



NOTE

Beyond Covenants Not to Compete: Equilibrium in High-Tech Startup Labor Markets

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Abstract. The literature analyzing the relationship between enforceability of covenants not to compete and the success of Silicon Valley is incomplete. The microstructure of the employee stock options market, combined with California's strong public policy against noncompete enforcement, creates an equilibrium in which employees at less successful private firms can move to competitors at little or no cost, but valuable employees of successful private firms are, practically, handcuffed just as if they were subject to a powerful noncompete. This limitation on employee mobility is removed once the company holds a liquidity event—such as an initial public offering or acquisition—allowing its entrepreneurial talent to transition to other companies or start new ones.

This Note argues that this narrowly tailored retention function provides a more compelling explanation for Silicon Valley's success than does an explanation that has become popular among policymakers in recent years: the unenforceability of noncompetes as the sole factor. This Note further suggests that companies' current tendency to delay liquidity events, a tendency facilitated by recent changes in the private capital market and the securities regulatory environment, might overly restrict employee mobility and impair the efficient allocation of talent that characterized Silicon Valley for many years.

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Introduction

The legal literature and popular press feature considerable debate over “noncompetes”: contracts limiting employees’ ability to work for competitors after their employment ends.¹ These agreements were once considered an essential means of protecting trade secrets and encouraging companies to invest in human capital as well as research and development (R&D).² They are now increasingly regarded as a threat to innovation and economic growth.³ While most of the research in this field focuses on the importance of mobility of skilled employees among firms as a catalyst for knowledge transfer and entrepreneurial spawning⁴—with Silicon Valley being the most prominent example⁵—this Note seeks to illuminate the role of broad-based employee stock options⁶ in moderating this mobility.

1. See *infra* Part I.B. For examples of op-eds and other discussions regarding noncompete enforcement, see Omri Ben-Shahar, Opinion, *California Got It Right: Ban the Non-compete Agreements*, FORBES (Oct. 27, 2016, 3:02 PM), <https://perma.cc/VWA2-ECM3> (discussing the pros and cons of noncompete enforcement and embracing the Obama Administration’s call for states to ban noncompetes); Lydia DePillis, *The Rise of the Non-compete Agreement, from Tech Workers to Sandwich Makers*, WASH. POST: WONK BLOG (Feb. 21, 2015), <https://perma.cc/HKP3-MZ4Y> (suggesting that noncompetes are “remarkably widespread” and are even used in industries where “they’re probably not really necessary”); Conor Dougherty, *How Noncompete Clauses Keep Workers Locked In*, N.Y. TIMES (June 9, 2017), <https://perma.cc/2TT6-5V8T> (relating stories of employees from a range of industries who were prevented from working in their field of expertise due to noncompetes); Conor Dougherty, *Noncompete Pacts, Under Siege, Find Haven in Idaho*, N.Y. TIMES (July 14, 2017), <https://perma.cc/ZR9T-WA9P> (describing the debate between noncompete proponents and opponents in Idaho and nationwide); Jason Furman & Alan B. Krueger, Opinion, *Why Aren’t Americans Getting Raises?: Blame the Monopsony*, WALL ST. J. (Nov. 3, 2016, 7:33 PM ET), <https://perma.cc/JJ6A-TAQY> (calling for the adoption of policies that prevent development of monopsony power in the labor market and labeling “excessive use of noncompete clauses” as a culprit); Paul Krugman, Opinion, *The Unfreeing of American Workers*, N.Y. TIMES (May 22, 2017), <https://perma.cc/TC42-T9V3> (arguing that in many cases noncompetes are used to suppress labor market competition rather than to protect legitimate employer interests); Orly Lobel, Opinion, *Companies Compete but Won’t Let Their Workers Do the Same*, N.Y. TIMES (May 4, 2017), <https://perma.cc/64JJ-NECW> (“Noncompete agreements, like other anti-competitive practices, poison our economy . . . [by] reduc[ing] employee motivation, entrepreneurship and sharing of knowledge . . .”); and Steve Lohr, *To Compete Better, States Are Trying to Curb Noncompete Pacts*, N.Y. TIMES (June 28, 2016), <https://perma.cc/2NXA-WUH9> (discussing the effects of Massachusetts’s policy on noncompetes compared to that of California and other states).

2. See *infra* Part II.A.

3. See *infra* Part II.B.

4. See *infra* Part II.C.

5. See *infra* Part II.B.

6. By broad-based stock options, I mean those granted to rank-and-file employees rather than those restricted to management.

Although the use of noncompetes as sticks to induce workplace loyalty is largely prohibited in California, employee stock options are considered a legitimate carrot for achieving the same goal.⁷ The retention function of private firms' employee stock options is common knowledge among practitioners.⁸ This function, however, is often underappreciated in the literature on employee mobility and innovation.⁹ For an employee holding an equity stake in a startup, the decision to leave the company might involve substantial financial consequences.¹⁰ This Note therefore takes a classical economic "rational person" approach to decisionmaking. By doing so, it intends not to discount the importance of other factors guiding employment choices—such as the quality of relationships with colleagues, professional development, or personal satisfaction—but rather to illustrate the role employee stock options play in the specific context of startup employee retention.

Building on a previous observation by Richard Booth, I argue that the combination of a strong public policy against enforcing noncompetes and a favorable approach toward broad-based employee stock options is what explains Silicon Valley's efficiency in matching talent with ventures.¹¹ Due to the prevalence of employee stock options among Silicon Valley's technology firms,¹² it is inaccurate to characterize the region as a labor market with high mobility across the board. Stock options, however, induce retention in a different manner than noncompetes. Whereas noncompetes suppress employee mobility regardless of company success, stock options provide a strong retention tool in the hands of successful startups only. The asymmetric payoff structure of stock options binds employees to the startup when the

7. See Richard A. Booth, *Give Me Equity or Give Me Death—The Role of Competition and Compensation in Silicon Valley*, 1 ENTREPRENEURIAL BUS. L.J. 265, 271 (2006) (arguing that California employers rely on equity compensation as a way to bind employees because the companies are not allowed to use noncompetes); Ronald J. Gilson, *The Legal Infrastructure of High Technology Industrial Districts: Silicon Valley, Route 128, and Covenants Not to Compete*, 74 N.Y.U. L. REV. 575, 607-09 (1999) (discussing California's ban on enforcing noncompetes and its effects); see also Jonathan M. Barnett & Ted Sichelman, *Revisiting Labor Mobility in Innovation Markets* 11 (Ctr. for Law & Soc. Sci., USC Gould Sch. of Law, Legal Studies Research Papers Series No. 16-15, 2016), <https://perma.cc/8HT9-NGXD> (pointing to equity compensation as a factor that potentially diminishes employee mobility in jurisdictions that are hesitant to enforce noncompetes); *infra* note 208 and accompanying text (collecting empirical research on broad-based stock options and employee mobility in public firms).

8. See, e.g., *infra* notes 184, 197, 246, 286 and accompanying text.

9. See *infra* Part II.C.

10. See *infra* Part III.B.

11. See Booth, *supra* note 7, at 274-77 (hypothesizing that equity compensation is a superior method for ensuring employee loyalty for many reasons—among them the potential for better allocation of talent); *infra* Part IV.A.

12. See *infra* Parts III.A, V.C.

startup prospers but pushes them away when the startup stumbles. Thus, stock options inherently contain an efficient-breach mechanism that channels employees of less successful firms toward more promising ones, preventing inefficient retention. Moreover, stock options link the strength of the retention incentive to a startup's prospects and an employee's relative importance within the company.¹³ Consequently, they provide a narrowly tailored means for talent market regulation, steering talent to where it is most valuable.

This Note further suggests that historically, successful startups either needed to go public to raise money and provide their investors and founders with liquidity or were pushed to go public by the federal securities regime.¹⁴ This pressure intensified when employees began to exercise their options in large numbers.¹⁵ An initial public offering (IPO) allowed the vested employees to cash out and thus released the company's grip on its entrepreneurial talent.¹⁶ While most employees continued working for their firms after they went public, many entrepreneurial employees chose to found or join a new startup.¹⁷ Padded with cash, these employees were better equipped to bear the risks associated with such entrepreneurial endeavors. Thus, stock options had a built-in release valve that calibrated the limitations on employee mobility to the company's life cycle and allowed employees of mature companies to depart. In a cycle typical of Silicon Valley for many years, startups that had peaked would lose their talent to younger ones that were just taking off.¹⁸ Hence, IPOs played a central role not only in the career paths of individual employees but also in the regeneration of the local industry cluster.

But a combination of economic and legal conditions in the current environment allows successful companies to delay going public, weakening the built-in release valve previously embedded in stock options. Today, companies are able to raise growing sums of money on private markets,¹⁹ and regulatory changes including the Jumpstart Our Business Startups (JOBS) Act of 2012 have made it even easier for them to grow in size and valuation while staying private.²⁰ Thus, the lock-in effect of stock options might significantly impede

13. See *infra* note 212 and accompanying text; see also *infra* Parts IV.A, .C.

14. See *infra* Parts V.A-.B.

15. See *infra* Part V.B.

16. See *infra* Part IV.D.

17. See *infra* Part IV.D.

18. See *infra* Part IV.D.

19. See *infra* Part V.A.

20. See Pub. L. No. 112-106, 126 Stat. 306 (codified as amended in scattered sections of 15 U.S.C.). The JOBS Act amended the Securities Exchange Act of 1934, Pub. L. No. 73-291, 48 Stat. 881 (codified as amended in scattered sections of 15 U.S.C.), to raise the threshold at which companies become subject to public company reporting
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the departure of much-needed entrepreneurial talent from the most successful private firms. The lock-in problem not only is unfortunate for the individual employees involved but also poses a threat to the efficiency of the regional economy. Companies' new ability to delay holding liquidity events might cause inefficient retention in large private companies and could hinder the creation of successful new startups.²¹ This Note seeks to draw attention to the role stock options play in the allocation of talent in the startup labor market—specifically in the rise of Silicon Valley—and voices concern about the erosion of this important incentive.

This Note proceeds as follows. Part I highlights the serendipitous circumstances that gave birth to the now-common model of venture capital-backed startups and, consequently, to Silicon Valley. It then turns to the policy discussion surrounding noncompete enforcement stimulated by Silicon Valley's economic success.

Part II introduces the academic debate on noncompete enforcement. It first describes the conventional economic analysis of noncompete enforcement and then describes the new wisdom regarding the relationship between this retention tool and the suppression of innovation and economic growth. Finally, it examines the empirical evidence economists have begun to collect regarding the effects of noncompetes on economic growth, employee mobility, innovation, and entrepreneurship.

Part III sheds light on the missing link in the discussion regarding employee mobility and Silicon Valley's success—employee stock options. It starts with a brief historical review of the use of broad-based employee stock ownership in Silicon Valley. It then continues with a short technical overview of the gradual vesting schedule, the potentially heavy tax implications of exercising stock options, and how these system design features can suppress employee mobility.

Part IV, the heart of this Note, discusses the efficiency attributes of a startup labor market characterized by a noncompete ban and a favorable approach toward employee stock options. Stock options protect the company's initial investment in R&D and employee training—much like noncompete agreements do. However, unlike noncompetes, stock options have the selective effect of encouraging employee retention only when the match between the employee and the startup is efficient from the standpoint of the regional economy, and only for a limited duration (throughout the vesting schedule and as long as the company remains private).

obligations, *see* JOBS Act, §§ 501-502, 601(a), 126 Stat. at 325-27 (codified as amended at 15 U.S.C. § 781 (2016)). As a result of this reform, employees' exercise of options no longer forces companies to undertake public company reporting requirements and a consequent IPO. *See infra* Part V.B.

21. *See infra* Part V.C.

Finally, Part V concludes with a cautionary message. It turns the spotlight on unintended side effects of recent changes in the economic and regulatory environment that allow startups to grow in size and valuation without going public. Companies' current tendency to delay liquidity events, such as IPOs or acquisitions, affects employee mobility due to the lock-in effect of stock options. Therefore, lack of liquidity for employees might impair the efficient allocation of talent that has characterized Silicon Valley for many years and hinder the distinctive attributes of this regional economy.

I. Silicon Valley's Birth and the Current Policy Debate

One could start telling the story of Silicon Valley at different points in time: At the dawn of the twentieth century when radio fans began to gather around the San Francisco Bay Area;²² in 1937 when Stanford University School of Engineering graduate students William Hewlett and David Packard started a small electronics company in a Palo Alto garage;²³ a decade later when Stanford Dean of Engineering Frederick Terman managed to open a university-based technology incubator;²⁴ or in 1955 when William Shockley, one of the fathers of the transistor, left Bell Labs to start his own semiconductor business in Mountain View.²⁵ As with any attempt at periodization, the choice is somewhat arbitrary. However, for the purposes of this Note, the story starts when a group of employees chose to depart and compete with their former employer.

A. How It All Started

In 1957, a group of young scientists and engineers, soon to be known as the Traitorous Eight, wrote an unusual letter to the Wall Street investment bank Hayden, Stone & Co.²⁶ The letter, which was later described as the "Declaration

22. See Timothy J. Sturgeon, *How Silicon Valley Came to Be*, in UNDERSTANDING SILICON VALLEY: THE ANATOMY OF AN ENTREPRENEURIAL REGION 15, 16-18 (Martin Kenney ed., 2000).

23. See *id.* at 15-16 ("Most accounts of the region's history begin in 1955 More careful accounts push the origin of Silicon Valley back a bit further, to the formation of Hewlett Packard Company in 1938"); see also ANNALEE SAXENIAN, REGIONAL ADVANTAGE: CULTURE AND COMPETITION IN SILICON VALLEY AND ROUTE 128, at 20 (1994) (tracing Silicon Valley's origins to HP's inception).

24. See SAXENIAN, *supra* note 23, at 21-22; Sturgeon, *supra* note 22, at 16.

25. See SAXENIAN, *supra* note 23, at 25; Sturgeon, *supra* note 22, at 15.

26. See CHRISTOPHE LÉCUYER, MAKING SILICON VALLEY: INNOVATION AND THE GROWTH OF HIGH TECH, 1930-1970, at 135 (Wiebe E. Bijker et al. eds., 2006). The group was formed by seven dissident employees, but they were later joined by Robert Noyce and thus became known as the Traitorous Eight. See Craig Addison, *Oral History Interview: Jay T. Last*, SEMI, <https://perma.cc/TM9H-AXHK> (archived Feb. 12, 2018).

of Independence of the Digital World,”²⁷ included both a cry for help and an investment proposition:

This prospectus is to introduce a group of seven senior scientists and engineers who have been working together in the development of transistors and other semiconductor devices. . . . Because of seemingly insuperable problems with the present management, the group wishes to find a corporation interested in getting into the advance semiconductor device business. . . .

This group of seven people, which represents a majority of the senior staff, is presently working at the Shockley Semiconductor Laboratory of Beckman Instruments Inc., which is headed by Dr. William Shockley, who has recently received the Nobel Prize in Physics for his contribution to the invention of the transistor

Our present dissatisfactions have arisen primarily from Shockley’s confusing and demoralizing management. . . . Many people are seriously considering leaving the organization. A group feeling arose to the effect that rather than leave one by one, we would much prefer to stay together. We believe that we are much more valuable to an employer as a group.

....

Negotiations should be concluded as soon as possible in order to preserve the unity of the group. Details of the separation of the group from the present organization can be worked out later, but it would be well to make this separation as quickly as possible after a commitment has been made.²⁸

As with many great developments, the backdrop of the letter was utter dissatisfaction. The group was then working under Shockley, a Nobel laureate and brilliant scientist but a poor manager.²⁹ Shockley lived in constant fear of betrayal and accordingly instilled a culture of secrecy and suspicion in his firm: Phone calls were recorded;³⁰ employees were forced to keep their work secret even from each other;³¹ and on one occasion, the entire lab was asked to undergo a lie detector test.³²

27. See Michael S. Malone, *Digital Declaration*, FORBES (May 29, 2000), <https://perma.cc/GT35-B68J>.

28. PETER MEYER, EUGENE KLEINER: ENGINEER, VENTURE CAPITALIST, FOUNDING FATHER OF SILICON VALLEY 16-17 (Stuart Dim ed., 2006), <https://perma.cc/L7KD-LX7J>.

