societal interests (besides those that sales should reflect) also stifles the incentive for researchers and firms to come up with new technologies, processes, or business models that would generate welfare spillovers.

The divergence of interests between society and investors is exacerbated in the context of VC investments. This is because the exit strategy of VCs is not directly tied to the market performance of the venture. As will be elaborated below, VCs are not interested in solid businesses that sell.\textsuperscript{120} Rather, they seek disruptive ideas that have a chance—albeit a slim chance—to generate asymmetric returns on capital.\textsuperscript{121} In other words, the business model of VCs forces the VC to bet only on potential “unicorns” in order to produce the return on investment (ROI) that the VC needs to stay in business.\textsuperscript{122} In contrast, society does not necessarily need unicorns more than it needs real businesses that solve real problems in a helpful way. In fact, vast research shows that unicorns may enrich investors and entrepreneurs but that their profit rarely trickles down to the economy.\textsuperscript{123}

One effect of the overreliance on VCs is that innovative companies with promising markets and solid business models can be left unfunded. The other effect of the unicorn discovery business is incentivizing investors to invest in more mature companies rather than early-stage companies because it is easier to identify a potential unicorn at a later stage.\textsuperscript{124} The late funding exacerbates the problems of undercapitalization that were discussed in the previous Subsection.

\textit{How Does Regulation Constitute Markets?}, in \textit{Government and Markets: Toward a New Theory of Regulation} 164, 170, 174 (Edward J. Balleisen & David A. Moss eds., 2009) (“[Credence] goods . . . create ‘lemons problems.’ Because of informational shortcomings, consumers will continually purchase or consume inferior products when superior alternatives are available . . . .”).

\textsuperscript{118} For example, the output of the R&D could be used by competitors or have applications beyond what the innovator can capture. The R&D process itself may save R&D expenses to firms that are pursuing the same invention. See Mark A. Lemley & R. Anthony Reese, \textit{Reducing Digital Copyright Infringement Without Restricting Innovation}, 56 \textit{Stan. L. Rev.} 1345, 1387 (2004) (“Economic evidence strongly suggests that those unanticipated future benefits, or ‘spillover’ effects, often exceed the immediate value of most new technologies.”).


\textsuperscript{120} \textit{See infra} Part II.C.

\textsuperscript{121} \textit{See infra} Part II.C.

\textsuperscript{122} \textit{See infra} Part II.C. By “unicorns,” I refer to ventures that are valued at over $1 billion.

\textsuperscript{123} \textit{See Fredrik Erixon & Börn Weigel, The Innovation Illusion: How So Little is Created by So Many Working So Hard} 200 (2016).

\textsuperscript{124} \textit{See supra} Part II.B.1.
The second reason that private funding of innovation results in inferior innovation concerns product design. Without funding, startups cannot maximize the potential of their invention. For undercapitalized businesses, everything is an uphill battle: they face hurdles in developing their products, promoting sales, generating profits, attracting labor, and other business challenges. What is more, as will be discussed later, staged financing keeps founders busy raising money rather than constantly developing the innovative product.

Relatedly, under the extant regime, VCs impose very intense pressure on early-stage companies. One type of pressure is formal: VCs typically have board seats and veto powers. An even more intense VC threat is subtle. In a realm of staged financing and well-networked VCs, startups have a powerful incentive to keep their investors content. The result of the VC pressure is that innovation that could have resulted in high social benefit may be channeled to become more profitable for VCs but less valuable for society.

Worse yet, the dearth of financial alternatives under the extant regime forces innovators to strive to increase cash flow. In a climate of underfunding, revenues are needed as fuel to run the company. Revenues also signal to investors that the invention has market value and that the venture is mature for investment. Thus, companies have a powerful incentive to focus on selling whatever they can sell rather than creating the best product.

The policy decision to leave the selection of innovation in the hands of private investors and to grant them a powerful influence over innovation design is striking. Innovation is desired because it boosts overall societal welfare. Yet, the current regime shifts the focus from maximizing social welfare to maximizing investors’ returns. In too many cases, the effect is a shift of wealth from society to a small group of innovators and investors. The misfit between innovation and social value has created various examples of harmful innovation, such as innovation with costs to privacy, intellectual property, safety, equality, and the environment. While post-innovation regulation can tackle some of these effects, many of them cannot be fixed ex post when the wrong products are on the market.

126. See infra note 195.
128. See supra Part II.B.1.
130. Note the exception of CBTs, where the government selects innovation for monetary reward. See supra Part II.B.
131. See sources cited supra notes 1–2.
3. Distributive Concerns

Finally, another concern of the current regime is distributive. More than anyone, the lack of funding affects entrepreneurs without financial background or credit. What is more, the reliance on private market funding exposes entrepreneurs to biases in the VC industry. As discussed below, unequal access to funding leads to both distributive concerns and loss of innovation.

Obviously, financial constraints disproportionately affect entrepreneurs who cannot bring money from home and who have limited connections to financial networks. Approximately 25%–40% of startup funding originates from the founders’ first, second, and third degrees of connections. Investment decisions also rely heavily on personal connections. The vitality of personal connection to funding favors some entrepreneurs, while others remain “out-of-the-loop” for reasons that do not concern the quality of their innovation. In particular, the personal-connection threshold appears to be problematic for women and racial minorities.

The reliance on private financing results in discriminatory practices in yet another way. At the startup’s early stages, data-driven due diligence is limited because hard data and operating history are hard to come by.


134. See Angus Loten, For Startups, Self-Reliance Comes at a Cost, WALL ST. J., Feb. 5, 2015, at B5 (discussing “the clubby venture-capital world,” and the challenges for innovators who are “not very well connected”).

135. See Schwartz, supra note 23, at 621.

136. See, e.g., Peri Pakroo, The Women’s Small Business Start-Up Kit 96–100 (2010) (describing difficulties of female entrepreneurs); Robb, supra note 125, at 2–3; Paroma Sanyal & Catherine L. Mann, The Financial Structure of Startup Firms: The Role of Assets, Information, and Entrepreneur Characteristics 15–16 (Fed. ERV. Bank Bos., Working Paper No. 10-17, 2010) (finding that African-American teams are 98% less likely to have equity investors); Venture Capital Demographics—87% of VC-Backed Founders Are White; All-Asian Teams Raise Largest Funding Rounds, CBInsights (Aug. 3, 2010), https://www.cbinsights.com/research/venture-capital-demographics-87-percent-vc-backed-founders-white-asian-teams-raise-largest-funding [https://perma.cc/Z5EG-KNJJ] (noting that 87% of VC-backed founders were White and that Asian teams raised the largest rounds); Schwartz, supra note 23, at 622–23.

137. See Scott Kupor, Secrets of Sand Hill Road: Venture Capital and How to Get It 42 (2019) (“There simply aren’t enough financial metrics to meaningfully model
Instead, VCs often use decision shortcuts and rely on their gut feelings and intuition. For the same reason, VCs also put considerable weight on the entrepreneurs who run the company, “betting on the jockey over the horse.” On its face, this strategy makes sense. After all, the founders need to be able to lead the company to success. What is more, investments are a relational business too, and investors need to work with the entrepreneurs for years ahead.

Though unintentional, VCs’ assessments of founders’ fit, as well as their intuition and gut feelings, are often biased against nonstandard entrepreneurs on various parameters, such as education, gender, race, and even personality traits. The impact of many of these parameters on the startup’s eventual success has been found to be questionable at best. Such parameters might have formed from a myriad of irrelevant considerations, from personal connections to past experiences to a memory of the faces that have lately appeared on the cover of Forbes. These considerations obviously run against diversity and perpetuate the profile of past winners.

Relatedly, angel investors (Angels) and VCs are geographically concentrated. VCs are concentrated in several areas in the country, and VCs (as well as Angels) almost exclusively invest locally. Local investment future potential returns for a business that just doesn’t exist beyond the PowerPoint slides the entrepreneur has put together."

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138. See generally Kupor, supra note 137, at 69–71.
139. See id. at 27. See generally Paul A. Gompers, Will Gornall, Steven N. Kaplan & Ilya A. Strebulaev, How Do Venture Capitalists Make Decisions?, 135 J. Fin. Econ. 169, 177 (2020) (finding that VCs attribute success—or failure—to the team more than to the business).
140. See Kupor, supra note 137, at 69.
142. See, e.g., Thomas Eisenmann, Determinants of Early-Stage Startup Performance: Survey Results 1 (Harv. Bus. Sch., Working Paper No. 21-057, 2020), https://ssrn.com/abstract=3725023 (finding that “[v]aluation outcomes were not related to several founder/CEO attributes, including age, educational background, personality traits, and motivations for becoming an entrepreneur”); Azoulay et al., supra note 141.
143. See sources cited supra notes 141–42.
144. See Richard Florida, The Rise of the Creative Class: And How It’s Transforming Work, Leisure, Community and Everyday Life 50–51 (2002); Andrew Wong, Angel Finance: The Other Venture Capital, in VENTURE CAPITAL: INVEST...
facilitates due diligence and monitoring. Investors’ concerns are also attenuated by the reputation market that works well in a local community. Concentration also allows VCs to benefit from economies of scale and constant deal flow. But local investment also means that rural entrepreneurs are at a distinct disadvantage compared to their urban counterparts.

The result of all this is that nonstandard innovators’ businesses would be undercapitalized and outcompeted, and the entrepreneurs would need to invest much more time and effort to obtain the funding that they need. This reality has a dynamic effect because inferior access to capital places a chilling effect on innovators from unconventional backgrounds. Indeed, inequality is overwhelmingly reflected in the rate of entrepreneurship. Depending on the type of patent, women are issued only 10–30% of patents, and women “patent at only 8% of the male rate.” The rate of minority inventorship is under-researched, but indications are that this rate is very low, particularly among Blacks.
The societal price of nondiverse innovation is immense. The lack of
diversity in innovation harms the concept that all inventors, including
small entities and members of marginalized communities, have an equal
chance to invent and build successful businesses.152 Beyond its distribu-
tive value, the equality promise is designed to augment innovation gains
by diversifying the inventive base.153 A broad pool of inventors can yield
a diversity of products, markets, and processes because different founders
are aware of different innovation needs.154 In particular, inventors from
underrepresented groups can tackle issues that sit in the blind spot of
others or address well-known problems with a more inclusive solution.155

C. THE PRIVATE ORDERING OF INNOVATION FUNDING

In the absence of stimuli programs for the post-invention, pre-market
stages of innovation, early-stage entrepreneurs must fall back to market
financing, in particular VCs.156 VCs are equity investment firms that in-
vest in a roster of portfolio companies, which they nurture for scale and
exit.157 The VC market is vehemently celebrated as efficient and well-

Blacks comprising 0.4%); 157 CONG. REC. H4484 (2011) (statement of Rep. Moore) (stat-
ing that minority-owned companies hold fewer patents than nonminority-owned
companies).

152. See generally 35 U.S.C. § 154(a)(1) (“Every patent shall contain . . . a grant to the
patentee, his heirs or assigns, of the right to exclude others from making, using, offering
for sale, or selling the invention . . . .”); Abraham Bell & Gideon Parchomovsky, Reinventing
Copyright and Patent, 113 MICH. L. REV. 231, 234 (2014) (“Whatever the patent, the law
offers a monopoly consisting of a specified set of rights over the invention for a fixed
period of time.”); Wendy J. Gordon, A Property Right in Self-Expression: Equality and
Individualism in the Natural Law of Intellectual Property, 102 YALE L.J. 1533 (1993) (dis-
cussing equality in IP under Lockean principles).

153. See Peter Lee, Toward a Distributive Agenda for U.S. Patent Law, 55 HOUS. L.
REV. 321, 366 (2017) (“[D]isproportionately low participation by other groups represents a
missed opportunity.”); Jennifer Hunt, Jean-Philippe Garant, Hannah Herman & David J.
17888, 2012) (“[E]liminating the patenting shortfall of female holders of science and engi-
neering degrees would increase GDP per capita by 2.7%.”); W. Keith Robinson, Protecting
American Innovators by Combating the Decline of Patents Granted to Small Entities, 88 ST.
JOHN’S L. REV. 379, 385 (2014) (suggesting that increasing small-entity patenting would
boost innovation); Jay Mattappally, Goliath Beats David: Undoing The Leahy-Smith
America Invents Act’s Harmful Effects on Small Businesses, 58 LOY. L. REV. 981, 985
(2012) (arguing that small businesses’ patenting can create jobs).

154. See Lee, supra note 153, at 366–67 (“[I]t seems likely that minority, women, and
low-income inventors would be well situated to develop technologies sensitive to the needs
of such communities.”); See generally Ingrid Verheul, Andre Van Stel & Roy Thurik, Ex-
plaining Female and Male Entrepreneurship at the Country Level, 18 ENTREPRENEURSHIP
& REGIONAL DEV. 151 (2006) (discussing differences between male and female entrepreneur-
ship).


156. Note the almost-opposite account of the situation by Darian M. Ibrahim: “Other
countries lack the infrastructure of private financing, a skilled high-tech labor force, and
past entrepreneurial successes that exists in the United States, particularly in Silicon Val-
ley, and they have therefore resorted to public markets to supply startups with venture capital.”
Ibrahim, supra note 25, at 1138.

157. See id.; see also Elizabeth Pollman, Information Issues on Wall Street 2.0, 161 U.
PA. L. REV. 179, 184 (2012) (“The VC selects the portfolio companies for the fund, and
nurture and supports them by contributing money and often services or advice that the
companies need in order to develop.”); Darian M. Ibrahim, The New Exit in Venture Capi-
functioning and has been offered as a model for other countries and for other areas.\textsuperscript{158}

The VC glory is not unjustified. After all, it is in this investment climate that our most life-changing technologies have sprouted.\textsuperscript{159} Yet, the dearth of stimuli for the post-invention, pre-market stages of innovation means that the VC industry must shoulder the entire universe of innovation funding in the US. This is one step too far. VCs may be doing an impressive job as unicorn hunters, but they do not internalize the cost of lost innovation that occurs when they pass on great innovation that is less likely to produce asymmetric returns. VCs also do not internalize the distributive concerns and the loss of innovation that results from their preference for in-group entrepreneurs.\textsuperscript{160} Relying on VCs exclusively also counters innovation theory, which overwhelmingly accepts that the private market alone cannot be counted on to promote innovation.\textsuperscript{161}

In this Part, I show that despite its many virtues, the VC industry should not be counted on to support all innovation in the United States for most of the innovation lifecycle. This discussion serves to support this Article’s thesis that stimuli for the post-invention, pre-market stage are vital.

1. The VC Industry

To understand the decision-making in the VC industry, it is crucial to recognize the conditions under which it operates and the challenges that it must overcome. As Ron Gilson and others have established, innovation funding in the private market faces three challenges.\textsuperscript{162} The first is uncertainty: it is impossible to predict how an early-stage startup will eventually perform.\textsuperscript{163} The second challenge concerns information asymmetry: entrepreneurs inevitably know more than investors about their business, especially when complex technology is involved.\textsuperscript{164} Finally, the third chal-
The challenge is agency costs\textsuperscript{165}: like other managers, entrepreneurs may engage in self-dealing at the expense of investors.\textsuperscript{166} The solutions that the VC market has adopted include, \textit{inter alia}, various mechanisms to increase the investor’s control over the investment.\textsuperscript{167}

On the other side of the market, VCs must successfully raise money for their funds, which the VCs then invest in startups. VCs raise funds from Limited Partners (LPs). LPs are institutional investors that invest in VCs as the riskiest part of their portfolio, with an expectation to see excess returns relative to a specific market index within a certain time. The expectations of LPs drive the selection process at VCs: to stay in business, VCs must seek companies that can generate excess returns in a certain timeframe.\textsuperscript{168} Post-investment, VCs must also work with their portfolio companies to ensure that a few of them make the expected asymmetric returns.