29. See CHRISTOPHE LÉCUYER & DAVID C. BROCK, MAKERS OF THE MICROCHIP: A DOCUMENTARY HISTORY OF FAIRCHILD SEMICONDUCTOR 45 (2010); JOEL N. SHURKIN, BROKEN GENIUS: THE RISE AND FALL OF WILLIAM SHOCKLEY, CREATOR OF THE ELECTRONIC AGE 173-74 (2008); see also *The Nobel Prize in Physics 1956*, NOBELPRIZE.ORG, <https://perma.cc/5P4A-WWPD> (noting that Shockley and two other scientists jointly won the 1956 Nobel Prize in Physics “for their researches on semiconductors and their discovery of the transistor effect”).

30. See SHURKIN, *supra* note 29, at 232.

31. See *id.* at 175-76.

32. See LÉCUYER & BROCK, *supra* note 29, at 45; SHURKIN, *supra* note 29, at 176; Interview by Rob Walker with Gordon E. Moore in Los Altos Hills, Cal. (Mar. 3, 1995), <https://perma.cc/SZ27-U2LF>.

In a twist of events that was a product more of luck than of careful planning, this unsolicited letter reached the desk of a young investment banker named Arthur Rock.³³ Rock recognized the value in the opportunity to work with such an exceptionally talented group of scientists and conceived a revolutionary idea: Rather than help the scientists find a new employer, he would help them find financing to start their own company.³⁴ After many unsuccessful attempts to land an investment,³⁵ Rock made one final effort. He contacted Sherman Fairchild, a wealthy entrepreneur interested in technology.³⁶ Together they founded Fairchild Semiconductor—believed to be the first venture-backed startup.³⁷

The rest is history. The newly founded Fairchild Semiconductor soon became the leader in its industry and, more importantly, was involved in the birth of dozens of corporations, including Advanced Micro Devices and Intel.³⁸ These and the many other descendant companies, called “Fairchildren” in the local dialect, gave rise to the industry cluster that would soon become known as Silicon Valley, after the silicon used in computer chips.³⁹

The departure of the Traitorous Eight—Julius Blank, Victor Grinich, Jean Hoerni, Eugene Kleiner, Jay Last, Gordon Moore, Robert Noyce, and Sheldon Roberts—from Shockley’s lab represented the birth of a new era in investment, technology, and economic development.⁴⁰ It created a novel model for partnership between investors and engineers working on cutting-edge technologies and turned a somewhat sleepy rural area in Northern California into the world’s leading technology hub.⁴¹ Moreover, the new model heralded a transformation of the values at the core of U.S. employment relationships—from loyalty and stability to mobility and flexibility.⁴² Thus, the departure of

33. See *SOMETHING VENTURED* at 3:20-4:00 (Miralan Productions & Geller/Goldfine Productions 2011).

34. See *id.* at 5:45-6:25; see also Addison, *supra* note 26.

35. See *SOMETHING VENTURED*, *supra* note 33, at 6:35-7:00.

36. See *id.* at 6:45-7:55; Interview by Rob Walker with Gordon E. Moore, *supra* note 32.

37. See Interview by Rob Walker with Gordon E. Moore, *supra* note 32; see also, e.g., Olav Sorenson, *Where Is the Money in Venture Capital?*, YALE INSIGHTS (Oct. 22, 2015), <https://perma.cc/4NPE-T5XY>.

38. See *Fairchild’s Offspring*, BUS. WK., Aug. 25, 1997, at 84, 84 (charting the corporate “offspring” of Fairchild Semiconductor).

39. See David Laws, *Fairchild, Fairchildren, and the Family Tree of Silicon Valley*, COMPUTER HIST. MUSEUM (Dec. 20, 2016), <https://perma.cc/FZ6T-QLU7> (attributing the term “Silicon Valley” to a 1971 article by journalist Don Hoefler).

40. See *id.*

41. See *id.* (describing Fairchild’s influence); see also SAXENIAN, *supra* note 23, at 11 (describing Silicon Valley’s agricultural background).

42. See REID HOFFMAN ET AL., *THE ALLIANCE: MANAGING TALENT IN THE NETWORKED AGE* 6 (2014) (describing the new era of at-will employment in which employees are
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the Traitorous Eight from Shockley soon turned from an apologetic tale into a story of heroism.⁴³ The Traitorous Eight became role models for future generations of entrepreneurs who would leave their employers to start new ventures, and Fairchild Semiconductor became the prototype for other “spinouts”—new firms founded by former employees of incumbent firms in the same industry.⁴⁴ Indeed, Fairchild led directly or indirectly to hundreds of spinouts.⁴⁵ These Fairchildren established Silicon Valley as a global center of entrepreneurial activity and technological leadership, and their cumulative value is estimated to be over \$2 trillion.⁴⁶

B. The Policy Debate Inspired by Silicon Valley’s Success

Fast forward to March 2016, when the U.S. Department of the Treasury’s Office of Economic Policy issued a report on the economic effects and policy implications of noncompete agreements.⁴⁷ The report examined the effects of noncompetes on “worker welfare, job mobility, business dynamics, and economic growth.”⁴⁸ It pointed out that although a significant number of U.S. workers are subject to such agreements, the social benefits of noncompetes

encouraged to view themselves as “free agents” and act according to their self-interest); Edward L. Powers, *Employee Loyalty in the New Millennium*, S.A.M. ADVANCED MGMT. J., Summer 2000, at 4, 4-5 (describing the changing norms regarding employee loyalty); Linda K. Stroh & Anne H. Reilly, *Rekindling Organizational Loyalty: The Role of Career Mobility*, 24 J. CAREER DEV. 39, 45-50 (1997) (providing empirical insight into declining loyalty among managers); *Declining Employee Loyalty: A Casualty of the New Workplace*, KNOWLEDGE@WHARTON (May 9, 2012), <https://perma.cc/LS5A-52QD> (describing the organizational changes that have driven a decline in employee loyalty).

43. See SAXENIAN, *supra* note 23, at 31. In May 2011, the California Historical Society gave the Legends of California Award to the Traitorous Eight, honoring them as the “founders of Silicon Valley.” See Cal. Historical Soc’y, *Legends of California: Honoring the Traitorous Eight* (2011), <https://perma.cc/YR4V-JLAA>; see also Therese Poletti, *Commentary: The “Traitorous Eight” Have Become California Icons*, MARKETWATCH (May 11, 2011, 11:37 AM ET), <https://perma.cc/3MSJ-5AFX> (recognizing that the Traitorous Eight have been “credited with planting the seeds” of Silicon Valley).

44. See April Franco, *Employee Entrepreneurship: Recent Research and Future Directions*, in HANDBOOK OF ENTREPRENEURSHIP RESEARCH: INTERDISCIPLINARY PERSPECTIVES 81, 87 (Sharon A. Alvarez et al. eds., 2005) (defining spinouts); see also SAXENIAN, *supra* note 23, at 31 (describing a poster of the Fairchild spinout “family tree” as “symboliz[ing] the complex mix of social solidarity and individualistic competition that emerged” in Silicon Valley).

45. See Laws, *supra* note 39.

46. See *id.* Fairchild’s progeny amassed this value even though the company’s own market valuation never exceeded \$2.5 billion. See *id.*

47. OFFICE OF ECON. POLICY, U.S. DEP’T OF THE TREASURY, NON-COMPETE CONTRACTS: ECONOMIC EFFECTS AND POLICY IMPLICATIONS (2016), <https://perma.cc/2VJX-YP3S>.

48. See *id.* at 3.

were not clear-cut.⁴⁹ It found that although noncompetes can provide social benefits such as protection of trade secrets and encouragement of human capital investments, these benefits often come at the “expense of workers and the broader economy.”⁵⁰

Two months later, the White House issued its own report.⁵¹ This report was even more critical and explicitly questioned the breadth of industry usage of noncompetes, particularly with respect to lower-ranking employees who are unlikely to possess trade secrets.⁵² The report emphasized that noncompetes “can reduce the welfare of workers and hamper the efficiency of the economy as a whole by depressing wages, limiting mobility, and inhibiting innovation.”⁵³ The report concluded that reform must come from individual states and their legislatures, and it pledged the Obama Administration’s commitment to continue working with the Department of the Treasury and the Department of Labor “to facilitate discussion on non-compete agreements and their consequences.”⁵⁴ Several state legislatures have since proposed or enacted legislation to reform the scope and reach of noncompete agreements, including Alabama, Idaho, Illinois, Maryland, Massachusetts, Nevada, Utah, and Washington.⁵⁵

Though nearly sixty years apart, the story of the Traitorous Eight and the modern call for reform are linked. The tremendous economic growth of Silicon Valley has led to an explosion of research by sociologists, economists,

49. *See id.* (“Recent research suggests that a considerable number of American workers (18 percent of all workers, or nearly 30 million people) are covered by non-compete agreements.”); *id.* at 3-4 (outlining the social benefits of noncompetes “in some situations” but also noting that they can impose “large costs on workers” and be socially unbeneficial).

50. *See id.* at 3-4.

51. WHITE HOUSE, NON-COMPETE AGREEMENTS: ANALYSIS OF THE USAGE, POTENTIAL ISSUES, AND STATE RESPONSES (2016), <https://perma.cc/ZUZ4-Z73Z>.

52. *See id.* at 4 (pointing out that noncompetes are used in “instances where the benefit is likely to be low,” such as where workers do not have access to trade secrets).

53. *See id.* at 5.

54. *See id.* at 3, 16.

55. Alabama, Illinois, Nevada, and Utah have enacted legislation. *See* H.R. 352, 2015 Leg., Reg. Sess. (Ala. 2015) (enacted) (codified at ALA. CODE §§ 8-1-190 to -197 (2018)); Illinois Freedom to Work Act, Pub. Act No. 99-0860, 2016 Ill. Laws 4234 (codified as amended at 820 ILL. COMP. STAT. ANN. 90/1 to /10 (West 2018)); Act of June 3, 2017, ch. 324, 2017 Nev. Stat. 1860 (codified as amended in scattered sections of chapter 613 of the Nevada Revised Statutes); Post-employment Restrictions Act, ch. 153, 2016 Utah Laws 732 (codified at UTAH CODE ANN. §§ 34-51-101 to -301 (LexisNexis 2017)).

Legislation has been proposed in Idaho, Maryland, Massachusetts, and Washington. *See* H.R. 61, 64th Leg., 1st Reg. Sess. (Idaho 2017); H.D. 506, 2017 Leg., Reg. Sess. (Md. 2017); S. 1017, 190th Gen. Court, Reg. Sess. (Mass. 2017); H.R. 1967, 65th Leg., Reg. Sess. (Wash. 2017).

and legal scholars who argue that the secret to Silicon Valley's success lies in its employees' mobility and tendency toward job-hopping.⁵⁶ As described in greater detail in Part II.B below, this characteristic of Silicon Valley is not just a product of differences in organizational culture and social norms. Rather, it is said to be the result of a different legal regime.⁵⁷ Although most states enforce noncompetes—at least to the extent they are reasonable in scope and prescribe geographic parameters and limited duration⁵⁸—California has a strong public policy against noncompete agreements and in favor of employee mobility.⁵⁹ Thus, were it not for the fact that Shockley happened to have chosen to set up his semiconductor business in California instead of on the East Coast—where the other technology centers were gathered—the Traitorous Eight would not even have been able to depart for the new venture, let alone raise investment funds.⁶⁰ Moreover, it would not have been possible under a different legal

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56. See, e.g., SAXENIAN, *supra* note 23, at 34-37, 54-55 (discussing the high rate of employee mobility in early Silicon Valley); Bruce Fallick et al., *Job-Hopping in Silicon Valley: Some Evidence Concerning the Microfoundations of a High-Technology Cluster*, 88 REV. ECON. & STAT. 472, 478, 481 (2006) (providing empirical evidence on the relationship between the enforceability of noncompetes and employee mobility in Silicon Valley); AnnaLee Saxenian, *Beyond Boundaries: Open Labor Markets and Learning in Silicon Valley*, in THE BOUNDARYLESS CAREER: A NEW EMPLOYMENT PRINCIPLE FOR A NEW ORGANIZATIONAL ERA 23, 23 (Michael B. Arthur & Denise M. Rousseau eds., 2001) (describing “interfirm mobility” as a distinctive feature of Silicon Valley culture); see also *infra* Part II.B.
57. See ORLY LOBEL, TALENT WANTS TO BE FREE: WHY WE SHOULD LEARN TO LOVE LEAKS, RAIDS, AND FREE RIDING 64-69 (2013) (describing California’s approach to noncompete agreements as “zero tolerance” and arguing that this approach is the key to Silicon Valley’s success); Gilson, *supra* note 7, at 603-09 (suggesting that the difference in employment patterns between Massachusetts’s Route 128 and Silicon Valley stems from California’s and Massachusetts’s different policies regarding noncompete enforcement); Alan Hyde, *Should Noncompetes Be Enforced?*, REGULATION, Winter 2010-2011, at 6, 7-8 [hereinafter Hyde, *Should Noncompetes Be Enforced?*] (asserting that California’s ban on noncompete enforcement “must be part of the mix” that leads to the high employee mobility that distinguishes Silicon Valley); cf. ALAN HYDE, WORKING IN SILICON VALLEY: ECONOMIC AND LEGAL ANALYSIS OF A HIGH-VELOCITY LABOR MARKET 43 (2003) (arguing that Silicon Valley’s success owes to California’s “weak trade secrets protection”).
58. See 1 ROGER M. MILGRIM & ERIC E. BENSON, MILGRIM ON TRADE SECRETS § 4.02 (LexisNexis 2017) (surveying the enforceability of noncompetes across the fifty states); Russell Beck, Beck Reed Riden LLP, Employee Noncompetes: A State by State Survey (2017), <https://perma.cc/8UVE-PKAH> (same).
59. See 1 ANTITRUST, UCL & PRIVACY LAW SECTION, STATE BAR OF CAL., CALIFORNIA ANTITRUST AND UNFAIR COMPETITION LAW § 20.05 (Cheryl Lee Johnson ed., LexisNexis rev. ed. 2017) (discussing California’s now-codified common law rule that “an agreement that limits the rights of a party to engage in lawful employment or business activities is an unreasonable restraint of trade and unenforceable as a matter of public policy”); *infra* note 84 and accompanying text.
60. See JOSEPH BLASI ET AL., IN THE COMPANY OF OWNERS: THE TRUTH ABOUT STOCK OPTIONS (AND WHY EVERY EMPLOYEE SHOULD HAVE THEM) 3 (2003) (noting the “far-reaching” consequences of Shockley’s decision to locate his company in Silicon Valley
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regime for Fairchild to have spawned dozens of spinout companies. Therefore, the argument goes, if other states wish to become similarly attractive to entrepreneurial, innovative talent and to induce economic growth, they should amend their noncompete policies to be more like California's.⁶¹

This new wisdom has sparked a heated debate among economists, legal scholars, and policymakers, as it stands in sharp contrast to a more traditional economic analysis of noncompetes. As described in greater detail in Part II.A below, conventional wisdom held that without the ability to secure some level of exclusivity over their employees' services, employers would refrain from undertaking otherwise efficient investments in R&D and training.⁶² If employees are free to depart for a rival firm or to found a spinout before the employer realizes a return on these investments, then the company will refrain from making these investments altogether.⁶³ The fear stemming from the potential appropriation of these assets by free riders would discourage employers from much-needed spending on training workers and developing trade secrets.⁶⁴ Therefore, the traditional argument goes, some degree of limitation of employee mobility is warranted and even essential for economic development. Thus, it is not surprising that nearly all states adopted common law standards of reasonableness to create a balance between employers' legitimate interest in suppressing staff turnover and employees' and the broader economy's interest in employee mobility.⁶⁵

The question regarding the optimal legal conditions for inducing economic growth and fostering innovation is, at least at its core, an empirical one. However, as with other policy issues, empirical studies do not provide clear-cut

rather than the Northeast and suggesting that he chose Mountain View partly because he wished to be close to his mother, who lived in Palo Alto); LÉCUYER, *supra* note 26, at 131-32 (discussing what attracted the Traitorous Eight to Silicon Valley).

61. See LOBEL, *supra* note 57, at 50-53, 64-75; Hyde, *Should Noncompetes Be Enforced?*, *supra* note 57, at 7; *supra* note 1 and accompanying text.

62. See Barnett & Sichelman, *supra* note 7, at 3.

63. See *id.*

64. See Harlan M. Blake, *Employee Agreements Not to Compete*, 73 HARV. L. REV. 625, 627 (1960) ("From the point of view of the employer, postemployment restraints are . . . perhaps the only effective method of preventing unscrupulous competitors or employees from appropriating valuable trade information . . . for their own benefit."); Edmund W. Kitch, *The Law and Economics of Rights in Valuable Information*, 9 J. LEGAL STUD. 683, 685-86 (1980) ("[I]f the employee is free to leave[,] . . . the employer will have no incentive to make the [human capital] loan."); Paul H. Rubin & Peter Shedd, *Human Capital and Covenants Not to Compete*, 10 J. LEGAL STUD. 93, 99 (1981) ("Our explanation of covenants not to compete is in terms of human capital.")

65. See Barnett & Sichelman, *supra* note 7, at 3; Eric Posner et al., *Investing in Human Capital: The Efficiency of Covenants Not to Compete* 1 (Univ. of Va. Law Sch., John M. Olin Program in Law and Economics Working Paper No. 11, 2004), <https://perma.cc/6QED-CWYV>.

insights capable of putting the discussion to rest; rather, they provide further ammunition for both sides of the academic and public debate on noncompete enforcement. As described in greater detail in Part II.C below, in recent years empirical study of the relationships between noncompete enforcement, employee mobility, industry clustering, innovation, and economic growth has ballooned. The debate is ongoing, and in some states it has spread from the lecture hall to the legislative hall.⁶⁶ The following Part summarizes the literature on which this debate draws.

II. Noncompete Enforcement: A Battlefield for Economists

Contrary to popular belief, there is widespread agreement among economists about quite a few issues.⁶⁷ Noncompete enforcement is not one of them.

A. The Conventional Economic Analysis of Noncompetes

Traditional legal literature defines noncompete agreements as contractual clauses under which employees agree not to work for a firm's competitors or to establish a competing business themselves for a specified duration in a designated geographic area after the employment is terminated.⁶⁸ The conventional analysis of noncompetes resembles the law and economics-type reasoning behind other intellectual property protections—balancing the tradeoff between incentive and access.⁶⁹ In this analysis, noncompete agreements create a legally enforceable obligation to exclude competitors, including the employee herself, from using certain knowledge and skills acquired by the employee in the course of employment. Without such restrictions, the employer's incentive to provide on-the-job training that is

66. See, e.g., Barb Darrow, *Non-compete Law Reform Doesn't Make It in Massachusetts*, FORTUNE (Aug. 1, 2016), <https://perma.cc/PV9X-X5V2> (describing the controversy over noncompete reforms in Massachusetts); Jasen Lee, *New Organization Formed to Challenge Noncompete Bill*, DESERET NEWS (Feb. 16, 2017, 6:45 PM), <https://perma.cc/W7E6-HSLP> (reporting opposition to proposed changes to noncompete law in Utah); Taylor Soper, *Debate: Venture Capitalist and Tech Association Leader Spar Over Banning Non-compete Agreements*, GEEKWIRE (Feb. 2, 2016, 10:59 AM), <https://perma.cc/A6BC-8AX4> (describing the controversy over noncompete reforms in Washington state).

67. See Robert Whaples, *Do Economists Agree on Anything? Yes!*, ECONOMISTS' VOICE 1, <https://perma.cc/2W5E-LR3J> (2006); Justin Wolfers, *The Secret Consensus Among Economists*, FREAKONOMICS BLOG (July 25, 2012, 9:08 AM), <https://perma.cc/5HPJ-3Y8R>.

68. See, e.g., Blake, *supra* note 64, at 625-26.

69. See Barnett & Sichelman, *supra* note 7, at 3; see also Richard A. Posner, *Intellectual Property: The Law and Economics Approach*, J. ECON. PERSP., Spring 2005, at 57, 57 ("The traditional focus of economic analysis of intellectual property has been on reconciling incentives for producing such property with concerns about restricting access to it by granting exclusive rights in intellectual goods . . .").

potentially applicable to employment at other companies might diminish.⁷⁰ This is because competitors could poach employees after the training phase, taking a free ride on this investment.⁷¹ Furthermore, after the training phase, the employee could appropriate her new knowledge and skills by starting a new firm or renegotiating her compensation.⁷² Because employees generally cannot fully self-finance their training costs by accepting lower wages, the classic analysis predicts that limitations on employees' postemployment ability to compete are essential to ensuring efficient investment in human capital.⁷³ Noncompetes should therefore be enforced to the extent they allow employers to earn some return on their investments in human capital.

The same argument goes for the role of noncompetes in promoting firms' investment in trade secrets. Because employees are exposed to these secrets and can use them in the service of a competitor upon their departure, and because infringement of these rights is difficult to track and prove, some level of protection is needed to provide an adequate incentive to invest in these assets.⁷⁴

70. See Rubin & Shedd, *supra* note 64, at 109 (arguing that the existence of noncompetes is evidence that the traditional model of human capital introduced by Gary Becker is incomplete because it fails to consider all forms of human capital). Becker's seminal model introduced the classic distinction between specific and general human capital. See GARY S. BECKER, *HUMAN CAPITAL: A THEORETICAL AND EMPIRICAL ANALYSIS, WITH SPECIAL REFERENCE TO EDUCATION* 16-37 (2d ed. 1975). General human capital is applicable to a number of firms; this type of training increases the value of the worker in the job market. See *id.* at 19-20. "[R]ational firms in competitive labor markets" would have no incentive to bear any of its cost and would pass it on to the worker in the form of reduced wages by the amount needed to cover the costs of the training. See *id.* at 20-21. Specific training, on the other hand, increases the productivity of the worker in the firm providing the training more than it increases the worker's productivity in other firms. See *id.* at 26. In this case, the rational firm would be willing to support most of the cost of training because the firm would collect the returns in the form of higher productivity. See *id.* at 27-28. Becker acknowledged that most training is actually neither completely specific nor completely general and that therefore the cost would optimally be shared between the worker and the firm. See *id.* at 26, 31-32.

71. See Blake, *supra* note 64, at 627; Kitch, *supra* note 64, at 685; Barnett & Sichelman, *supra* note 7, at 3.

72. See Raghuram G. Rajan & Luigi Zingales, *The Firm as a Dedicated Hierarchy: A Theory of the Origins and Growth of Firms*, 116 Q.J. ECON. 805, 805 (2001); Rubin & Shedd, *supra* note 64, at 97; Posner et al., *supra* note 65, at 1-2.

73. See Rubin & Shedd, *supra* note 64, at 96-98.

74. Rajan and Zingales describe this dilemma in the following terms:

At the root of most enterprises generating economic surplus is an entrepreneur with a unique critical resource such as an idea, good customer relationships, a new tool, or superior management technique. A fundamental problem of entrepreneurship is how to enlist the cooperation of the many agents necessary for production without ceding to them too much of the surplus generated by the enterprise. The risk of being expropriated, however, is always inherent in production. In particular, the entrepreneur has to give her employees (whom we call managers) close proximity or *access* to the critical resource for them to learn to produce effectively. For example, a manager has to understand the idea, be in contact with the key customers and suppliers, or even learn the entrepreneur's unique managerial techniques, in

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If the law refuses to enforce noncompetes, employers might react by reorganizing their businesses in an inefficient manner in order to limit employees' exposure to trade secrets—such as splitting up tasks among multiple employees or assigning sensitive tasks only to trusted family members.⁷⁵ Alternatively, companies might move their operations to jurisdictions that enforce noncompetes.⁷⁶

But noncompetes might discourage employees from investing in their own human capital. Noncompetes reduce employees' ability to capture gains from investing in their own skills because they reduce employees' ability to accept better-paying opportunities elsewhere, thus reducing employers' incentives to increase compensation.⁷⁷ Furthermore, by limiting employee mobility, noncompetes might prevent efficient allocation of human capital, as talent is prevented from moving to its highest-valued use.⁷⁸

In theory, a third party who places greater value on the employee's knowledge and skills could negotiate with the employer and pay a fee to lift the noncompete.⁷⁹ But the transaction costs of such bargains are substantial. Moreover, because intellectual property created during the first employment relationship could potentially belong to the first employer, the employee and the second employer share an interest in keeping their plans confidential until after the employee has resigned in order to avoid claims of intellectual property infringement.⁸⁰ By initiating negotiation before resigning, the

order to work effectively. But access also gives the manager the opportunity to expropriate this critical resource and compete against the entrepreneur. Managers may steal the idea, walk away with clients, or mimic the entrepreneur's management style, and start up a rival concern. The greater the access a manager has, the more he can appropriate, and the more effectively he can compete.

Rajan & Zingales, *supra* note 72, at 805.

75. See WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 364 (2003).

76. *See id.*

77. See LOBEL, *supra* note 57, at 178; Mark J. Garmaise, *Ties That Truly Bind: Noncompetition Agreements, Executive Compensation, and Firm Investment*, 27 J.L. ECON. & ORG. 376, 383 (2009).

78. *See* Posner et al., *supra* note 65, at 1.

79. *See id.* at 3. Presumably, noncompetes provide property rule protection rather than liability rule protection because the latter would not earn the employers' trust given that employees can default and file for bankruptcy. *See id.* at 1. For the foundational treatment of property rules and liability rules, see Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972). Courts are also reluctant to order specific performance of labor contracts. *See* Rubin & Shedd, *supra* note 64, at 94 ("It is an old and well-established principle of law . . . that courts will generally not order specific performance . . .").

80. Inventions created by employees who are employed to invent (such as engineers, scientists, and R&D personnel) are generally owned by the employer even if the

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employee might generate a basis for the first employer to claim that the intellectual property about to be used by the second venture was created while under contract.

Thus, enforcing noncompetes may reduce efficiency in the labor market by preventing workers from leaving their current employers for other firms that value them more. Finally, noncompetes might stifle competition by repressing potential entrants and slowing the flow of ideas and methods,⁸¹ an assertion on which I will elaborate in Part II.B below as part of the new wisdom regarding noncompetes.

The traditional economic view of noncompetes describes a tradeoff between employers' investment in human capital and trade secrets on one hand and employees' self-investments in human capital and efficient allocation of talent on the other. The conclusion is that some limitations on employee mobility are essential to balance the benefits and costs. Without some assurance of loyalty, employers would not invest in human capital and trade secrets. However, excessive restrictions have adverse effects on talent market efficiency and employee incentives. Therefore, it is not surprising that almost all states (excluding only California, North Dakota, and Oklahoma) have adopted a reasonableness standard regarding noncompetes that aims to balance these offsetting effects.⁸²

B. The New Wisdom Regarding Noncompetes

The overwhelming success of Silicon Valley in the second half of the twentieth century has made the region the focus of many research efforts. Researchers have tried to understand the conditions that enabled tremendous

employee did not sign an invention assignment agreement. *See* Robert P. Merges, *The Law and Economics of Employee Inventions*, 13 HARV. J.L. & TECH. 1, 5 (1999); *see also* CAL. LAB. CODE §§ 2870-2872 (West 2018); *Mattel, Inc. v. MGA Entm't, Inc.*, 782 F. Supp. 2d 911, 946 n.4 (C.D. Cal. 2011) (“[California] Labor Code § 2870 bars the assignment of inventions developed on an employee’s own time, unless (1) the employee used the employer’s materials or information; (2) the invention relates at the time of conception or practice to the employer’s business, or actual or demonstrably anticipated research or development of the employer; or (3) the invention results from any work performed by the employee for the employer.”). The conditions for assignment of inventions under California law are open to interpretation and could create uncertainty as to the ownership of intellectual property.

For a different explanation for employers' failure to capture employees' inventions, see Joseph Bankman & Ronald J. Gilson, *Why Start-Ups?*, 51 STAN. L. REV. 289, 299-305 (1999) (highlighting the various costs associated with employees' efforts to perfect their own property rights in an innovation within an environment where R&D efforts are carried out in teams).

81. *See* Blake, *supra* note 64, at 627.

82. *See* Beck, *supra* note 58.

economic growth in Silicon Valley while other areas that perhaps seemed better positioned to make that leap—namely Massachusetts’s Route 128—wound up lagging behind.⁸³ Researchers noticed that California is different in that it does not enforce noncompetes, even when they are reasonable in purpose and scope.⁸⁴

In response to this phenomenon, a group of sociologists, economists, and legal scholars studying economic development have created a “new wisdom” regarding noncompetes, now arguing that these agreements hamper economic growth and prevent industry cluster rejuvenation.⁸⁵ The argument posits the existence of a collective action problem in which the shared resources are the highly skilled employees (and the knowledge and skills they possess), and each employer, acting in its own self-interest, uses noncompetes to prevent employees from departing.⁸⁶ On a regional basis, the argument goes, the firms would be better off not restraining employee mobility because they all benefit from the advantages embedded in an efficient labor market.⁸⁷ And the new wisdom suggests that California’s strong public policy against noncompetes played an essential role in the rise of Silicon Valley by imposing the “coordination mechanism necessary to overcome” this collective action problem.⁸⁸

To understand the way in which all employers benefit from a labor market with high employee mobility, an additional concept must be introduced. The concept of “agglomeration economies,” which is attributed to the influential nineteenth century economist Alfred Marshall, describes the benefits firms obtain by locating near one another (agglomerating).⁸⁹ One such benefit is the

83. See SAXENIAN, *supra* note 23, at 8-9.

84. See CAL. BUS. & PROF. CODE § 16600 (West 2018) (“Except as provided in this chapter, every contract by which anyone is restrained from engaging in a lawful profession, trade, or business of any kind is to that extent void.”); *Edwards v. Arthur Andersen LLP*, 189 P.3d 285, 297 (Cal. 2008) (“Noncompetition agreements are invalid under section 16600 in California even if narrowly drawn, unless they fall within the applicable statutory exceptions”). The exceptions permit “noncompetition agreements in the sale or dissolution of corporations, partnerships, and limited liability corporations.” *Edwards*, 189 P.3d at 290-91 (citations omitted); see also CAL. BUS. & PROF. CODE §§ 16601-16602.5.

85. See Barnett & Sichelman, *supra* note 7, at 8 (collecting scholarship).

86. See *infra* note 213 and accompanying text.

87. See Gilson, *supra* note 7, at 609 (noting that the “collectively rational strategy” freely allows mobility in employment “because the per firm benefit of the economy exceeds the per firm cost of the intellectual property dilution that results” from knowledge transfers that occur when an employee leaves a company).

88. See *id.*

89. See 1 ALFRED MARSHALL, PRINCIPLES OF ECONOMICS 506 (London, Macmillan & Co. 1890) (explaining that proximity of labor resources is “the most striking of all the
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pooling of skilled workers who wish to work in a specific industry: In a labor market where employees enjoy alternative job opportunities rather than being tied to a single employer, wages go up, encouraging more skilled workers to move into the region.⁹⁰ The increase in the supply of skilled employees then encourages more companies to migrate to the area and reinforces the supply of jobs.⁹¹ The robust labor market allows for a better quality of worker-firm matches.