From this backdrop, VC investments have developed into three main types: staged, concentrated, and competitive. Staged investment means that startups never get all the funds that they need at once. Rather, funding is raised in stages or, in industry terms, “rounds.”\textsuperscript{169} Concentrated investment means that the industry revolves around one type of investor, than the other party does (for example, an employee or manager knows more about how hard she works than the venture capitalist does).\textsuperscript{164}


\textsuperscript{168.} See KUPOR, supra note 137, at 54 (explaining VCs’ business model).

\textsuperscript{169.} In a crude portrait, startup founders invest the first tens or low hundreds of thousands of dollars themselves, then raise the next round or two—“pre-seed” and “seed” rounds—from “angel investors.” The next rounds, A round, B round, C round, etc., are typically VC-led. See infra notes 173–195 and accompanying text.
which is also interconnected. Finally, competitive investment means that startups face fierce competition for funding at each stage. Each stage of funding serves as a filter: most startups prove unable to raise the next round of funding and vanish. The few that secure funding remain in the game for the next round. Below I show why this structure may be working well for VCs and the few businesses that end up making asymmetric returns. However, if this is virtually the only available model for innovation funding, it is detrimental to the innovation ecosystem as a whole.

a. Staging

In most cases, entrepreneurs fund the first proof of concept of their idea themselves. But most peoples’ savings are not sufficient to maintain a business. Thus, if the idea progresses, entrepreneurs must seek financial help, typically from their first-degree network. This round of funding is mockingly dubbed the “triple-f’s” round (friends, family, and fools).


172. See infra note 202 and accompanying text.

173. See ROBERT D. MANNING, CREDIT CARD NATION 228 (2000) (“[C]redit cards have become the number one source of financing for small businesses—supplanting bank loans in the late 1990s.”); Andrew A. Schwartz, Old Enough to Fight, Old Enough to Swipe: A Critique of the Infancy Rule in the Federal Credit CARD Act, 2011 UTAH L. REV. 407, 428 (2011); Schwartz, supra note 23, at 621–22 (noting that entrepreneurs rely on personal credit, despite its high interest rate and relatively low limits); Loten, supra note 134, at B5 (reporting on entrepreneurs’ increasing reliance on personal finances in recent years).


175. Investing the entrepreneur’s own and family’s savings has become a market expectation, not to say a requirement for later investments. See, e.g., Martin Zwilling, The Right Way to Get Funding From Family and Friends, FORBES (Aug. 23, 2016, 12:32 AM), https://www.forbes.com/sites/martinzwilling/2016/08/23/the-right-way-to-get-funding-from-family-and-friends/shs=579c734a29 [https://perma.cc/EW52-P3YR] (discussing the expectation of investors that entrepreneurs’ first degree connections “are willing to bet on [them], even before [their] idea has a chance to show traction”); Pakroo, supra note 136, at 105 (discussing the practicality of early stage financing).
If the idea progresses, the entrepreneurs must obtain more outside capital. But they quickly find out that startups are virtually excluded from traditional financing options.176 Indeed, startups check all the wrong boxes for conventional funding, such as small business loans and bank loans.177 Startups require significant funds, lack substantial tangible assets or collaterals, have a high failure rate, lack a valuation determination, and have uncertain prospects.178 Startups also do not yield linear income, but instead expect little or no revenues for a long period and foresee a “hockey-stick” growth graph in the future.179

Likewise, the option of an initial public offering (IPO) is impractical for virtually all early-stage firms due to prohibitive compliance costs and modest prospects.180

This is where professional investors, in particular VCs, step in.181 The


177. This has not always been the case. Consider, for example, the backing of Edison’s inventions efforts by JPMorgan. The 1930s passing of the Glass-Steagall Act (some of the provisions of which were later repealed by the Gramm-Leach-Bliley Act) precluded such activities. See 12 U.S.C. § 227. The legislation included amendments to various banking laws regarding national banks, Federal Reserve Banks, and member banks. See also Moran Ofir & Ido Tzang, An Empirical View of Peer-to-Peer (P2P) Lending Platforms, 19 BERKELEY BUS. L.J. 175 (2022) (discussing alternative lending sources for startups).


179. See Lee, supra note 174; Erik Hurst & Benjamin Wild Pugsley, What Do Small Businesses Do?, BROOKINGS PAPERS ON ECON. ACTIVITY, Fall 2011, at 73 (explaining that most businesses are different than startups, being small and local service businesses with “little desire to grow big or to innovate in any observable way”).

180. See Carlos Berdejo, Going Public After the JOBS Act, 76 OHIO ST. L.J. 1, 49 (2015) (reporting that the average cost of regulatory compliance for small issuers’ IPO is about $3.5 million). See also Schwartz, supra note 23, at 622.

issue is that, even for VCs, early investments present a problem. Uncertainty, information asymmetry, and agency costs are exacerbated at an early stage when no data exists to back up entrepreneurs’ prospects. On this issue, the past few decades have seen a consistent trend of tech-VC investors that entered investments increasingly late in the game and required more traction, such as stable Monthly Recurring Revenues (MRR), to make investments.

VC scrutiny does not end when the investment is secured. Investment agreements typically define a set of milestones that the company must meet to trigger a follow-up investment in the next round. In recent years, milestones have become increasingly demanding, partially because companies must make grandiose promises to secure that first round of funding.

The market reacted to the heightened VC demands with additional funding options. Angel investors step in to finance startups until they meet the VC standard. “Angels” are well-heeled individuals, often former entrepreneurs, who invest their own money in areas where they have personal expertise. Similarly, other pre-VC-period investment vehicles include, but are not limited to, angel groups, family offices, crowdfunding, and micro-VCs. More recently, venture lending instruments have formed around VC-backed companies that need a financial bridge to meet the milestones needed to qualify for the next VC round. “Strategic investment”—namely, investment by existing industry players—has also been growing rapidly as incumbents increasingly seek to have a stake in the startup arena in their spaces.

Staged investments make sense for investors as a method of addressing the three challenges of entrepreneurial finance: uncertainty, information asymmetry, and agency costs. Staging addresses uncertainty and

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182. See sources cited supra notes 162–166 and accompanying text. If in the past, $500,000 could have formed a normal seed round, it would most likely comprise a modest pre-seed round these days and would not raise the interest of VCs.


184. The VC typically allocates additional funds for follow-up investments. See Kupor, supra note 137, at 67–69.


186. Owing to the personal nature of angel investments, the amount, terms, and nature of investments varies widely. See Ibrahim, supra note 145, at 1407–10 (discussing typical angel investment deals).


188. See generally Nguyen, supra note 178, at 138 n.22 (discussing “alternative lenders”: non-banks that lend to VC-backed startups).

189. Strategic investors are firms that invest in startups with the goal of acquiring strategic advantages rather than simply financial returns. See generally Thomas Hellmann, A Theory of Strategic Venture Investing, 64 J. FIN. ECON. 285 (2002).