Another benefit of agglomeration has to do with “knowledge spillovers,” namely ideas and techniques that spread from one firm to another within the industry or the region.⁹² As employees move between companies, knowledge

influences” that affect costs of production); *see also* SAXENIAN, *supra* note 23, at 173 n.12 (crediting Marshall for originally stating the principle of agglomeration economies).

90. *See* OFFICE OF ECON. POLICY, *supra* note 47, at 18-19 (finding that the weight of the literature supports the hypothesis that “stricter non-compete enforcement [is] associated with both lower wage growth and lower initial wages”); Garmaise, *supra* note 77, at 378 (concluding that executive compensation is “both lower and more salary based” in jurisdictions with high enforcement of noncompetes); Matt Marx et al., *Regional Disadvantage?: Employee Non-compete Agreements and Brain Drain*, 44 RES. POL’Y 394, 397-99 (2015) (finding that a policy change in Michigan from nonenforceability to enforceability led to a “brain drain”—a migration of inventors to states that continued not to enforce noncompetes); Evan Starr, *Consider This: Training, Wages, and the Enforceability of Covenants Not to Compete 2-4* (Feb. 6, 2018) (unpublished manuscript), <https://perma.cc/8TXB-8QQ7> (examining the effect of noncompete enforceability on training and wages and finding that “an increase from non-enforcement to mean enforceability is associated with a 4% decrease in wages” as well as that the evidence “align[s] with a more monopsonistic view of the labor market, whereby the enforceability of noncompetes reduces the elasticity of labor supply and puts downward pressure on wages” (citation omitted)). *But cf.* Evan Starr et al., *Noncompetes in the U.S. Labor Force 24* (Dec. 24, 2017) (unpublished manuscript), <https://perma.cc/3GW9-A5GY> (finding that employees who sign noncompetes under conditions that allow for negotiation—such as knowing about the agreement before signing an employment offer, or having an alternative job opportunity—have higher starting salaries than other similarly situated employees).

91. *See* 1 MARSHALL, *supra* note 89, at 333.

92. *See, e.g.*, Paul Almeida & Bruce Kogut, *Localization of Knowledge and the Mobility of Engineers in Regional Networks*, 45 MGMT. SCI. 905, 905 (1999) (“Vibrant regions are those that produce knowledge externalities that denote the spillover of ideas from innovating firms to other firms.”); *see also id.* at 905 n.1 (describing “knowledge spillovers” as “the benefit of knowledge to people, or to firms, not responsible for the original investment in the creation of this knowledge”). Under this theory, knowledge that underlies production functions is different from other goods in the sense that it is a side product of production efforts and that once it is discovered it tends to spread. *See, e.g.*, Maryann P. Feldman & Gil Avnimelech, *Knowledge Spillovers and the Geography of Innovation—Revisited: A 20 Years’ Perspective on the Field of Geography of Innovation*, in HANDBOOK OF RESEARCH ON INNOVATION AND ENTREPRENEURSHIP 150, 150-51, 154 (David B. Audretsch et al. eds., 2011). Specifically, the mobility of personnel among firms provides a way of spreading this information. *See, e.g.*, Almeida & Kogut, *supra*, at 906. For example, in the process of manufacturing a widget, a firm’s employees acquire “know-how” in manufacturing methods. This knowledge may leak to competitors

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spillovers become more frequent and lead to the diffusion of information among the region's firms, like bees carrying pollen from one flower to another, pollinating the entire field.⁹³ The result is that the entire agglomerate becomes more sophisticated and more attractive to new employees and new firms.

Silicon Valley provided the perfect case study for these theories. The regional development literature, as led by AnnaLee Saxenian, proposed the idea that high rates of mobility generated agglomeration economies in Silicon Valley.⁹⁴ Saxenian observed that in early Silicon Valley, job-hopping was common among engineers, whereas engineers in Massachusetts pursued more stable careers.⁹⁵ She argued that this cultural difference allowed for rapid movement of tacit knowledge across firm boundaries and thus played a crucial role in Silicon Valley's overtaking Route 128.⁹⁶

Saxenian did not discuss legal factors, but her research had a dramatic effect on legal thinking. Saxenian's discussion of Silicon Valley implicitly assumed that the benefits of agglomeration economies exceed the losses to the more established firms due to the leakage of their intellectual property.⁹⁷ Building on Saxenian's observation, the legal literature, led by Ronald Gilson, concludes that California's strong public policy against noncompetes was a major factor in the rise of Silicon Valley, as it offered a solution to the collective action problem that arises from noncompete enforcement.⁹⁸

without return to the original manufacturer—thus creating a “spillover effect.” See, e.g., Robert J. Barro & Xavier Sala-i-Martin, *Public Finance in Models of Economic Growth*, 59 REV. ECON. STUD. 645, 655 (1992).

The classic economic analysis saw knowledge spillovers as a problem: Because the social value of production exceeds the private return to the producer, firms' investments in R&D are expected to be below the “socially optimum level.” See Kenneth J. Arrow, *The Economic Implications of Learning by Doing*, 29 REV. ECON. STUD. 155, 168 (1962); see also Paul M. Romer, *Endogenous Technological Change*, 98 J. POL. ECON. S71, S96 (1990). Modern theories of growth, however, describe this effect as a blessing. See Hyde, *Should Noncompetes Be Enforced?*, *supra* note 57, at 8. Because firms produce knowledge regardless whether they can exclude others from using it, and because this knowledge is dynamically transferred within industries and regions, information flow increases the specialization and sophistication of the entire system. See Paul M. Romer, *Increasing Returns and Long-Run Growth*, 94 J. POL. ECON. 1002, 1003 (1986) (noting the “positive external effect” of the creation of knowledge at one firm on the production capabilities of other firms “because knowledge cannot be perfectly patented or kept secret”).

93. I thank Steven E. Bochner, partner and former CEO at Wilson Sonsini Goodrich & Rosati, for this analogy.

94. See SAXENIAN, *supra* note 23, at 34-36, 54-55.

95. See *id.* at 62-63.

96. See *id.* at 29-30, 35-37, 60.

97. See Fallick et al., *supra* note 56, at 472.

98. See Gilson, *supra* note 7, at 609 (“Silicon Valley’s legal infrastructure, in the form of . . . section 16600’s prohibition of covenants not to compete, provided a pole around which Silicon Valley’s characteristic business culture and structure precipitated.”).

Another central concept in the new wisdom about noncompetes is that of the employee spinout.⁹⁹ Employee spinouts are firms whose founders previously worked for a company in the same industry.¹⁰⁰ Spinouts appear to perform better than other startups, on average, across a range of industries.¹⁰¹ Economists studying economic growth in successful industry clusters—especially Silicon Valley’s computer industry and Detroit’s automotive industry—have noticed that spinouts played an important role in the economic rise of those regions.¹⁰² In the 1960s, after the first Silicon Valley spinout—Fairchild Semiconductor—was born out of the Traitorous Eight’s escape from Shockley’s grip, waves of Fairchild executives, engineers, and production managers defected to various startups in Silicon Valley.¹⁰³ According to one count of these so-called Fairchildren, by 1976 at least twenty-nine Silicon Valley semiconductor startups had one or more founders who had previously worked at Fairchild.¹⁰⁴ Michigan’s auto industry followed a similar pattern during the era before the state resumed enforcing noncompetes.¹⁰⁵ Based on

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99. See SAXENIAN, *supra* note 23, at 25-26 (describing the process of entrepreneurship spawning in Silicon Valley via employee spinouts (referred to as “spin-offs”)); April Mitchell Franco & Darren Filson, *Spin-Outs: Knowledge Diffusion Through Employee Mobility*, 37 RAND J. ECON. 841, 841-42 (2006) (describing the central role employee spinouts—“the most important type of entrant in many high-tech industries”—play in the transmission of knowledge between firms); Steven Klepper, *Spinoffs: A Review and Synthesis*, 6 EUR. MGMT. REV. 159, 159 (2009) (describing the role of spinouts in the evolution of successful industry clusters, such as the automobile industry in Detroit and the semiconductor industry in Silicon Valley).
100. See Franco, *supra* note 44, at 87; Franco & Filson, *supra* note 99, at 841; Klepper, *supra* note 99, at 159. Though the terms are sometimes used interchangeably in the literature, see, e.g., SAXENIAN, *supra* note 23, at 25, spinouts are a distinct concept from “spinoffs,” which are subsidiaries sold off by their parent companies, see Franco & Filson, *supra* note 99, at 842 n.1.
101. See Michael S. Dahl & Olav Sorenson, *The Who, Why, and How of Spinoffs*, 23 INDUS. & CORP. CHANGE 661, 661-62 (2014).
102. See Steven Klepper, *Disagreements, Spinoffs, and the Evolution of Detroit as the Capital of the U.S. Automobile Industry*, 53 MGMT. SCI. 616, 628 (2007) [hereinafter Klepper, *Disagreements*] (attributing the “superior performance” of Detroit automobile firms to “the high quality of the [spinouts] that located there”); Steven Klepper, *Employee Startups in High-Tech Industries*, 10 INDUS. & CORP. CHANGE 639, 639 (2001) (noting that spinouts are seen by many as the “font of innovation” responsible for “fueling the juggernaut known as Silicon Valley”); see also *supra* Part I.A (discussing the spinout culture of Fairchild Semiconductor and its role in the explosion of Silicon Valley).
103. See BLASI ET AL., *supra* note 60, at 8; SAXENIAN, *supra* note 23, at 26; Laws, *supra* note 39.
104. April M. Franco & Matthew F. Mitchell, *Covenants Not to Compete, Labor Mobility, and Industry Dynamics*, 17 J. ECON. & MGMT. STRATEGY 581, 582-83 (2008) (citing ERNEST BRAUN & STUART MACDONALD, *REVOLUTION IN MINIATURE: THE HISTORY AND IMPACT OF SEMICONDUCTOR ELECTRONICS* (2d ed. 1982)).
105. See Klepper, *Disagreements*, *supra* note 102, at 617-20, 628. Michigan had banned enforcement from 1905 through 1984. See Marx et al., *supra* note 90, at 396. But in 1984, the legislature repealed the statutory prohibition on noncompetes, apparently
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these patterns, the advocates of the new wisdom argue that noncompetes inhibit the creation of spinouts and the progress of industry clusters.¹⁰⁶

The new wisdom regarding noncompetes shifts away from a two-dimensional analysis of the employee-employer relationship and toward a complex model in which the effects on the entire industry cluster are taken into account. According to this modern view, employee mobility is not a zero-sum game but rather a means to expand the economic pie of an entire sector and achieve maximum communal benefit. Specifically, this line of thought emphasizes three advantages that are products of high employee mobility: the pooling of high-skilled labor, spillover of knowledge, and creation of spinouts.

C. The Quest for Empirical Support

In recent years, many researchers have joined the quest to add empirical insights to this discussion. As often happens, the new evidence points in more than one direction. The body of published empirical works in this area is immense and spans various disciplines. This Note does not attempt to summarize each of these works here but instead points out some of their most relevant findings.¹⁰⁷

Early works focused on Saxenian's observations that Silicon Valley is characterized by a rapid movement of technically sophisticated employees between firms and that this flow facilitates the diffusion of information among the region's firms.¹⁰⁸ Fallick and colleagues tested Saxenian's first observation using employee mobility data from the U.S. Census Bureau's Current Population Survey.¹⁰⁹ They found that college-educated men in Silicon Valley demonstrated increased employee mobility relative to those in other metropolitan areas with large computer industry clusters.¹¹⁰ The authors also found that employee mobility is high in other computer industry clusters in

inadvertently. *See id.*; *see also* Michigan Antitrust Reform Act, No. 274, 1984 Mich. Pub. Acts 1148 (codified as amended at MICH. COMP. LAWS §§ 445.771-.788 (2018)).

106. *See* Franco & Filson, *supra* note 99, at 860 ("Our results suggest that preventing employee mobility leads to inefficient resource allocation . . ."); Barnett & Sichelman, *supra* note 7, at 4 (collecting scholarship that "generally assert[s] that banning noncompetes (and, by implication, other contractual restrictions on employee mobility) promotes employee turnover, which promotes innovation").

107. For two recent review papers that offer a good starting point for those who wish to delve into this subject more thoroughly, see Norman D. Bishara & Evan Starr, *The Incomplete Noncompete Picture*, 20 LEWIS & CLARK L. REV. 497 (2016); and Barnett & Sichelman, *supra* note 7.

108. *See* SAXENIAN, *supra* note 23, at 34-36, 54-55, 111 (describing the culture of employee mobility in early Silicon Valley and its survival into the ensuing decades).

109. *See* Fallick et al., *supra* note 56, at 475-76.

110. *See id.* at 473, 475-81.

California relative to similar clusters elsewhere in the United States.¹¹¹ However, outside the computer industry, California's mobility rates are not higher than those elsewhere.¹¹²

Almeida and Kogut examined Saxenian's latter observation about information flows.¹¹³ Analyzing citations in patents relating to semiconductor design, they showed that during the 1980s, firms in the semiconductor industry in Silicon Valley were significantly more likely to cite patents belonging to other firms in their own geographic region than were semiconductor firms outside Silicon Valley.¹¹⁴ These empirical findings support Saxenian's argument that employee mobility facilitates knowledge spillover and information diffusion in Silicon Valley.

More recent works have attempted to move beyond Saxenian's account of Silicon Valley to test Gilson's suggestion that California's noncompete ban is the primary reason for Silicon Valley's success.¹¹⁵ However, this hypothesis is much more complicated to measure because differences in state noncompete policies are unlikely to be the sole factor affecting economic growth, clustering, and innovation. Moreover, scholars disagree even on the threshold issue of how to measure states' levels of noncompete enforcement. For example, Jonathan Barnett and Ted Sichelman recently reviewed the empirical literature and concluded that "several prominent studies that purport to show a strong relationship between the enforceability of noncompetes and employee circulation and innovation . . . suffer from serious infirmities or substantial limitations," including a critical failure to characterize states' noncompete laws accurately.¹¹⁶ Similarly, Norman Bishara and Evan Starr have found "the empirical work to be unsatisfactory on several dimensions."¹¹⁷

Taking these calls for caution into account, I will nonetheless now describe the literature's central findings. To a great extent, the research has borne out the basic predictions of both the traditional economic analysis and the new wisdom. But the net effect of noncompete enforcement remains ambiguous.

Recall that traditional economic theory suggests that noncompete enforcement encourages firms to spend on training but discourages employees

111. *See id.*

112. *See id.*

113. *See Almeida & Kogut, supra* note 92, at 908.

114. *See id.* at 909-12.

115. *See supra* note 98 and accompanying text.

116. Barnett & Sichelman, *supra* note 7, at 5.

117. Bishara & Starr, *supra* note 107, at 501 ("In particular, the existing research fails to answer even the most basic questions regarding the use and consequences of noncompetes for employees, firms, and regions.").

from investing in their own human capital.¹¹⁸ The empirical findings are consistent with these predictions. Starr has examined the effect of enforcement on training and wages, employing a statistical technique that exploits cross-state variation in noncompete enforcement.¹¹⁹ Starr found that if a nonenforcing state were to adopt “mean enforceability policies,” the incidence of employee training provided by employers would rise by 14%.¹²⁰

Conversely, Mark Garmaise has considered the effects of noncompete enforcement on executives’ self-investment in their own human capital.¹²¹ Garmaise relied on two methods. First, he used a time-series test to analyze the effect of changes in state law regarding enforceability of noncompetes in Florida, Louisiana, and Texas.¹²² Second, he used cross-state variation in noncompete enforceability as measured by an index developed from legal literature.¹²³ Garmaise’s results suggest that noncompete agreements discourage executives from making investments in their own human capital and that this effect has a stronger influence than does the firm’s greater tendency to invest in executives’ human capital under high-enforceability regimes.¹²⁴

As for firms’ investment in innovation, the literature once again points in multiple directions. Using the cross-state and time-series variation in noncompete enforceability described above, Garmaise found that increased enforceability reduces R&D spending and capital expenditures per

118. See *supra* Part II.A.

119. See Starr, *supra* note 90, at 2. Starr created a measure of noncompete enforcement modeled closely on one used by Bishara. See *id.* (citing Norman D. Bishara, *Fifty Ways to Leave Your Employer: Relative Enforcement of Covenants Not to Compete, Trends, and Implications for Employee Mobility Policy*, 13 U. PA. J. BUS. L. 751 (2011)).

120. See *id.* at 29. These findings are consistent with evidence from European countries demonstrating that employers tend to invest less in general training (developing transferable skills) in dense regional labor markets that generate more cause to fear that competitors will poach employees. See Giorgio Brunello & Francesca Gamberotto, *Do Spatial Agglomeration and Local Labor Market Competition Affect Employer-Provided Training? Evidence from the UK*, 37 REGIONAL SCI. & URB. ECON. 1, 13 (2007); Samuel Muehleemann & Stefan C. Wolter, *Firm-Sponsored Training and Poaching Externalities in Regional Labor Markets*, 41 REGIONAL SCI. & URB. ECON. 560, 561 (2011).

121. See Garmaise, *supra* note 77, at 376-78.

122. See *id.* at 378, 390-93.

123. See *id.* at 388-90, 393-94 (relying on the model constructed in 1 BRIAN M. MALSBERGER, COVENANTS NOT TO COMPETE: A STATE-BY-STATE SURVEY (4th ed. 2004)). Garmaise’s index considers twelve questions asked by Brian Malsberger about each jurisdiction and “assign[s] 1 point to each jurisdiction for each question if the jurisdiction’s enforcement of that dimension of noncompetition law exceeds a given threshold.” See Garmaise, *supra* note 77, at 388-89.

124. See Garmaise, *supra* note 77, at 376-77, 410-14. *But see* Starr, *supra* note 90, at 2 (finding “no evidence” of the theorized negative relationship between noncompete enforceability and self-investment in human capital).

employee.¹²⁵ However, Raffaele Conti has provided more nuanced results regarding the type of innovation affected by noncompete enforcement, concluding that enforceability allows firms to better capture the fruits of their innovations, thereby encouraging them to pursue higher-risk R&D projects.¹²⁶

With respect to employee mobility, Garmaise has also examined how noncompete enforcement affects executive mobility and wages.¹²⁷ Using intrastate time-series variation in levels of enforcement, Garmaise found that a shift to an increased enforceability regime reduces the rate of executives' moves within an industry by 47% and decreases executive compensation growth by 8.2%.¹²⁸

In another study attempting to tackle the causal relationship between noncompete enforcement and employee mobility, Marx et al. have exploited a "natural experiment" in Michigan—the change in noncompete enforceability following the Michigan Antitrust Reform Act of 1984.¹²⁹ They used patent data to detect moves between firms of inventors who held at least two patents.¹³⁰ They then compared the likelihood of movement before and after the legal reform to a group of ten control states that do not enforce noncompetes.¹³¹ They found that after Michigan began to enforce noncompetes, inventor mobility fell by 8.1% compared to the control states.¹³² This effect was amplified for inventors who had developed more firm-specific knowledge and for those whose work was highly specialized.¹³³

125. See Garmaise, *supra* note 77, at 376, 409-10.

126. See Raffaele Conti, *Do Non-competition Agreements Lead Firms to Pursue Risky R&D Projects?*, 35 STRATEGIC MGMT. J. 1230, 1231 (2014). Specifically, using the same time-series variation in noncompete enforceability identified by Garmaise, Conti found that increased enforceability in Florida was associated with both increases in extreme successes (top 1% of forward patent citations) and extreme failures (zero forward citations). See *id.* at 1234-38. Conti also found the inverse result in Texas, where the state supreme court had weakened noncompete enforcement in 1994. See *id.*

127. See Garmaise, *supra* note 77, at 378.

128. See *id.* at 397, 402. The cross-state comparison provided similar results. See *id.* at 399, 402. Garmaise also found that measures of enforcement had statistically insignificant effects on inter-industry transfers (as is to be expected because noncompetes are considered reasonable only when limited in scope). See *id.* at 399.

129. See Matt Marx et al., *Mobility, Skills, and the Michigan Non-compete Experiment*, 55 MGMT. SCI. 875, 875-76 (2009) [hereinafter Marx et al., *Mobility*]; see also Marx et al., *supra* note 90, at 396 (describing the circumstances surrounding Michigan's inadvertent noncompete reform in 1984).

130. See Marx et al., *Mobility*, *supra* note 129, at 881-82.

131. See *id.* at 879-80.

132. See *id.* at 876.

133. See *id.* The reductions in mobility in these cases were 15.4% and 16.2%, respectively. See *id.* at 887. The firm-specificity of knowledge was measured by "the proportion of the citations to a given patent that are from internal as opposed to from external firms,"
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Regarding noncompete enforcement influence on employee spinout creation, Sampsa Samila and Olav Sorenson have found that compared to states with higher enforcement rates, an increase in the local supply of venture capital in states with lower enforceability has significantly stronger positive effects on the number of new firms.¹³⁴ Similarly, Starr et al., using data on 5.5 million new firms, have found that greater enforceability is associated with fewer within-industry spinouts.¹³⁵ However, they also found that relative to the out-of-the-industry spinouts, the within-industry spinouts created under high-enforceability conditions start larger and stay larger, are founded by higher-earning employees, and are more likely to survive their initial years.¹³⁶

To summarize, the empirical findings suggest a vicious cycle. Without some limitation on employee mobility, employers invest less in human capital and innovation. But once the initial investment is made, the same mobility limitation has a chilling effect on further development. Is there a way around this impasse? The answer is yes. Thus far, researchers have largely overlooked the other factor that affects employee mobility and retention in high-tech startup labor markets.

III. Equity Compensation as the Missing Link

The crucial factor both proponents and skeptics of noncompetes have generally ignored is startup employee stock options. With few exceptions, stock options are rarely mentioned in the literature on noncompetes.¹³⁷ When

and the level of specialization was measured by analyzing the “concentration of an inventor’s inventions” within a particular “patent technology class.” *See id.* at 880.

134. *See* Sampsa Samila & Olav Sorenson, *Noncompete Covenants: Incentives to Innovate or Impediments to Growth*, 57 *MGMT. SCI.* 425, 426 (2011).

135. *See* Evan Starr et al., *Screening Spinouts?: How Noncompete Enforceability Affects the Creation, Growth, and Survival of New Firms*, 64 *MGMT. SCI.* 552, 552, 557, 561 (2018).

136. *See id.* at 553; *see also* Jessica S. Jeffers, *The Impact of Restricting Labor Mobility on Corporate Investment and Entrepreneurship* 2-3 (Sept. 18, 2017) (unpublished manuscript), <https://perma.cc/CR8J-J4QN>. Using LinkedIn data on employment histories and changes in the enforceability of noncompete agreements, Jessica Jeffers found that stronger enforceability leads to a decline in employee departures—particularly in “knowledge-intensive” jobs—and reduces entrepreneurship in corresponding industries. *See id.* However, these shocks increase the investment rate at existing knowledge-intensive firms. *See id.* at 3.

137. For one such exception, *see* Booth, *supra* note 7, at 271 (“There is a much more important device by which California firms can and do bind their employees. It is equity and the prospect of equity . . .”). Booth’s speculation that California employers have relied on equity compensation to bind employees and have thereby created an improved mechanism for allocation of talent received little attention, and the empirical literature that followed Saxenian’s and Gilson’s works never attempted to test Booth’s hypothesis. His paper has gained only a handful of citations in law reviews
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they are, they are described as the mere economic equivalents of noncompetes.¹³⁸ However, stock options influence incentives in a fundamentally different way than noncompetes do. Thus it was the combination of California's public policy against noncompetes and its policy in favor of employee stock options that facilitated an efficient allocation of talent in Silicon Valley. To understand the foundations of employee stock options, we must return to the early days of Silicon Valley and the Traitorous Eight's departure from Shockley Semiconductor Laboratory.

A. The Origins of Broad-Based Employee Stock Options

When the Traitorous Eight acquired funding with the help of Arthur Rock, they set up an unusual arrangement: Each of the eight scientists received 10% of the equity in Fairchild Semiconductor in return for a \$500 investment, Rock's banking firm got 20%, and Fairchild Camera and Instrument lent the group \$1.5 million and received an option to buy the company for \$3 million.¹³⁹ As shareholders, the Traitorous Eight became their own bosses, and they created an organizational culture wholly different from the one they had experienced at Shockley.¹⁴⁰ At Fairchild Semiconductor there were no titles, dress codes, or reserved parking spaces, and everyone sat in one open space.¹⁴¹ The lack of a rigid hierarchy was intended "to create an intellectual atmosphere in which creativity would flourish" and ideas would freely flow.¹⁴²

Fairchild Semiconductor's success and high profit margin led the parent company Fairchild Camera to exercise its option to purchase all the shares of the startup in 1959, just two years after its founding.¹⁴³ The acquisition created a financial windfall for the founders, turning each founder's \$500 investment

and relevant journals. A March 3, 2018 search on Google Scholar identified only 15 citing references, of which 6 are law review pieces.

For other contributions addressing stock options, see Toby E. Stuart & Olav Sorenson, *Liquidity Events and the Geographic Distribution of Entrepreneurial Activity*, 48 ADMIN. SCI. Q. 175, 175-76 (2003) (discussing the effect of liquidation events on the ability of high-level employees who own equity in the firm to launch their own ventures); and Barnett & Sichelman, *supra* note 7, at 11 (describing the ability of employers to control equity vesting schedules in a way that penalizes departing employees as a "potent mechanism by which to discourage employee movement").

138. See Barnett & Sichelman, *supra* note 7, at 9-12.

139. See BLASI ET AL., *supra* note 60, at 6-7.

140. See *id.* at 7.

141. *Id.*

142. *Id.*

143. See *id.* at 6-7; Laws, *supra* note 39.

into about \$250,000 worth of Fairchild Camera stock.¹⁴⁴ The founders became wealthy overnight, but they also lost ownership in the corporation they had founded and were suddenly once again mere employees in someone else's company.¹⁴⁵ As a result, the group began to split. In January 1961, Last and Hoerni left Fairchild and founded Amelco Semiconductor, the microelectronics branch of Teledyne, a Southern California startup designing military electronic systems.¹⁴⁶ Kleiner and Roberts soon followed them; the rest remained, for the time being, at Fairchild.¹⁴⁷

The buyout of the founders' shares showed Noyce, the uncrowned leader of group, the potential of this type of compensation.¹⁴⁸ "Suddenly it became apparent to people like myself, who had always assumed they would be working for a salary for the rest of their lives, that they could get some equity in a startup company," Noyce said in a 1980 interview.¹⁴⁹ "That was a great revelation—and a great motivation."¹⁵⁰ Witnessing the bleed of Fairchild talent to the startups that were beginning to proliferate, Noyce wanted to extend Fairchild Semiconductor's stock option plan to lower-level employees.¹⁵¹ At the time, stock option plans were common compensation for top management among public companies, and Fairchild was no exception.¹⁵² But Noyce's proposal to offer this exclusive perk to all knowledge workers fell on deaf ears. Fairchild Camera was an East Coast company with an "East Coast mentality," Arthur Rock later explained, and "couldn't see clear to giving out options to people below the executive level."¹⁵³

144. See BLASI ET AL., *supra* note 60, at 7. The sum would be worth over \$2.1 million today. See *CPI Inflation Calculator*, BUREAU LAB. STAT., <https://perma.cc/8A5V-WK53> (archived Mar. 3, 2018).

145. See Addison, *supra* note 26. In the words of Traitorous Eight member Jay Last:

[T]he character of Fairchild had changed. When we started it was eight of us together. We each owned 10 percent of the company or some number roughly like that. We were all equals working together as a team. . . . [After the exercise of the option] I realized, as did a number of other people, the company was getting stratified and I was an employee in a big company and so the group spirit was going away. . . . So I was missing the excitement that I had when we started.

Id.

146. LÉCUYER & BROCK, *supra* note 29, at 44; see also LÉCUYER, *supra* note 26, at 212.

147. See Addison, *supra* note 26.

148. See BLASI ET AL., *supra* note 60, at 7-8; LÉCUYER, *supra* note 26, at 129.

149. BLASI ET AL., *supra* note 60, at 7-8 (quoting Justin Fox, *The Next Best Thing to Free Money*, FORTUNE (July 7, 1997), <https://perma.cc/7GLE-UT4R>).

150. *Id.* at 8 (quoting Fox, *supra* note 149).

151. See *id.*

152. See *id.*

153. See Fox, *supra* note 149; see also SAXENIAN, *supra* note 23, at 53-57, 77-78 (comparing stock option practices in the 1960s and 1970s in Silicon Valley, where many technology
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When Noyce quit Fairchild in 1968 along with fellow Traitorous Eight member and R&D chief Gordon Moore, the two decided that their new company, Intel, would not be so stingy about granting stock options to employees.¹⁵⁴ Their time with Shockley had taught them that with a toxic work culture, even the most innovative and exciting company will lose its talent. Their experience with Fairchild had further taught them that good culture is not enough; to keep their most valuable employees from doing exactly what Noyce and Moore had themselves done to Shockley and Fairchild, they would also need to provide employees with a sense of ownership.¹⁵⁵ Intel therefore offered stock options to all its engineers and office staff.¹⁵⁶ This development was an important innovation: It reduced the divide between managerial and technical employees, gave technical employees a more entrepreneurial point of view, and helped Silicon Valley attract top talent from across the country.¹⁵⁷ While neither Shockley nor Fairchild lived up to its potential, Intel went on to become one of the most successful U.S. companies of all time.¹⁵⁸ Other Silicon Valley startups soon followed Intel's example, and by 1977, it was not at all remarkable for Apple Computer—another startup backed by Rock and Fairchild descendants—to grant options to all its engineers.¹⁵⁹

B. Startup Employee Stock Options and Employee Mobility

Employee stock options provide an employee the right, but not the obligation, to buy a specific amount of the company's common stock at a prespecified price (the strike price), usually the fair market value of the stock

firms “provided generous stock options for all employees,” with those in Route 128, where options “were typically reserved for top executives, if they were offered at all”).

154. See Fox, *supra* note 149. Moore was also the man behind Moore's Law, see Laws, *supra* note 39, which states that computer power doubles every two years at the same cost, see Dennis Martin, Note, *Demystifying Hash Searches*, 70 STAN. L. REV. 691, 731 n.262 (2018) (discussing Moore's Law but noting that “it's unclear how long Moore's Law will continue to hold”).