190. See sources cited supra note 162. See also Gompers & Lerner, supra note 157, at 171 (“Staged capital infusions are the most potent control mechanism a venture capitalist can employ.”).
reduces information asymmetry by discouraging entrepreneurs from exaggerating prospects during negotiation.\textsuperscript{191} Staging reduces agency costs by providing a powerful incentive for managers to meet designated milestones.\textsuperscript{192} Staging also reflects the costs involved in researching small, new firms.\textsuperscript{193}

Yet, staging yields costs too. For entrepreneurs, staging implies longer periods of cash constraints and an increased risk of failure.\textsuperscript{194} Staging also means that entrepreneurs are constantly busy raising money rather than pursuing their idea.\textsuperscript{195}

b. Concentration

The investment landscape is not only staged, but it is also concentrated. Concentration means that the investment market ultimately revolves around VCs.\textsuperscript{196} Indeed, the lion’s share of venture investments is VC-led.\textsuperscript{197} VCs also dominate the industry by influencing the investment decisions of other investors. Indeed, despite the proliferation of angel investors, micro-VCs, family offices, and venture lending instruments, such players will only invest in a company if they feel that, at the end of the current round, the company would be “VC material.”\textsuperscript{198} Otherwise, their money has a high chance of going down the drain.\textsuperscript{199}

What is more, the VC industry is interconnected. VCs often invest to-

\textsuperscript{191}See Cable, supra note 163, at 125–26 (stating that VC funds stage their investments by tying the funds to specified milestones to mitigate information asymmetry and uncertainty); Fan, supra note 181, at 362 (“[S]taged capital infusions keep the company ‘on a “tight leash” and [reduce] potential losses from bad decisions.’”); Gompers & Lerner, supra note 157, at 171.

\textsuperscript{192}See Schwartz, supra note 23, at 638; Fan, supra note 181, at 372–73 (explaining how staging enhances monitoring and control). See generally Gilson, supra note 25, at 1078–83 (explaining staged funding and VC control).


\textsuperscript{194}It is hard to ascertain whether founders win or lose from staging in terms of equity. On the one hand, every stage requires surrendering more equity. On the other hand, uncertainty is gradually diminished, allowing founders to surrender less equity to investors in each round.

\textsuperscript{195}Each funding round supposedly lasts about nine months to a year of startup operations. The time it takes founders to secure the next funding round, on average, is nine months to a year. This means that startup founders are busy raising money all the time. See generally Alejandro Cremades, How Long It Takes to Raise Capital for a Startup, Forbes (Jan. 3, 2019, 8:47 AM), https://www.forbes.com/sites/alejandrocremades/2019/01/03/how-long-it-takes-to-raise-capital-for-a-startup/?sh=14f4d975744a1 [https://perma.cc/9974-CLC6].

\textsuperscript{196}But see Joseph Flaherty, Invisible Unicorns: 35 Big Companies That Started with Little or No Money, TechCrunch, (July 1, 2017, 2:00 PM), https://techcrunch.com/2017/07/01/invisible-unicorns-35-big-companies-that-started-with-little-or-no-money [https://perma.cc/2WE6-KJ6C] (“Provid[i]ng a counterbalance to the VC-centric outlook . . . .”).

\textsuperscript{197}See sources cited supra note 170.


\textsuperscript{199}In fact, they will need to see that the company has good prospects to be “VC material” about six months earlier, because this is the average time needed to raise the next round. See supra note 195.
gether with other VCs. The strongest effect of this interconnectedness occurs when a VC abstinets from making a follow-up investment in a portfolio company. The lack of interest of existing investors to back a portfolio company in a follow-up round forms a bright red flag for other VCs and hinders the chances of the company securing funding.

The dominance of VCs and the VC industry's interconnectedness create powerful incentives for founders to keep VCs content and to meet the milestones set for them. The problem arises in cases where the interests of VCs do not align well with that of the entrepreneurs or with that of society. Providing additional sources of funding beyond VCs could reduce the dependency of innovation on VC interests.

c. Competitiveness

Finally, the private market for investments is extremely competitive. Competitiveness means that startups face fierce rivalry for funding at each stage. Only about 1% of startups receive any outside funding. Estimates are that only 0.05% of startups win VC investments. Some estimate that 90% of startups fail, but the real number may be higher if ideas that never received external funding (and thus do not make it to the statistics) are counted. About 95% of patents never make it to market. Failure to raise money is the leading reason for startup closure at all stages.

The competitive nature of fundraising is anything but surprising. For VCs, the opportunity cost of investing in a particular venture is infinite because every investment precludes investment in a better option that may come along. VCs do not internalize the costs of lost innovation,
and their wait-and-see approach is rational from their point of view. The problem is that, in the absence of pertinent government stimuli, the VC ecosystem (including Angels and the other investment vehicles that orbit VCs) comprises almost the exclusive investment vehicle for the stages between invention and market penetration, leading to the costs that were discussed in the previous section.

2. *Is the Private Ordering for Innovation Justified?*

As we have seen, the shortage of stimulus mechanisms for early-stage innovation forces startups to rely on funding opportunities in the private market, and this policy results in innovation adversities.\(^{209}\) This Section rebuts two possible justifications for the private ordering of innovation funding. The first proposition is that the “valley of death” is an efficient way to vet companies for the best use of innovation resources. The second theory is that private investors, in particular VCs, provide expertise and mentoring, which companies need no less than they need capital in order to facilitate their leap to a fruitful commercialization stage.

a. The Capital Market as a Screening Mechanism

A viable justification for a market-based funding system is that investors perform the necessary function of filtering out bad companies that begin the innovation process. There are, after all, very few entry barriers in the innovation space. Even patents, while they may be expensive to secure, raise an insignificant technical or scientific bar.\(^{210}\) Therefore, access to capital markets may form a necessary vetting mechanism to screen out bad innovation.

To analyze whether investors provide efficient filtering, we need to have a concept of what efficient filtering means in the context of innovation. To assess this question, let us imagine an ideal world with unlimited resources, where no financial constraints block the creation and dissemination of products of innovation. What kind of screening would be desired in such a scenario? My answer is that in such a world, pre-market screening would not be desired at all. Unless, for example, blatantly harmful ideas are at play, the right place to vet new products should be the market.\(^{211}\) Of course, markets are not a perfect proxy for societal welfare. Some decisions of buyers in the marketplace may be misinformed or self-disinterested, and others may generate negative externalities.\(^{212}\) And yet, the market is still the best available tool to convey

\(^{209}\) See supra Part II.B.

\(^{210}\) See sources cited supra note 104.

\(^{211}\) See sources cited supra note 113 and accompanying text.

societal value and is clearly superior to granting gatekeeping powers to parties with additional, unique interests.

Of course, our nonideal world cannot fund all the ideas that people would like to test in the market. Limited resources inevitably impose pre-market vetting. But our short thought experiment demonstrates that the optimal vetting system would have two characteristics: first, it would be minimal; second, it would endeavor to imitate market decisions. How does the VC investment ecosystem fare on these criteria?

The discussion in the previous section laid the basis for understanding that the current system is suboptimal on both criteria. First, as discussed, the extant screening is way too rigorous, as almost all ventures are filtered out during the staged investment process.213 As mentioned, VCs do not internalize the loss of potential innovation. In fact, VCs have a powerful incentive to excessively vet out companies. The first reason for that is resource allocation. The VC operation does not scale; VCs not only have limited resources, but they also work closely with the teams they fund and can only do so with a limited number of startups. The second reason concerns incentives: to win, VCs need a few of their investments to produce asymmetric return. A scenario where all their investments make stable businesses would be called a failure, yet a scenario where all their investments fail alongside one that yielded an asymmetric return would be deemed a success. Because VCs win when a fraction of companies win big, and cannot invest in many firms, the VC vetting mechanism is built to be anything but minimal.