155. See BLASI ET AL., *supra* note 60, at 8.

156. See *id.* at 15. This still only amounted to about one-third of the company's workforce. *Id.*

157. See LÉCUYER, *supra* note 26, at 265.

158. See BLASI ET AL., *supra* note 60, at 11. Shockley Semiconductor was sold in 1963 and became part of a Massachusetts company. See *id.* Shockley himself stayed in Silicon Valley and took a professorship at Stanford. *Id.* Fairchild Semiconductor saw most of its talent depart. See *id.* The parent company Fairchild Camera was bought and sold multiple times before finally going public in 1999. *Id.*

159. See *id.* at 17-18; see also *infra* note 198 and accompanying text.

on the day of the grant.¹⁶⁰ If the stock's value goes up, the option becomes valuable because the employee has the right to buy it at the lower price. The options are typically subject to a four-year vesting schedule with a one-year cliff vesting, meaning that the employee has to remain with the firm for one year before earning the right to exercise a quarter of the options, and then, typically, the remaining three-quarters vest monthly throughout the subsequent thirty-six months.¹⁶¹ Companies sometimes also rely on "refresher grants"—grants that vest in part immediately but mostly vest only after the employee's initial grant is fully vested—thus reinforcing the retention incentive of stock options even after the initial four-year period.¹⁶² If the employee leaves the firm or her employment is terminated for cause before the end of the first year of employment, she usually does not get any of the options.¹⁶³ After a year—and as long as she remains employed—the employee will have a set period of time, often seven to ten years, in which to exercise the vested portion of the options.¹⁶⁴

The extended period before the option's expiration is an important attribute of employee stock option plans because according to the Black-Scholes option pricing model, the longer the option has until expiration, the more valuable it is.¹⁶⁵ This is because the longer period before expiration

160. See *Fundamentals of Equity Compensation*, PAYSAs, <https://perma.cc/WUL3-T3HY> (archived Feb. 24, 2018) (surveying the fundamentals of equity compensation, including the types of stock options and the timelines for vesting and acceleration); see also Karen A. Madsen, Comment, *Employee Stock Options: Is Complete Forfeiture of Non-vested Stock Options Fair and Equitable When an Employee Is Involuntarily Terminated Without Cause?*, 33 SANTA CLARA L. REV. 213, 215 (1993).

161. See *Fundamentals of Equity Compensation*, *supra* note 160; see also Thomas A. Smith, *The Zynga Clawback: Shoring Up the Central Pillar of Innovation*, 53 SANTA CLARA L. REV. 577, 586 (2013).

162. See, e.g., *Employee Equity*, SAM ALTMAN (Apr. 18, 2014, 11:26 AM), <https://perma.cc/2A6T-ULH3>.

163. See generally Madsen, *supra* note 160, at 213-14 (questioning whether such an outcome is fair if the employee is terminated without cause just before the initial vesting date).

164. See *Fundamentals of Equity Compensation*, *supra* note 160. The ten-year limit comes from a provision in the Internal Revenue Code. See I.R.C. § 422(b) (2016) (providing that in order for a stock option to qualify as an "incentive stock option," it must not be "exercisable after the expiration of 10 years from the date [it] is granted"); see also *id.* § 421(a) (deferring the income tax that would otherwise accrue upon exercise of the option).

165. See Fischer Black & Myron Scholes, *The Pricing of Options and Corporate Liabilities*, 81 J. POL. ECON. 637, 638 (1973) ("If the expiration date of the option is very far in the future, then the price of a bond that pays the exercise price on the maturity date will be very low, and the value of the option will be approximately equal to the price of the stock."). For an accessibly written explanation, see ASWATH DAMODARAN, *INVESTMENT VALUATION: TOOLS AND TECHNIQUES FOR DETERMINING THE VALUE OF ANY ASSET* 89-96 (3d ed. 2012).

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provides more time for the value of the underlying asset to move, increasing the option's value.¹⁶⁶ Further, because the strike price the employee needs to pay at the option's expiration is fixed, the present value of that amount declines as the life of the option extends.¹⁶⁷

Upon termination of employment, however, the timeframe to exercise the vested portion is typically reduced to ninety days or less, after which the employee forfeits the grant.¹⁶⁸ And herein lies a major difference between public and private firms: To exercise stock options for a public firm, an employee does not need to invest her own money because she can sell some stock to finance the exercise price and to meet the income tax liability triggered by the exercise. Conversely, because private companies' stock is restricted, the employee usually cannot cover those costs by selling some of the

By comparison, long-term publicly traded equity options generally have expiration dates no more than two years after purchase. See *Employee Stock Options: Comparisons to Listed Options*, INVESTOPEDIA, <https://perma.cc/C869-PXWS> (archived Feb. 24, 2018). In this respect, employees enjoy access to an asset class with a valuable feature available to no other investor.

166. See DAMODARAN, *supra* note 165, at 89.

167. See *id.*

168. See, e.g., *Employee Equity*, *supra* note 162 ("Most employees only have 90 days after they leave a job to exercise their options."). The ninety-day exercise window also comes from the Internal Revenue Code's provisions around incentive stock options. See I.R.C. § 422(a)(2) (allowing for favorable income deferral upon exercise of an incentive stock option if the taxpayer was employed by the granting firm "at all times during the period beginning on the date of the granting of the option and ending on the day 3 months before the date of such exercise"). A longer postemployment exercise window thus disqualifies the option's status as an incentive stock option and denies the employee favorable tax treatment.

It is important to note that early employees can sometimes use the election offered in § 83(b) of the Code, which gives an employee or founder the option to pay income tax on a stock option in advance (when the company's valuation is low) on equity she may not get to keep instead of waiting until vesting and exercise (when the value has likely grown considerably). See I.R.C. § 83(b). Under a § 83(b) election, the employee pays income tax on the total fair market value of the grant at the time of transfer (which is typically close to zero) and thus avoids a potentially heavy tax bill in the future when the company's equity valuation rises. See *id.*; Ronald J. Gilson & David M. Schizer, *Understanding Venture Capital Structure: A Tax Explanation for Convertible Preferred Stock*, 116 HARV. L. REV. 874, 894-95 (2003); see also David I. Walker, *The Non-option: Understanding the Dearth of Discounted Employee Stock Options*, 89 B.U. L. REV. 1505, 1556-57 (2009) (suggesting that § 83(b) election makes sense for bullish employees of private companies). Employees who take advantage of this election and choose to use it can escape the dilemma discussed in this Subpart.

A similar solution is available for stock option holders who exercise the stock option immediately without waiting for it to vest. See Gilson & Schizer, *supra*, at 897 ("Managers can achieve this result if the common stock is valued at \$1 per share when the options are granted, and the executives exercise the options immediately. To secure this tax benefit, entrepreneurs and managers sometimes negotiate for the right to exercise options immediately, even if the options are not yet vested.").

stock. Instead, exercising options requires out-of-pocket money to cover both the strike price and the resulting tax bill.¹⁶⁹

Stock options for startup employees can encourage retention by providing both a positive incentive to stay in the form of the vesting schedule and a negative incentive to depart in the form of potential tax liability. If a private firm has been successful between the time of the grant and the time of the exercise, the tax liability incurred by exercising the options often exceeds the cash the employee has on hand; she therefore needs to choose between walking away from valuable vested options too costly to exercise or continuing to work for the company.¹⁷⁰ This dilemma is even more daunting considering

169. Shortly before this Note went to print, Congress enacted a tax reform statute. See H.R. 1, 115th Cong. (2017) (enacted). The new statute addresses the problem of startup employees' need to pay out of pocket to take advantage of their equity compensation upon vesting and exercise in two ways.

First, depending on the employee's income, exercising incentive stock options can trigger the alternative minimum tax. See *Fundamentals of Equity Compensation*, *supra* note 160. Although Congress did not repeal the alternative minimum tax, it significantly increased the income exemption and phase-out amounts, leaving fewer startup employees who receive stock options subject to the tax. See *Six Ways Tax Reform Affects Your Stock Compensation and Financial Planning*, MYSTOCKOPTIONS.COM, <https://perma.cc/HJ6Z-ANGT> (archived Apr. 5, 2018).

Second, the new statute creates § 83(i) of the Internal Revenue Code. See H.R. 1, § 13603(a). Section 83(i) offers certain employees of eligible private companies the opportunity to defer taxation on exercise or settlement of their equity awards for up to five years after vesting, *see id.*, thus attempting to close the gap between when employees incur tax liability on their equity compensation and when they can sell their shares. This new tax deferral treatment "applies to stock options that are exercised and [restricted stock units (RSUs)] that are settled after December 31, 2017." Davis Polk & Wardwell LLP, *New Tax Act Provides Tax Deferral Opportunity for Private Company Equity Compensation Awards 1* (2018), <https://perma.cc/8GFL-AEAN>.

But for multiple reasons, the new § 83(i) does not eliminate the problem of startup employees' inability to cash out without incurring tax liability. See Davis Polk & Wardwell LLP, *supra*, at 1 (explaining that "[i]t is unclear how many companies and employees will actually be able to take advantage of" the provision because it "imposes numerous restrictive requirements and limitations" and because the provision's "exact intent and application . . . are not clear from the statutory language"). Employees must also consider the possibility that the company will eventually fail or will still be private five years after the deferral. See Lydia O'Neal, *New Tax Law's Equity Grant Rule Not Too Useful for Startups*, BLOOMBERG BNA (Jan. 30, 2018), <https://perma.cc/NV5R-WE89> ("Practitioners said what sounds great in theory may in reality still tie employees to the risk that the company will bottom out.").

170. See, e.g., Connie Loizos, *Dear Unicorn, Exit Please*, TECHCRUNCH (July 23, 2015), <https://perma.cc/DX8U-6TM2> (discussing how "companies with skyrocketing valuations are particularly dangerous for employees" because increasingly "the amount of capital needed to buy one's options has escalated too fast for anyone who isn't already exceedingly wealthy to afford them"); see also Phil Haslett, *Weekly Update #216: What the 90-Day Option Exercise Rule Means for Pre-IPO Secondaries*, EQUITYZEN, *footnote continued on next page*

that after the employee has paid taxes for the stock, the profit might never materialize, as the startup may not live up to its valuation.¹⁷¹ In some cases, employees of successful startups need to deplete their savings, or even borrow money, to exercise their options.¹⁷² In other cases, even these measures might not suffice.¹⁷³

If an employee cannot raise enough money or is reluctant to risk tax exposure, she would need to choose between walking away from extremely valuable vested options too costly to exercise or continuing to work for the company. If, however, the company were to go public, then after a waiting period of a few months (during which insiders are forbidden to sell shares),¹⁷⁴ the employee could exercise and sell a fraction of her grant to cover the remaining costs. Therefore, rather than forgoing a bird in the hand—valuable stock options—or taking on debt to exercise options, staying with the company until an IPO would appear to be the employee’s safest option. Thus, stock options may encourage retention for durations that vary with the anticipated liquidity horizon.

IV. Equilibrium in Tech Startup Labor Markets

As discussed above, to facilitate capital investments as well as entrepreneurship and efficient allocation of talent, the conditions of the labor market should satisfy three somewhat contradictory requirements: They should (1) provide employers an incentive to invest in human capital and innovation;¹⁷⁵ (2) allow talent to move to its highest-value use;¹⁷⁶ and (3) provide a

<https://perma.cc/Y8J5-UTNP> (archived Feb. 24, 2018) (noting that layoffs can and often do thrust employees into this dilemma unexpectedly); *supra* note 169.

171. See Katie Benner, *When a Unicorn Start-Up Stumbles, Its Employees Get Hurt*, N.Y. TIMES (Dec. 23, 2015), <https://perma.cc/HVZ3-MJF9> (telling the story of one such startup whose per-share value dropped from \$4.32 to \$0.44 over the course of a year, after some employees had paid taxes on the higher value).

172. See *id.* (describing how in order to pay taxes stemming from stock grants, some employees were forced to “empt[y] savings accounts and borrow[] money”); see also Scott Kupor, *The Lack of Options for (Startup Employees’) Options*, ANDREESSEN HOROWITZ (June 23, 2016), <https://perma.cc/TJ8Z-WSST> (“[T]hat’s the catch: Exercising requires cash.”).

173. See, e.g., Connie Loizos, *Handcuffed to Uber*, TECHCRUNCH (Apr. 29, 2016), <https://perma.cc/5V4U-BMHL> (describing a hypothetical example of an Uber engineer whose stock options are too costly to exercise due to the company’s tremendous success).

174. See *Initial Public Offerings: Lockup Agreements*, U.S. SEC. & EXCHANGE COMMISSION (Sept. 6, 2011), <https://perma.cc/6LLB-96YM> (“Before a company goes public, the company and its underwriter typically enter into a lockup agreement to ensure that shares owned by [company] insiders don’t enter the public market too soon after the offering.”).

175. See *supra* notes 70-73 and accompanying text.

176. See *supra* notes 78-81 and accompanying text.

solution to the collective action problem that arises from each employer's incentive to retain its own employees while simultaneously benefiting from knowledge transfers by poaching employees from other firms.¹⁷⁷ Unless these requirements are satisfied, the further advance of the region's agglomeration economies—including the pooling of a skilled workforce and interfirm knowledge spillovers—and the continuing evolution of spinouts will be compromised.

Noncompete agreements provide an incentive to invest in human capital and innovation, but they prevent talent from moving to its highest-value use, and they engender a collective action problem.¹⁷⁸ In contrast, stock options provide an incentive to invest in innovation and human capital while avoiding the adverse effects of noncompetes. Thus, the instrument Noyce recognized early on as an effective way to attract talent and instill motivation among employees indeed provided Silicon Valley with the advantage it needed to take over the computer industry and become the world's leading technology hub.¹⁷⁹

A. The Selective Effect of Stock Options on Employee Mobility

To understand the efficiency attributes of Silicon Valley's labor market, let us first make the following assumptions: (1) talent is a scarce resource; (2) money is a scarce resource; (3) startups vary in their prospects of success; and (4) employees vary in their aptitude to accumulate human capital on the job. We will treat a startup's success as measured by the changes in its stock value from the beginning of an employee's term of employment.

After an employment relationship begins, the value of the employer's stock could either appreciate or not—placing the stock options “in the money” or “out of the money.” Similarly, the employee's human capital could either appreciate on the job or not. If the employee gains firm-specific human capital on the job, she will bring more value to her current employer, but her market value will remain the same.¹⁸⁰ If the employee gains general human capital on the job, she will bring more value to her current employer, and her market value will also rise.¹⁸¹ In the latter case, a decision to remain with her current employer would produce an opportunity cost: the loss of potential gains from alternative employment opportunities, including as a founder of a rival firm. Therefore, the employer and employee will find themselves in one of four scenarios presented in Table 1 below: (1) an employee whose general human

177. *See supra* notes 85-88 and accompanying text.

178. *See supra* Part II.A.

179. *See supra* notes 148-59 and accompanying text.

180. On the distinction between specific and general human capital, see note 70 above.

181. *See supra* note 70.

capital appreciated on the job holds out-of-the-money stock options; (2) an employee whose general human capital did not appreciate on the job holds out-of-the-money stock options; (3) an employee whose general human capital did not appreciate on the job holds in-the-money stock options; or (4) an employee whose general human capital appreciated on the job holds in-the-money stock options. We now consider the gravity of the retention effect in each of these four scenarios, with the assumption that for retention to occur in at-will employment, an employment relationship needs to be beneficial to both the employee and the employer.

Scenario 1: If an employee's general human capital appreciated on the job and her stock options are out of the money (and therefore likely worthless), the opportunity cost would exceed the employee's anticipated total payout from staying at the company. Therefore, the employee is likely to resign and move to an employer that assigns greater value to the employee's human capital.

Scenario 2: If the employee's general human capital did not appreciate on the job and her stock options are out of the money, the stock options do not create additional retention incentives on top of the employee's base salary. If the employee's base salary falls below her market-rate salary (as is typically the case in Silicon Valley startups¹⁸²), she is likely to move to a competitor. If the employee's base salary exceeds her market-rate salary, retention might not serve the employer. Either way, the employee will return to the labor market, and the startup will typically run out of resources.

Scenario 3: If the employee's general human capital has not appreciated and her stock options are in the money, the stock options create a strong retention incentive from the employee's perspective, but the employer might not be interested in retaining the employee. The magnitude of the employer's interest in retention depends on whether the employee possesses enough firm-specific human capital (knowledge and skills that add value to the current employer only) and on whether the employee's departure would hurt the employer due to knowledge spillover to the next employer. If, after considering these factors, retention is not mutually beneficial, the parties may split before the grant fully vests.¹⁸³

182. See, e.g., Joseph Bankman, *The Structure of Silicon Valley Start-Ups*, 41 UCLA L. REV. 1737, 1750 (1994) (explaining that because startups provide "contingent compensation" in the form of equity, "employees sacrifice the higher cash salary" they might obtain at "more established companies"); Booth, *supra* note 7, at 274 (noting that startups can "compete for talent without offering more cash" by offering equity instead).