As for the second characteristic, owing to the divergence of interests between VCs and society, the filtering criteria investors use does not mimic the market operation.214 Rather, these criteria often represent idiosyncratic considerations of the VC industry.215 For example, VCs do not internalize the societal interest in competition and avoid investing in startups that compete with an existing investment.216 VCs will also pass on

213. See sources cited supra note 19.
214. See sources cited supra note 113 and accompanying text.
215. See also Joseph Flaherty, 5 Reasons Entrepreneurs Don’t Get Funded (Which Are Not Their Fault), SCALE FIN., https://scalefinance.com/5-reasons-entrepreneurs-dont-get-funded-which-are-not-their-fault [https://perma.cc/WP6G-QU9Y] (discussing reasons behind VCs’ decisions to pass on investments that are beyond the startup control, such as timing or the state of the VC).
216. Of course, companies can be backed by different VCs and compete against each other. Yet, the more venture-backed companies in a space, the harder the fundraising for a new startup. See, e.g., Jason Lemkin, Will VC Invest in a Venture That Can Be a Competitor to the Venture That They Already Funded, SAASTR (June 15, 2016), https://www.saastr.com/will-vc-invest-in-a-venture-that-can-be-a-competitor-to-the-venture-that-they-already-funded [https://perma.cc/FQM6-572I] (“The larger the check, the less likely a VC will invest in a direct competitor.”); Connie Loizos, Sequoia Is Giving Away $21 Million to a Payments Startup It Recently Funded As It Walks Away From Deal, TECHCRUNCH (Mar. 9, 2020, 12:31 PM), https://techcrunch.com/2020/03/09/sequoia-is-giving-away-21-million-to-a-payments-startup-it-funded-as-it-walks-away-from-deal [https://perma.cc/2PAL-RK8L] (“In the world of venture capital, where trust between investors and founders is paramount to the success of both, investing in a company that competes with another startup in a firm’s portfolio is a no-no.”).
investing in businesses that would not potentially produce an asymmetric return, such as in “obviously good ideas,” where competition would likely squeeze the economic rent. Likewise, VCs would avoid ventures that produce value that the VC cannot capture but would embrace ventures that have evidently overriding social costs. Finally, VCs would be biased in favor of specific locations and backgrounds and favor nondiverse teams.

In sum, the underlying assumption of this discussion is that markets generally form a good proxy for the welfare that innovation produces for society. Investors function as pre-market gatekeepers, but the criteria that they use are both too strict and divergent from the societal interests in innovation. This analysis does not take away from the virtues of the VC industry. Yet, this analysis goes to show what we have known all along: in terms of promoting innovation, the private market can only take us so far. The private market cannot shoulder the entire universe of innovation. This theory applies to the entire innovation lifecycle.

b. The “Added Value” of VCs

Another possible justification for the private ordering of innovation funding is that private investors add value to companies beyond capital. VCs pride themselves on being long-term partners to startups that they nurture. In addition to funding, VCs claim to provide their time, connections, experience, and operational support to companies. Indeed, the correlation between companies’ success and VC backing may imply that VCs provide valuable support.

In the industry, however, the proposition that VCs provide added value to startups is questionable at best. A 2018 study of the matter found that VCs vastly overvalued both their contribution to and their impact on the startup compared to the founders’ perspectives. Similarly, prominent figures in the VC industry question whether VCs actually offer meaning-

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217. See Dreyer, supra note 107 (explaining that obviously good ideas “invite too much competition” and “would never produce venture returns”).
218. See generally Posner, supra note 116; Eriksen & Weigel, supra note 123.
219. See supra Part II.B.3.
220. See Gilson, supra note 25, at 1072 (“[VC] contributions consist of management assistance, corresponding to that provided by management consultants; intensive monitoring of the portfolio company’s performance which provides an objective view to the entrepreneur; and the use of the fund’s reputation to give the portfolio company credibility with potential customers, suppliers, and employees.”); Catherine Casamatta, Financing and Advising: Optimal Financial Contracts with Venture Capitalists, 58 J. Fin. 2059, 2072–73 (2003) (arguing that VCs contribute advice and effort that is essential to the success of the venture).
221. See Flaherty, supra note 196 (“VC is a common denominator of the most successful tech startups . . . .”); Samuel Kortum & Josh Lerner, Assessing the Contribution of Venture Capital to Innovation, 31 RAND J. Econ. 674, 674–75 (2000) (reporting that VC-backed firms produce more patents and more valuable patents than firms that are not VC-backed).
ful advice to startups.223 Startups also do not select VCs based on any added-value criteria.224 These findings are hardly surprising. The ultimate performance measure of VCs is not portfolio support, but financial performance, which mostly depends on the selection of companies and dealmaking.225 As a result, there is little incentive for VCs to focus too much on the added-value aspect of their operation.226

Also consider that, as discussed, VCs’ interests may not overlap with founders’ interests, and thus some VCs’ advice will not always be in line with the company’s best interest. For example, because VCs structurally make a profit only when a company makes an “exit,”227 a VC-backed company would be unable to remain a private company, albeit a profitable one. VCs may also put pressure on a company to sell early if the VC needs liquid assets and other companies are not performing as expected.228

Finally, VCs are not the only ones claiming to offer support and advice. A thriving industry of startup support, including incubators, accelerators, boot camps, corporate initiatives, and a myriad of other programs of various kinds and compensation methods, have arisen in the startup ecosystem.229 Similarly, outlier banks also purport to nurture early-stage companies.230

To sum up this point, it appears that the correlation between startup success and VC-backing owes less to the added value VCs provide, and more to the capital that they supply and to the rigorous selection function of companies at the outset. There is perhaps a chicken and egg problem: there is no way to know if the fact that VC-backed companies have a

223. See, e.g., Kim-Mai Cutler, Vinod Khosla: 70-80% Of VCs Add Negative Value to Startups, TECHCRUNCH (Sept. 11, 2013, 2:24 PM), https://techcrunch.com/2013/09/11/vinod-khosla [https://perma.cc/QK6F-36VF] (quoting Vinod Khosla of Khosla Ventures) (“Maybe some percentage that’s substantially larger than 95 percent of VCs add zero value. I would bet that 70-80 percent add negative value to a startup in their advising.”); Boris Golden, Can VCs Really Add Value Beyond Money?, PARTech (Oct. 16, 2018), https://partechpartners.medium.com/can-vc-really-add-value-beyond-money-18016ec660f8 [https://perma.cc/ZT78-PUXN] (“[M]any people in the ecosystem, including VCs themselves, are doubtful on why a VC could be a good advisor [and] really help, or even whether it is part of the job . . . .”).

224. In fact, only a rather small number of companies use these services. See FRITJOFSSON & DESHAYS, supra note 222, at 13.

225. See supra Part II.C.1 (discussing the VCs’ LPs).

226. See FRITJOFSSON & DESHAYS, supra note 222, at 13, 21.

227. By “exit,” I refer to the sale of the company or an IPO.

228. See, e.g., KUPOR, supra note 137, at 62–66 (exemplifying how a VC can push a company for near-term sale for the interest of the VC’s LPs, even against the best interest of the company).


230. See Startup Banking, JPMORGAN, https://www.jpmorgan.com/commercial-banking/startups [https://perma.cc/6SEM-HK7T] (“We understand banking for startups. With smooth onboarding and an intuitive digital experience, our products can help you reduce costs, save time and make more informed decisions—allowing you to focus on growing your business.”).
considerably higher chance of success shows that VCs made the right decisions at the selection stage or that the VC-backing was a controlling reason for the venture's success. Either way, it seems unlikely that success depends on VCs' added value in any meaningful way.

Indeed, the reliance on VCs to fund the lion's share of the innovation lifecycle is costly. It leads to underfunding because VCs cannot possibly fund all innovative ideas. It also subjects the selection of innovation to VCs' business models and biases, and favors the unicorn-hunting model, which may be glorious but is probably less efficient from a societal standpoint. At the end of the day, relying on one type of innovation financier steers the entire universe of innovation to one direction and harms the quantity, quality, and diversity of innovation. This account does not mean that the VC model should be abolished, but it underscores the importance of complementing it with additional stimuli which would apply more broadly and more equally in the innovation ecosystem.

III. POSSIBLE SOLUTIONS

This Part considers some of the possible ways to address the issue that this Article raises. This discussion is intended to be suggestive rather than comprehensive. The idea is to demonstrate that it is possible to conceptualize ways to alleviate these concerns, despite the common belief that undercapitalization and its costs are an inherent feature of innovation. The discussion below sets the stage for further research regarding each of these solutions that can be expanded upon in subsequent scholarship.

There are three possible ways to address the concerns that this Article examines. The first one would double down on the existing stimuli but, apply them in the post-invention, pre-market stages of innovation. A second potential solution would maintain the private ordering of the investment market, but would improve it so that funding would be more efficient. Finally, a third group of solutions would keep the private market intact but address some of the resulting costs separately, one by one.