183. Some employees would leave after a few months and not earn any portion of their grants; others would continue working until the vesting cliff (the point at which the first portion of the grant vests) and earn part of their grants. Dismissing an employee right before a vesting cliff might constitute a bad-faith termination. See 3 LITTLER MENDELSON, *THE NATIONAL EMPLOYER* § 23.2.3(a)(x) (2014-2015 ed. 2014) ("Employees often sue for breach of the covenant of good faith and fair dealing with regard to equity
footnote continued on next page

Scenario 4: If the employee's general human capital has appreciated and her stock options are in the money, the employee's opportunity cost is offset against her anticipated total payout upon a liquidity event. The anticipation of a liquidity event such as an IPO or buyout leads to an equilibrium in which the employee's participation in the company's future profits is balanced against her opportunity cost.¹⁸⁴ Stock options do not dissolve the employee's interest in capitalizing on her new knowledge and skills, but they offer an incentive for the employee to remain long enough for the company's investors to see a return on their investment.¹⁸⁵

incentives, with varying results.”); *see also* Madsen, *supra* note 160, at 220 (citing *Gaines v. Monroe Calculating Machine Co.*, 188 A.2d 179, 179, 185 (N.J. Super. Ct. App. Div. 1963)). Yet some startups allegedly terminate employees just before a vesting event in order to save valuable stock. *See* Julie Bort, *The CEO of a \$3.7 Billion Startup Is Accused of Firing Employees Right Before Their Stock Options Vest, Report Says*, BUS. INSIDER (Apr. 13, 2017, 8:08 PM), <https://perma.cc/Ry3N-7WLL>; Robert Kowalski, *As Options Spread, So Too Do Suits from Workers Fired Before They Vest*, THE STREET (Mar. 15, 2000, 9:53 AM EST), <https://perma.cc/SF92-7NS8>. Likewise, some companies attempt to renegotiate employee equity compensation after their success becomes evident. This phenomenon is nicknamed the “Zynga clawback” after the gaming company that used it to reduce the ownership stake of certain employees before its IPO. *See* Smith, *supra* note 161, at 578.

184. For colorful quotations from workers in Silicon Valley discussing this balance, see BLASI ET AL., *supra* note 60, at 42-43. For example, one Portal employee said, “I’m willing to stick it out longer and put up with more crap, because there’s a financial stake.” *Id.* at 42 (quoting Jack, administrator in Portal’s finance unit).

185. Reaching a successful liquidity event (also known as “exit”) means that the venture capital investors who gave money to a firm to fund its growth can now see a return on their investment. *See* *Exit*, BUS. DICTIONARY, <https://perma.cc/33ET-WCXL> (archived Mar. 23, 2018); *see also* Luke Kanies, *If You Take Venture Capital, You’re Forcing Your Company to Exit*, MEDIUM (Nov. 9, 2017), <https://perma.cc/4UKH-VMAN> (“Th[e] distribution on an exit is the primary mechanism for [venture capitalists] to return capital to their investors. The other way is for a company to go public.”).

Table 1
Degree of Employee Mobility Under Possible Growth Scenarios
for the Employee and the Startup

		Company Stock	
		Not appreciated	Appreciated
Employee General Human Capital	Not appreciated	Retention will occur if base salary roughly equals the market-rate salary; startup will typically run out of resources	Retention will occur if employee possesses firm-specific knowledge and skills, or if preventing knowledge spillover is more beneficial to employer than termination
	Appreciated	Employee is likely to depart for a competitor	Stock options create a lock-in effect

The combination of a ban on noncompete enforcement with a broad-based employee stock option plan allows for mobility when continuing the employer-employee relationship would not be mutually beneficial.¹⁸⁶ Nonetheless, during the startup’s growth stages, as long as it continues to succeed, the stock options remain in the money and the employee is provided with an incentive to remain with the firm.¹⁸⁷ If, on the other hand, the company fails, the employee is free to depart and work for a competitor.¹⁸⁸

In contrast, when broad-based employee stock option plans are awarded against a backdrop of noncompete enforcement, departing employees are restrained from competing directly with their previous employer, regardless of the latter’s performance and regardless of their employment status.¹⁸⁹ Therefore, the outflow of knowledge is discouraged even when the company is not doing well and likely even when the employer is the one who chooses to terminate the employment.¹⁹⁰ Moreover, the anticompetitive protection

186. See *infra* Figure 1.

187. I elaborate on this point in Part IV.B below.

188. See *infra* Figure 1. I elaborate on this point in Part IV.C below.

189. Limited empirical evidence suggests that in jurisdictions where noncompete enforcement is relatively strong, executive compensation tends to be more salary-based than equity-based. See Garmaise, *supra* note 77, at 378.

190. See Bishara, *supra* note 119, at 777, 793 fig.12 (surveying state policies and demonstrating that most states enforce noncompetes in such situations); see also Kenneth J. Vanko, “You’re Fired! And Don’t Forget Your Non-compete . . .”: *The Enforceability* footnote continued on next page

provided by the noncompete is unrelated to the company's life cycle; new and mature companies are likely to receive identical protection.¹⁹¹ This characteristic is in contrast to employee stock options, a form of anticompetitive protection that is adjusted to the company's growth stage.

During Silicon Valley's growth stages, successful startups reached a liquidity event within a relatively short time span.¹⁹² Once an employee gains liquidity as a result of such an event, the golden handcuffs—secured by the exercise price and tax implications of the stock options—loosen. Therefore, as explored below, post-IPO companies become fertile ground for spinouts and tend to experience an exodus of highly experienced personnel such as inventors and executives to startups.¹⁹³ In this way, liquidity events regenerate the local talent pool and spinout reserve.

Historically the vesting schedule and the average time to IPO were compatible; as such, by the time an employee was fully vested, an IPO or acquisition was just around the corner.¹⁹⁴ Today, though, due to changes in the economic and regulatory environment, companies stay private for longer and reach extremely high valuations before ever reaching the public markets.¹⁹⁵ In this new environment, employees might get caught in limbo without being able to properly evaluate whether to stay with their current employers or to seize new opportunities. Thus, the efficient allocation of talent that was previously key to Silicon Valley's success might be at risk.

ity of Restrictive Covenants in Involuntary Discharge Cases, 1 DEPAUL BUS. & COM. L.J. 1, 2 (2002) (“[C]ourts have not established any clear rules to provide judges, lawyers and parties with guidance in termination cases.”).

191. *Cf.* Bishara, *supra* note 119, at 774-75. This is because the company's infancy is not itself considered a “protectable interest” justifying noncompete enforcement. *See id.* Typically, the employer needs to demonstrate some other reason to justify enforcement, such as investment in training, special consideration, the employee's use of confidential information, or the need to protect customer lists and trade secrets. *See id.* These protectable interests are unrelated to the company's age.

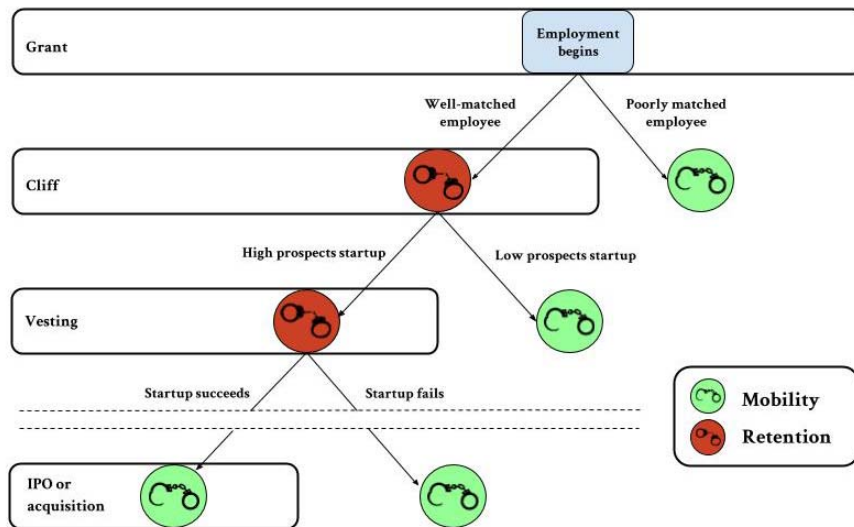
192. *See infra* Parts V.A.-B.

193. This phenomenon is depicted as the IPO stage in Figure 1 below. For further discussion, see Part IV.D below.

194. The median age of U.S. technology companies that went public in 1999 was 4 years; by 2016 the median had risen to 10.5 years. *See* Jay R. Ritter, *Initial Public Offerings: Median Age of IPOs Through 2016*, at 5 tbl.4a (2017), <https://perma.cc/R965-3QZH>.

195. *See* Abraham J.B. Cable, *Fool's Gold?: Equity Compensation & the Mature Startup*, 11 VA. L. & BUS. REV. 613, 621 (2017); Jeremy Abelson & Ben Narasin, *Why Are Companies Staying Private Longer?*, BARRON'S (Oct. 9, 2015), <https://perma.cc/5KNV-G34S>; Begum Erdogan et al., *Grow Fast or Die Slow: Why Unicorns Are Staying Private*, MCKINSEY & CO. (May 2016), <https://perma.cc/3K2V-A5T7>; *see also infra* Part V.

Figure 1
Simplified Scheme of the Narrowly Tailored Retention Function
of Startup Employee Stock Options



B. Incentive to Invest in Human Capital and Innovation

Recall that startups—and by extension, their investors—face a dilemma: In order to produce goods and services, they must hire and train employees and expose them to technology and trade secrets that lie at the core of the firm’s strategic advantage. However, once the employees acquire new knowledge and abilities, they can appropriate them and compete against the company.¹⁹⁶

Stock options, like noncompetes, mitigate the fear of expropriation and provide startups the incentive they need to invest in innovation and human capital. If the startup is successful, the employee’s incentive to appropriate the employer’s investments is offset against her anticipated payout when the company reaches liquidity.¹⁹⁷ Because of the protection stock options provide against expropriation of trade secrets by departing employees, it is not

196. See *supra* notes 72-76 and accompanying text.

197. See BLASI ET AL., *supra* note 60, at 42-43 (providing a firsthand account of employees’ incentives to stay at a successful startup until IPO even if they are miserable).

surprising that since the early days of Silicon Valley, venture capitalists, led by Arthur Rock, have advocated for broad-based employee stock option plans.¹⁹⁸

By reducing the cash salary startups need to give their employees, stock options also facilitate investment in human capital and innovation by enabling a fixed amount of venture capital money to finance more startups or to provide them with more capital. Whereas in a competitive labor market, employers would need to offer relatively high starting salaries to convince employees to sign noncompetes,¹⁹⁹ companies that grant stock options can offer relatively low starting salaries because the employee can expect to profit from the startup's ultimate success.²⁰⁰ Of course, if an employee departs before vesting or fails to exercise her options, the total payout would end up being lower than the employee's market-rate salary.

Note that stock options are not "free money" because if a company is successful, their eventual exercise will dilute the value of the other shareholders' shares.²⁰¹ Indeed, in some cases, they could prove to be extremely costly.²⁰² Nonetheless, both at the level of an individual company and at the level of a portfolio of startups (i.e., from the perspective of a venture capital firm), more often than not the potential value transfer to employees will never materialize. That is because at the individual company level, many employees will fail to exercise their stock options, either because they left before vesting

198. *See id.* at 17-18, 23-24; *see also* SAXENIAN, *supra* note 23, at 53. The early venture capitalists in Silicon Valley tended to be former entrepreneurs and operating executives, *see infra* notes 222-25 and accompanying text, while the venture capital community on the East Coast comprised veterans of the financial industry. *See* Interview with Scott C. Dettmer, Founding Partner, Gunderson Dettmer Stough Villeneuve Franklin & Hachigian, LLP, in Redwood City, Cal. (Oct. 11, 2017). Although this geographic distinction is probably not as pronounced today, some of those cultural traditions persist. *See id.*

199. Not all employees are able to negotiate an increased salary in exchange for signing a noncompete agreement. But those who are in such a position—because they know about the noncompete before signing the employment offer and have an alternative job offer—are likely to receive a premium for signing a noncompete. *See* Starr et al., *supra* note 90, at 25. Starr et al.'s survey data show that employees who were presented with a noncompete before they accepted a job offer and who had alternative employment options earned 19.3% higher wages than those who were not bound by noncompetes. *See id.* Likewise, some state laws tie the enforceability of noncompetes to the receipt of additional consideration—such as training, extra wages, or a promotion—besides continued employment. *See* Starr, *supra* note 90, at 2.

200. *See* Bankman, *supra* note 182, at 1750; Booth, *supra* note 7, at 274; Madsen, *supra* note 160, at 217.

201. *Contra* Fox, *supra* note 149 (arguing that because stock options "don't have a cash value when they're first given out, they don't cost the company anything").

202. *See* Calvin H. Johnson, *Stock Compensation: The Most Expensive Way to Pay Future Cash*, 52 SMU L. REV. 423, 424 (1999) ("Stock-based compensation, however, is a particularly expensive way . . . to pay employees.").

or because they decided not to risk their money.²⁰³ Moreover, in a typical portfolio of startup companies, most companies will fail to reach a lucrative exit.²⁰⁴ The employees of these companies would earn nothing or very little from their equity compensation. Therefore, in a sense, employees of less fortunate firms and employees who fail to exercise their options subsidize (by earning a lower cash salary and no equity) their lucky peers who wind up earning lucrative stock.

Furthermore, it is often argued that by providing stock options to their employees, companies can motivate them to work harder and adopt a more managerial perspective.²⁰⁵ Thus, stock options might improve the return on investment in human capital and R&D by increasing employees' productivity. But despite this argument's prevalence in the literature and strong appeal, it does not apply to rank-and-file employees of relatively large startups: If an employee cannot personally influence the company's stock price, stock options do not create any financial incentive for better performance.²⁰⁶ Moreover, if a company is sufficiently large, a free-rider problem will emerge, as all equity owners will share marginal gains from each employee's additional efforts.²⁰⁷ The empirical literature accordingly suggests that in large public companies, equity ownership affects employee performance by lowering turnover rather than by incentivizing productivity.²⁰⁸

203. Companies are well aware of this and routinely estimate the percentage of equity awards they expect to be forfeited (known as the forfeiture rate); indeed, accounting standards require that they do so when calculating stock-based compensation expenses. See, e.g., Radford, Radford Review: Forfeiture Rate Analysis 1 (2011), <https://perma.cc/BP7Z-35BU>.

204. See *Venture Capital Funnel Shows Odds of Becoming a Unicorn Are Less Than 1%*, CB INSIGHTS (Mar. 29, 2017), <https://perma.cc/YK4B-3RHG>.

205. See, e.g., SAXENIAN, *supra* note 23, at 52-53 (describing Noyce's egalitarian vision when founding Intel); Bankman, *supra* note 182, at 1750 ("[C]ontingent compensation is also thought to increase employee work effort."); Booth, *supra* note 7, at 273 ("Equity induces employees to work harder and to focus on how their efforts contribute to the success of the business."); Corey Rosen, Review, *The Record of Employee Ownership*, FIN. MGMT., Spring 1990, at 39, 41 (discussing a national survey that found a positive relationship between employee effort, employee satisfaction, and the amount of equity owned).

206. See Brian J. Hall & Kevin J. Murphy, *The Trouble with Stock Options*, J. ECON. PERSP., Summer 2003, at 49, 58 ("Conceptually, it seems implausible that stock options provide meaningful incentives to lower-level employees.").