A. “STRETCHING” EXISTING STIMULI

As discussed, the existing landscape of innovation stimulus mechanisms is composed of three main instruments: IP, CBT, and tax incentives. As analyzed above, CBT is designed to cover R&D costs—ex ante or ex post, while IP and tax incentives materialize when the innovation is on the market. But what if we could “stretch” the existing mechanisms to cover a larger part of the innovation process? As I discuss below, it is possible to consider such a strategy regarding each of the existing stimulus mechanisms.

231. See supra Part II.A.
232. See supra Part II.A.
1. Expanding the Use of IP Protection

Consider first IP. As discussed, IP purports to encompass the entire innovation process.\textsuperscript{233} Inventors are supposed to register their patents early and reap the fruits when they sell the resulting products, while, in the meantime, enjoying strategic benefits such as an elevated negotiation position on the market.\textsuperscript{234} The problem with this theory is that early-stage companies rarely have the resources, time, and focus needed to pursue, enforce, and form a strategy around their IP.\textsuperscript{235} As a result, they are likely to miss the pre-market benefits of patents and even pass on pursuing patents altogether.\textsuperscript{236}

A plausible way forward could be to conceptualize a patent system that does not (or does not always) require \textit{ex ante} investment of scarce resources. Such an IP scheme may be more appropriate to provide startup companies with benefits before market penetration. Concretely, a promising idea could be to establish another layer of patent protection, which would grant \textit{unregistered} inventions a period of limited patent protection. Unregistered patents could function in a similar vein to a regular patent: they would enable patentees to prevent others from using the invention.

Clearly, the lack of registration, and therefore notice, of the invention would require some tweaking of the rights bestowed in unregistered patents. A workable framework would probably be comprised of a lower-level protection of unregistered patents in at least three dimensions. First, unregistered patents should confer a monopoly with a reduced scope relative to a standard patent. For example, it could block competitors from selling the invention but not from producing it.\textsuperscript{237} Unregistered patents could also last for less than twenty years. Second, unregistered patents should probably trigger more limited enforceability. For example, it is possible to decide that the holder of an unregistered patent would be able to bring infringement suits only against competitors who copy the inventions rather than independently invent them.\textsuperscript{238} Finally, an unregistered patent could be designed to trigger more limited remedies. The available remedies for patent infringement include preliminary and temporary injunctions, actual damages, treble damages, and attorney fees.\textsuperscript{239} This panoply of remedies may be too extensive for unregistered patents.

\begin{itemize}
\item \textsuperscript{233} See supra Part II.A.1.
\item \textsuperscript{234} See supra Part II.A.1.
\item \textsuperscript{235} See supra Part II.A.1.
\item \textsuperscript{236} See supra Part II.A.1.
\item \textsuperscript{237} Cf. 35 U.S.C. § 271(a) (“Except as otherwise provided in this title, whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent.”).
\item \textsuperscript{238} Such a limitation exists under trade secrets law and under copyright law. See \textit{Unif. Trade Secrets Act} §§ 1(1), 2 (Unif. L. Comm’n 1985); Johnny Sinodis, \textit{The Law of Creation}, 1 Ariz. St. Sports & Ent. L.J. 111, 111 (2011) (“Independent creation has become one of the most oft-advanced defenses to a claim of copyright infringement.”).
\item \textsuperscript{239} 35 U.S.C. §§ 283–285; see also Rite-Hite Corp. v. Kelley Co., 56 F.3d 1538, 1548–49 (Fed. Cir. 1995) (extending range of lost profits available in cases of infringement).
\end{itemize}
The straightforward advantage of such a move is to enhance the access of early-stage companies (and perhaps the access of other groups of underprivileged inventors as well) to the patent system. The lack of registration would eliminate the requirement of an ex ante investment altogether and would thus be more readily available for the use of under-resourced startups. Most importantly, the availability of unregistered patents would allow startup companies to leverage their IP protection in the pre-market stage. Even with a limited scope, startup firms would be able to use their IP to block competition, and this market advantage would enable them to secure funding and achieve an elevated market position. It is also possible to consider that after a certain time, patentees would be able to register the invention and receive the full scope of protection. Such a framework would also enable early-stage companies to file for standard patents later in the innovation lifecycle when they can foresee the value patents can yield and can afford to pursue them.

Of course, such a revolution in patent law has broad implications and should be examined carefully. Patent registration serves crucial functions by providing credible information about property rights. The patent record indeed provides vital notice of patentee rights and thus justifies the in rem nature of the patents. Registration is also key to distributing knowledge of patents in order to promote the diffusion of inventions in the market. Any proposal to amend patent law to allow the protection of unregistered patents must take the registry’s roles into account.

While the idea of unregistered patents is revolutionary in the patent arena, other types of IP regimes, including copyright, trademark, and, most prominently, trade secrets, grant at least some degree of protection to unregistered works. The notion of deviating from a one-size-fits-all

240. See supra Part II.A.1.
244. See Helman, supra note 19, at 71–72. See also Bell & Parchomovsky, supra note 242, at 245–46.
patent system towards a more nuanced patent system also corresponds with novel literature in the area. For example, in a recent article, Gideon Parchomovsky and Michael Matioli propose schemes of “quasi-patents” and “semi-patents” comprised of different rights. Other scholars have extensively discussed the “crisis” in the patent system. The option of unregistered patents can substantially contribute to the scholarship in this realm. While a discussion of the specific contours of an unregistered patent model exceeds the limits of this Article, subsequent scholarship should be devoted to exploring this idea further and examining its potential virtues and limitations.

2. Expanding the Use of CBTs

CBTs are perceived as tools to cover R&D costs—ex ante via grants or ex post via prizes. As such, and as previously discussed, the CBT instrument targets the invention stage of innovation. Yet the limited coverage does not have to be an inherent feature of the CBT instrument. In essence, CBTs form a direct transfer of money to further innovation. And as discussed, the concept of furthering innovation must address not only the production of new technology but also the diffusion of the new technology in the market. CBTs can therefore be designed to cover the costs associated with market diffusion and thus accelerate the speed with which inventions are introduced to the market.

It is relatively easy to conceptualize an extended scheme that applies beyond the invention stage. For example, grants can be given out to subsidize the market penetration of inventions. Similarly, prizes can be awarded for successful market experimentation or pilot programs or can be calculated to subsidize early sales efforts.

Steps in this direction have been attempted globally. For example, the World Bank has pointed out the potential benefits of subsidizing market diffusion in cases where the adoption of a promising technology has proven difficult. Similarly, in 2017, Congress enacted the American Innovation and Competitiveness Act (AICA) which, among other things, encouraged federal entities to partner with the private sector when set-

248. See supra Part II.A.2.
249. See sources cited supra note 111–112 and accompanying text.
The effect of such partnerships can include better diffusion of innovation in the market because market players would be involved in the analysis of the gaps in innovation and in the selection of solutions. But even with these advances, prizes still aim at the development stages of the innovation rather than at diffusion of the resulting product in the market. Congressional reports that compile and analyze prize competition data do not even measure the extent to which the winning solutions have ever made it to market.

This, to me, is an oversight. As discussed, innovation fulfills its potential when new products arrive in the market, not by their mere creation. Expanding CBTs beyond production and onto market diffusion is therefore promising on two main levels. First and foremost, such an approach can help bridge the gap of funding between invention and profits, and yield dramatic innovation gains. Second, expanding the reach of CBTs can reduce the reliance on the IP regime and avoid its associated monopoly costs. Indeed, as discussed, IP is the prime tool to promote innovation. But it is well known that IP results in inefficiencies. In particular, IP makes innovation excludable and reduces access to innovative products. Diminished access to products of innovation famously generates social costs in the form of deadweight loss and distributive concerns, among others. If CBTs could reward inventors for more of their innovation costs, IP—and its resulting costs—may become less dominant. Additionally, if CBTs can enter the scene at the market penetration stage, they can, at least in some cases, set terms for winning proposals. Some terms can expand the accessibility of innovation or even require the inventor to renounce IP rights. Simply put, shifting the timing of CBTs can transform CBTs into a meaningful alternative to IP in suitable cases rather than a complementary tool for the R&D stages.

Yet, an enhanced CBT role in the innovation ecosystem will have implications beyond the scope of this Article. Expanded CBTs implies greater involvement of the government (or private parties) in the selection of projects, as well as in the selection of winners and losers. This inherent feature of CBTs can increase concerns about capture and, perhaps, inequality. Augmenting CBTs would also yield hefty financial implications for the government. Remember also that CBTs have their inherent drawbacks, as discussed above. Thus, CBTs would still be

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251. See supra note 79. Indeed, in recent years, “[a]pproximately 47% of [prize competitions] were conducted in partnerships with at least one non-Federal organization . . . .” OFF. OF SCI. & TECH. POL’Y, supra note 79, at 14.
252. See, e.g., OFF. OF SCI. & TECH. POL’Y, supra note 79.
253. See sources cited supra note 111–112 and accompanying text.
254. See sources cited supra note 75 and accompanying text.
255. See supra Part II.B.
256. See supra Part II.A.1.
257. See Stiglitz, supra note 3, at 1722.
258. For an extreme view of the matter, see Milton Friedman, Capitalism and Freedom 3 (1962) (“The great advances of civilization, whether in architecture or painting, in science or literature, in industry or agriculture, have never come from centralized government.”).
processed rather slowly, carry an ad hoc and competitive nature, and would not be a reliable source of income for early-stage innovators. In fact, the underpinning of IP law, and one of its most celebrated features, is that IP frees creators and inventors from the reliance on funding by the state or affluent private parties. A policy that expands the use of CBTs must be designed to avoid taking a step back in this regard. Yet, while the option to expand CBTs should be analyzed carefully, strategic use of the CBT tool in the more advanced stages of innovation can alleviate some critical financial hurdles for early-stage firms.

3. Expanding the Use of the Tax System

As discussed, the tax system fosters innovation by granting ex post tax credits to encourage ex ante investments in innovation. For this reason, as analyzed above, the tax system is generally of little avail to early-stage companies until they generate profits (if ever) that can be offset against taxes due.

But what if the tax system could be “stretched” to induce mechanisms that early-stage innovative firms could use? After all, tax mechanisms have been developed in myriad contexts to promote certain government policies or to encourage certain behaviors, including R&D activities. Indeed, recent scholarship has explored ways to harness the tax system to tackle the startup funding crisis.

One approach could be to target early-stage startup firms for specialized treatment by the tax system. While this approach is relatively easy to administer, and some tax provisions already single out “small businesses” for favorable treatment, the problem with this approach is twofold. First, it is bound to fall prey to definition failures and to be overinclusive and underinclusive at the same time. Second, a policy that turns solely on the size (or age) of a firm would miss the opportunity to create incentives for the firm besides staying small (or young).

A better approach could be to design policies that would address startups’ concerns while at the same time incentivizing them to boost innovation. Successful policy candidates would include two features. First, they would successfully target innovation-intensive startups for tax incentives.

259. See supra Part II.B.2.
260. See, e.g., Peter Lee, Social Innovation, 92 WASH. U. L. REV. 1, 6 (2014) (“Among its other virtues, the patent system is often extolled as a neutral platform in which the market—rather than a government entity—determines the allocation of resources for technological development.”); see also Wright, supra note 32, at 695.
261. See supra Part II.A.3.
262. See supra Part II.A.3.
263. See sources cited supra note 88 and accompanying text.
264. See generally Shay et al., supra note 87; Morse, supra note 55; Morse & Allen, supra note 91; Reuven S. Avi-Yonah, The UTPR and the Credits, 110 TAX NOTES INT’L 1363 (2023) (explaining that making tax credits refundable so that they can benefit startups—as well as tax partnerships—are consistent with the limits set by OECD pillar 2).
265. See I.R.C. § 1202 (concerning “small business stock”); I.R.C. § 1244 (same). Such policies are common to other areas of regulation as well. See, e.g., 37 C.F.R. § 1.16 (2023) (showing that there are lower filing fees for small and micro entities at the PTO).
Second, they should be easy to claim and involve as few transaction costs as possible.

One promising policy proposal involves shifting tax benefits in time and setting up an “ex ante tax credits” system for innovation. This system would enable immediate use of startups’ losses by tax refunds or refundable credits rather than by stocking losses up until profits arise (which is no guarantee). This proposal addresses the inherent inequality in the current scheme which makes tax benefit contingent on firm profit and disfavors newcomers that have no profit to offset credit against. A similar possibility is to enable immediate use of losses that startups generate by the startup’s equity owners, instead of by the entity itself, in the same way that partnerships and LLCs operate.

This method would facilitate better access for early-stage firms to tax incentives, lower transaction costs, and reduce the required upfront investment and need for tax planning. Such a method may also encourage equity investments in startups because equity holders would be able to enjoy immediate tax credits. On the other hand, the cost of giving tax refunds to loss companies may be too high. Shouldering startups’ losses is a rather expensive method for the government, and it may also create incentives for startups to take excessive risks.

Another idea concerns tax credit partnerships. The idea of a tax credit partnership is to allow firms to monetize tax credits that they receive by allocating them to limited partners or investors that can offset them against unrelated profits. Alternatively, partners or investors can use the losses that the firm generates directly if they are organized as pass-through entities, such as S corporations or partnerships.

266. See Morse, supra note 55, at 16 (“One solution is to change the timing of the benefit offered to the startup firm, in other words to offer it earlier . . . .”).


269. See Morse, supra note 55, at 13 (explaining the benefits of pass-through structures, such as LLCs, which enable immediate use of losses generated by a startup firm).

270. Currently, however, early stage investments are often done via non-equity instruments, such as convertible loans. See, e.g., Doug Bend, Should I Use SAFEs or Convertible Promissory Notes For My Startup’s First Investment Round?, FORBES (Aug. 25, 2022, 7:15 AM), https://www.forbes.com/sites/theyec/2022/08/25/should-i-use-safes-or-convertible-promissory-notes-for-my-startups-first-investment-round/?sh=120bb50b5a8a (the two most popular options are convertible promissory notes and SAFEs, or simple agreement for future equity). Potential distortions of investment mechanisms should be carefully examined before setting up such a scheme.


273. See generally Warren & Auerbach, supra note 97 (discussing tax credit partnerships).
Tax credit partnerships have the benefit that *ex ante* tax credits have: to enable startups to monetize credits that would otherwise go unused. It is also a promising way to attract investments, and it may enable startups to surrender less equity for investments or to charge more for the equity they issue. Yet, tax credit partnerships are usually more burdensome and more difficult to set up and use. They also impose a limitation on the type of organizations that the firm can choose from and drives firms to use pass-through entities with all the costs that are involved.274

Such policies—or others—have the potential to tailor the tax system to bridge the financial gap at the early stages of innovation.275 The benefit of using the tax system for that purpose would be substantial. The tax system is proven to be effective in boosting desired behaviors and deterring undesired ones.276 Harnessing the tax system to encourage innovation early in the lifetime of a firm can be a powerful tool to bridge the gap in government incentives.

### B. Improving the Funding Mechanisms of the Private Market

The previous subpart discussed the option to “stretch” the existing incentive mechanisms for innovation to the post-invention, pre-revenues stages of innovation. A second group of solutions concerns improving the funding mechanisms of the private market while maintaining the centrality of the private market in innovation funding. The idea behind this type of solution is that while some of the drawbacks of private innovation funding are structural,277 some policies can be crafted to improve the market’s efficiency, thus making government incentives less essential. In particular, proposals to fix the friction in the capital market include incentives to attract other types of investors to innovation funding.278 The idea is to open the VC-controlled space to more competition, if only to diversify the investment arena and capture the foregone value of VCs’ underinvestment.

One suggestion for a non-VC investment vehicle is crowdfunding. Crowdfunding is a way for startups (among others) to raise funding by obtaining small amounts from numerous individuals.279 In 2012, Congress enacted the JOBS Act with the key purpose of boosting crowdfunding.280

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275. *See generally* Shay et al., *supra* note 87.


277. *See supra* Part II.C.

278. *See, e.g.*, *supra* note 177 (discussing how bank regulations now preclude many investments in innovation).


Specifically, the JOBS Act purported to make crowdfunding less burdensome and easier for both investors and founders to facilitate. Despite its good intentions, the JOBS Act has not (or has not yet) made a significant difference in the market. One reason for that may be the onerous nature of the Act, which made it less accessible than its architects imagined it to be. Another reason may be unrelated to the Act itself and concerns the availability of private capital in the decade since the law passed. In any event, crowdfunding has remained a rather niche option for fundraising. Recently, the Securities and Exchange Commission (SEC) relaxed its rules regarding crowdfunding to clarify them and to enable broader participation of companies and investors. Time will tell if these new rules will turn crowdfunding into a viable option, which could help bridge the gap for early-stage innovation funding.

Another promising candidate for non-VC investors includes Corporate Venture Capital (CVC). CVC refers to large corporations that invest in startups directly or via a subsidiary. The role of CVCs in the venture ecosystem is under-researched and understated. Yet CVC investment grew rapidly throughout the past decade and is becoming an increasingly dominant player in the investment arena. Granted, CVCs still typically invest alongside traditional VCs and often allow VCs to lead the investment deal and represent investors on boards. One promising feature of the CVC market entry is that, unlike traditional VCs, CVCs expect strategic dividends in addition to financial ones. For example, CVCs use investments to learn about new trends in their industry as well as to accelerate traction. Even though CVCs usually invest alongside VCs today, the strategic value CVCs seek in their portfolio companies is likely to influence their investment selection in the future. Thus, instead of a unicorn hunt, CVCs may focus on companies that offer transforming technologies and interesting solutions to real problems in the industry.

It is unclear yet whether the law needs to take any measures to accelerate the market entry of these relatively new players or to attempt to affect their incentives. Yet this new phenomenon should be further explored in order to examine whether CVCs form—or can potentially other ways of raising capital. See Michael J. Zeidel, The JOBS Act: Did It Accomplish Its Goals?, HARV. L. SCH. F. ON CORP. GOVERNANCE (Jul. 18, 2016), https://corpgov.law.harvard.edu/2016/07/18/the-jobs-act-did-it-accomplish-its-goals [https://perma.cc/3PKR-STE6].

282. See Pantin, supra note 187, at 191.
285. See Mark Gallagher et al., The State of CVC, SILICON VALLEY BANK 8 (2021) (surveying the activity of CVCs).
286. See id. at 6–12.
287. See Drover et al., supra note 284, at 1834–37.
become—a meaningful investment vehicle to bridge the financial gap at the early stages of innovation.

Additional private market initiatives that can potentially address the funding shortage in the early stages of innovation come from innovation in the investment space itself. Among the initiatives that flourish in this space, two are worth mentioning. The first one concerns Special Purpose Acquisition Companies (SPACs). SPACs are firms that have no commercial operations and are formed strictly to raise capital through an IPO. SPACs attract vast interest and raise concerns on various levels. Yet, it is important to study SPACs through the prism that this Article sets forth and examine whether SPACs can provide an effective way to bridge the financial gap in the early stages of innovation.

A second innovation in the investment space involves new technological tools, typically based on blockchain platforms. Investments on the blockchain are enabled through tokenization, such as via Non-Fungible Tokens (NFTs), Security Token Offerings (STO) or Initial Coin Offerings (ICO). The general idea behind these mechanisms is that the startup issues tokens instead of equity and sets the terms of the deal through smart contracts. To attain the benefits of such instruments, regulation must be put in place, and its desired nature must be further researched.

C. Addressing Resulting Concerns Separately

Finally, a third way to address the issues raised in this Article is to tackle separately at least some of the costs that private ordering of innovation funding generates without tackling the funding issue itself. This strategy can be seen as a step-by-step approach to help mitigate the concerns that this Article analyzes, albeit imperfectly.

A good candidate for a problem that can be addressed separately, at least to a certain level, consists of distributive concerns. For example, it is possible to craft policies to address the various hurdles that female entrepreneurs face, such as domestic responsibilities, limited access to re-

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289. See generally id.
292. See supra Part III.B.3.
sources and education, societal biases, and differing attitudes toward risk. These issues can—and probably should—be addressed regardless of innovation funding. Solutions for such broad problems would not necessarily arise in the legal scholarship. Yet some legal measures can be taken to foster greater gender equality in the innovation space directly. For example, patent law should address potential biases against women within the patent system and tackle specific areas where problems can be identified, such as academic patenting.

Notably, this route—namely, addressing the concerns embedded in the extant regime separately—has evident drawbacks. Some of the solutions will always be partial, and some problems in the current innovation regime will remain unaddressed. On the other hand, this approach has noticeable merits. Prime among those is that many of the problems that the lack of startup funding exposes are broad societal issues that manifest themselves in other areas as well. Tackling these concerns could thus create spillover effects and produce value beyond the area of innovation alone. Consider, for example, the issue of gender (or other) inequality in innovation. If the attempt to address inequality in the innovation space succeeds, and women and minorities own more and more successful businesses, a snowball effect can result in other areas of society as well.

To maintain the focus of this Article, a detailed discussion of the various solutions cannot be provided here. This Article focuses on demonstrating the inefficiencies in the extant regime that often go unnoticed and paving possible routes to address those inefficiencies. Each of the solutions identified in this Part deserves a thorough analysis of its own. Further scholarship should develop these—and perhaps other—options more deeply.


298. Kyle Jensen, Balázs Kovács & Olav Sorenson, Gender Differences in Obtaining and Maintaining Patent Rights, 36 NATURE BIOTECHNOLOGY 307, 308 (2018) (finding that patents by female inventors were more likely to be rejected or narrowed in scope).
IV. CONCLUSION

Innovation is fervently celebrated as a life-transforming phenomenon that pushes society forward with the helpful support of a vibrant capital market. This Article focuses on the empty half of the glass—albeit with an optimistic outlook. Innovation faces a serious funding crisis. The stages between invention and successful commercialization are long and require, among various other things, an investment of sizable amounts of money.

The existing stimulus mechanisms for innovation apply only to the beginning of the innovative process and to its end. In the beginning, companies can file a patent and try to win grants or prizes. When the company is already selling, it can enjoy IP payoffs and tax credits. In between, no targeted stimulus mechanisms exist. This policy is an incongruity because most innovative endeavors struggle neither in the idea phase nor after they become profitable. Their “valley of death” occurs in their search for funding in between.

The gap in funding is also at odds with the otherwise shared wisdom regarding innovation funding on three main levels. First, this policy forces firms to rely on the private market to fund most of the innovation process, despite the common wisdom that innovation funding cannot rely on the market economy alone. Second, the current regime makes it more worthwhile to innovate at the profit stage of companies than as industry newcomers, despite the common knowledge that newcomers are better situated than incumbents to come up with valuable innovation. Third, the extant regime renders it cheap to come up with ideas but presents a serious hurdle to leap from the idea phase to successful commercialization. As a result, even great ideas cannot necessarily fly.

This Article explores the costs that this policy produces. It also paves the road for thinking about ways to alleviate this problem via three main routes. The first is to extend existing instruments to apply in earlier stages of innovation. The second is to maintain private ordering of innovation funding but improve the way it works. The third is to address the costs of private ordering without changing anything in the structure of the funding system. Most importantly, this Article shows that the problems in the existing structure of the market are not uncurable and that addressing them can promote more and better innovation.