207. See *id.* ("[A] free-rider problem exists: even if employees can increase the value of the firm, their share of that gain through their option holdings is very small.").

208. See, e.g., Paul Oyer, *Why Do Firms Use Incentives That Have No Incentive Effects?*, 59 J. FIN. 1619, 1641-43 (2004) (finding that option plans reduce the likelihood that an employee will accept an outside offer); Paul Oyer & Scott Schaefer, *Why Do Some Firms Give Stock Options to All Employees: An Empirical Examination of Alternative Theories*, 76 J. FIN. ECON. 99, 101 (2005) (finding that options "create attraction and retention benefits"); see also *footnote continued on next page*

Lastly, stock options do not discourage employees from investing in their own human capital, as noncompetes allegedly do. In anticipation of the day when their stock options will be liquid (or the day the stock options lose their value or the employment is terminated), employees are motivated to increase their own human capital to improve their bargaining power in the labor market.

C. Allowing Talent to Move to Its Highest-Value Use

Whereas noncompetes enable all employers to retain control over their employees' human capital regardless of the use each employer makes of its employees' talent, stock options are a strong retention tool only in the hands of successful startups. Stock options link the strength of the retention incentive to the company's prospects of success: The bigger the difference between the expected value of the stock upon liquidity and the strike price, the stronger the incentive to stay. Thus, stock options provide a more narrowly tailored means for talent market regulation, steering talent to where it is most valuable.

Recall the scenario in which the employee's general human capital has appreciated but the startup's stock has not.²⁰⁹ Because the employee's stock options are "out of the money" (the stock's market value is equal to or less than the strike price), the options are probably not worth exercising. In such a scenario, the stock options would not provide a retention incentive. The employee's human capital, on the other hand, would be more valuable than it was when the employee first negotiated compensation. Because the opportunity cost to the employee of staying with the firm would exceed her anticipated total payout, she is likely to resign and move to a competitor that assigns greater value to her human capital. Thus, stock options inherently contain an efficient-breach mechanism that helps avoid inefficient retention in a poorly matched employment relationship.

In the same vein, recall the scenario in which the employee's general human capital has not appreciated but the startup's stock has appreciated.²¹⁰ In this case, the stock options create a strong incentive for the employee to stay, but retention might not serve the employer's interest. The employer now needs to consider the value it receives from the employee's general and specific human capital and the losses it would incur due to knowledge leakage to

Sukanya Sengupta et al., *Employee Share Ownership and Performance: Golden Path or Golden Handcuffs?*, 18 INT'L J. HUM. RESOURCE MGMT. 1507, 1524 (2007).

209. See *supra* Table 1.

210. See *supra* Table 1.

competitors should the employee depart. In a sense, the employer internalizes the losses to the regional economy from inhibiting employee mobility.²¹¹

The inverse analysis applies to a situation in which a startup's stock has appreciated but at a slower rate than the accumulation of human capital by the employee. In such a scenario, the anticipated payout to the employee upon liquidity does not provide a strong enough incentive to prevent her from competing against her employer. In the absence of a noncompete agreement, the employee is free to move to whichever firm assigns the greatest value to her human capital. Nor do the employee and the new employer need to negotiate the terms of her departure with the previous employer, as they would if a noncompete were in force. The employee—or by extension, the next employer who would need to offer a higher salary—would simply internalize the costs of departure by forgoing the unvested stock options and either forgoing a portion of the vested options or risking tax liability on shares that in the meantime cannot be sold.

This analysis suggests a hypothesis: In order to enjoy adequate protection against information expropriation and to facilitate better internalization of departure costs by departing employees, companies need to adjust employees' exposure to stock options based on the level of confidentiality of the knowledge they possess. Employees whose departure would cause the firm more damage should receive more stock options, and with more gradual vesting schedules. Although available data are scarce, the limited evidence is consonant with this hypothesis.²¹²

211. Alan Hyde describes a similar internalization process when the employee is the one who wishes to depart. See Hyde, *Should Noncompetes Be Enforced?*, *supra* note 57, at 10 (“In California, where firms cannot enforce noncompetes, firms seriously consider whether or not to try to hold on to the employee who wants to leave. The employer asks what the employee was working on and whether his departure would harm the firm. It then decides whether to outbid rivals.”).

212. See David H. Erkens, *Do Firms Use Time-Vested Stock-Based Pay to Keep Research and Development Investments Secret?*, 49 J. ACCT. RES. 861, 863 (2011). David Erkens has found that executives' unvested equity holdings are larger when the executives are employed by R&D-intensive firms in industries that rely more on secrecy to profit from R&D. See *id.* at 863-64. This relationship is more pronounced for executives with a greater ability to exploit R&D-related information but holds for nonexecutive employees as well. See *id.* R&D-intensive firms in industries that rely more on secrecy to profit from R&D also use longer vesting periods. See *id.* at 864; see also Julia Porter Liebeskind, *Ownership, Incentives, and Control in New Biotechnology Firms*, in THE NEW RELATIONSHIP: HUMAN CAPITAL IN THE AMERICAN CORPORATION 299, 305-06, 321, 325 (Margaret M. Blair & Thomas A. Kochan eds., 2000) (suggesting that the characteristics of employee stock option plans in California biotechnology firms—including exceptionally long vesting periods, large ownership stakes granted to nonexecutives, and limitations on transferability—reflect that these human capital-intensive companies are using stock options to reduce employee mobility and the resultant knowledge leakage to rival firms).

Stock options thus can strike a balance between the conflicting goals of providing an incentive to invest in entrepreneurship and innovation on the one hand and allowing access to the created assets as embedded in employees' human capital on the other. But what about the employees of extremely successful startups? Would they be locked in forever? The next Subpart sheds light on another efficiency attribute of this retention tool.

D. A Solution to the Collective Action Problem

Recall that the new wisdom regarding noncompetes emphasizes the importance of employee mobility in facilitating the development of spinouts and agglomeration economies such as knowledge spillovers and pooling of skilled employees. Although all employers benefit from an efficient labor market that allows regionwide knowledge spillover, each individual employer might seek to prevent the departure of its own employees in order to enjoy knowledge transfers from other firms without sacrificing its own intellectual property. Thus, a collective action problem arises.²¹³ Gilson has suggested that California's ban on noncompete enforcement provided the solution, allowing Silicon Valley employers to collectively enjoy such regionwide knowledge spillover.²¹⁴ But if successful startups could hinder employee mobility by granting stock options to their employees, they could benefit from other firms' intellectual property without sacrificing their own.

Herein lies another important feature of stock options: They come with a built-in release valve. Following an acquisition or an IPO, employees can cash out and move on to the next venture.²¹⁵ As discussed in greater detail in Part V below, historically, companies needed to go public or be acquired in order to grow and to provide investors and founders with liquidity.²¹⁶ It was only such a liquidity event that would allow a company to tap into resources that were unavailable in the private markets and remove legal limitations on a company's ability to recruit employees and raise funds.²¹⁷ Therefore, when an employer, acting in its own self-interest in shielding itself from expropriation of intellectual property, granted stock options to its employees, it was also

213. See Gilson, *supra* note 7, at 596 ("While it would be in the interest of the region's firms collectively to facilitate employee mobility even at the expense of diluting the intellectual property of individual firms, it will be in the interest of any individual firm to impede the mobility of its own employees. Such a firm gets the benefit of the regionwide spillover of other firms' intellectual property without incurring the cost of diluting its own. Some coordinating mechanism is necessary to achieve (and perhaps maintain) the equilibrium . . ."); *supra* notes 85-88 and accompanying text.

214. See Gilson, *supra* note 7, at 596-97.

215. See *infra* notes 226-31 and accompanying text.

216. See *infra* Part V.A.

217. See *infra* Parts V.A.-B.

facilitating knowledge spillover in the long run. Within a few years, the company would either fail or reach a liquidity event; either way, employees would depart.²¹⁸ Then, without the chilling effect of noncompete enforcement, those who departed were free to spread the knowledge they had gained across the industry—subject, of course, to other intellectual property protections like patent and trade secret law.

Thus, the stock options that had been granted to these entrepreneurial employees upon hiring became the seeds of the next generation of spinouts.²¹⁹ Padded with cash and wise from experience, the departing employees were better equipped to bear the risks of founding or joining a new startup.²²⁰ IPOs therefore played a central role not only in individual employees' career paths but also in the regeneration of local industry clusters.²²¹ In a cycle that was typical of Silicon Valley for many years, startups that had peaked would lose their entrepreneurial talent to newer firms just taking off, and former employees would become the founders, managers, and investors in new startups. The windfall from the exit money would be recycled into the ecosystem.

In addition to the iconic example of the Traitorous Eight and the Fairchildren discussed in Part I.A above, the PayPal Mafia is another well-known example of this pattern.²²² After the PayPal IPO, a group of its founders and former employees moved on to develop many more technology companies, including Tesla Motors, LinkedIn, Palantir Technologies, SpaceX, YouTube, Yelp, and Yammer.²²³ Like the “traitorous” Eugene Kleiner who joined Tom Perkins from Hewlett-Packard to found the successful venture capital firm Kleiner Perkins Caufield & Byers,²²⁴ PayPal alumni Peter Thiel, Ken Howery,

218. See *infra* Parts V.A-B.

219. See *infra* notes 226-31 and accompanying text.

220. See Tania Babina et al., *Going Entrepreneurial?: IPOs and New Firm Creation* 19-20 (Jan. 2017) (unpublished manuscript), <https://perma.cc/A34Q-9WPV>; Endeavor Insight, *Why Spinoffs Are Better Than Other Startups*, ENTREPRENEURSHIP ECOSYSTEM INSIGHTS (Jan. 24, 2014), <https://perma.cc/K6AX-L4RH>.

221. See *infra* text accompanying notes 228-29.

222. See, e.g., Jeffrey M. O'Brien, *The PayPal Mafia*, FORTUNE (Nov. 13, 2007), <https://perma.cc/48MR-5UR6>; Charlie Parrish, *The PayPal Mafia: Who Are They and Where Are Silicon Valley's Richest Group of Men Now?*, TELEGRAPH (Sept. 20, 2014, 8:00 AM BST), <https://perma.cc/6YE3-AGEP>.

223. See Parrish, *supra* note 222; Robert Williams, *What's the PayPal Mafia Up To Next?*, WALL ST. DAILY (July 7, 2014, 6:00 AM), <https://perma.cc/8LTL-TQZQ>.

224. See SAXENIAN, *supra* note 23, at 26, 39-40 (describing how early Silicon Valley entrepreneurs went on to become the region's venture capitalists); Pui-Wing Tam, *Thomas J. Perkins, Pioneering Venture Capitalist in Silicon Valley, Dies at 84*, N.Y. TIMES (June 9, 2016), <https://perma.cc/GS3X-549D> (discussing Perkins's founding of Kleiner Perkins).

and Luke Nosek created the Founders Fund, a San Francisco-based venture capital firm.²²⁵

Empirical studies support this pattern. Shai Bernstein analyzed more than 7000 IPO filings as well as publicly available data on patent applications and citations.²²⁶ He examined the capabilities of innovative companies five years after they had filed for an IPO and found that following an IPO, critical inventors are more likely to leave the company, and the firm is more likely to generate spinouts—suggesting that the “inventors who leave remain entrepreneurial.”²²⁷

Similarly, Toby Stuart and Olav Sorenson examined the entrepreneurship rates in the biotech industry following liquidity events such as an IPO or acquisition.²²⁸ They found that entrepreneurship in the biotech industry spikes after liquidity events but that the effect of such events on the rate of new firm creation is muted in states that enforce noncompetes.²²⁹

Tania Babina and colleagues matched employee-employer data from the U.S. Census Bureau to examine the effect of a successful IPO on a firm’s existing employees and their future career choices and found that IPOs prompt employee departure.²³⁰ Specifically, the study showed that the increase in turnover following an IPO is driven by employees departing to work at startups; it detected no change in the rate at which employees depart for established firms.²³¹ The researchers suggested an explanation: “[F]ollowing an IPO, many employees who received large stock grants in the past are able to cash out. This shock to employee wealth may allow employees to better tolerate the risks associated with joining a new start-up.”²³² They estimated that the recent “decline in IPOs can explain more than eight percent of the decline in startup activity in the late 2000s” because fewer IPOs “means fewer workers mov[ing] to startups” and fewer new firms.²³³

The increased mobility of employees in post-IPO companies suggests that the retention effect of stock options expires upon liquidity. Thus, stock options

225. See Parrish, *supra* note 222; see also Bruce Gibney, *Manifesto: What Happened to the Future?*, FOUNDERS FUND, <https://perma.cc/PWQ7-B5JY> (archived Feb. 26, 2018).

226. See Shai Bernstein, *Does Going Public Affect Innovation?*, 70 J. FIN. 1365, 1368-70 (2015).

227. See *id.* at 1367, 1369.

228. See Stuart & Sorenson, *supra* note 137, at 175-78.

229. See *id.* at 195.

230. See Babina et al., *supra* note 220, at 2-7. Interestingly, the authors found that acquisitions also “are associated with an increase [in] turnover to startups, albeit at . . . one quarter of the magnitude as compared to following an IPO.” *Id.* at 5.

231. See *id.* at 30.

232. *Id.*

233. See *id.* at 31.

can satisfy two competing objectives: They provide a startup and its venture capital investors with an incentive to invest in human capital and innovation while allowing for employee mobility once a startup matures and goes public. However, to solve the collective action problem more fully by limiting employers' ability to impede employee departure, two conditions must be met—not only a ban on noncompete enforcement but also the presence of regulatory and economic conditions that facilitate liquidity.

V. A Cautionary Note on Liquidity

For many years, the conditions just described indeed characterized Silicon Valley. But the current environment is different in that a major liquidity event such as an IPO or acquisition is no longer an obvious milestone for a successful, mature startup. To understand what is driving this change, this Part describes the economic and regulatory conditions shaping Silicon Valley.

A. The Change in Economic Conditions Affecting Silicon Valley

Historically, companies needed to go public in order to raise large sums of money unavailable in private markets.²³⁴ In addition, an IPO or acquisition allowed startups' investors and founders to liquidate part of their stakes.²³⁵ Thus, employees' vesting schedules, venture capital funds' typical timeline, and the average time to IPO were compatible.²³⁶ During Silicon Valley's explosion, employees, founders, and investors shared a common goal of bringing their corporations public within five years of their founding.²³⁷

The current environment is different, characterized by an abundance of private capital and the public market's preference for larger companies. According to a McKinsey & Company report, capital invested in private tech companies almost tripled between 2013 and 2015, from around \$26.5 billion to over \$75 billion.²³⁸ Likewise, venture capital investments peaked in 2015 and remained high during 2016 and 2017.²³⁹ This influx of capital is partly due to

234. See Elisabeth de Fontenay, *The Deregulation of Private Capital and the Decline of the Public Company*, 68 HASTINGS L.J. 445, 461 (2017).

235. See *id.*

236. See LÉCUYER, *supra* note 26, at 264–65 (discussing how stock options were a tool to bring employees' interests in line with startup founders' and venture capitalists' expectations of a quick IPO).

237. See *id.*

238. See Erdogan et al., *supra* note 195 (measuring the annual aggregate private capital investment in tech companies between 2004 and 2015).

239. See PITCHBOOK & NAT'L VENTURE CAPITAL ASS'N, VENTURE MONITOR 4Q 2017, at 4 (2018), <https://perma.cc/N6L7-KJAX> (reporting high numbers in 2016 followed by a post-dot-com era record in 2017 in terms of total venture capital invested).

the growing involvement of nontraditional private investors such as sovereign wealth funds, hedge funds, corporate investors, and mutual funds that covet the sorts of returns found only in the private markets.²⁴⁰ The abundance of private capital allows companies to raise ever-growing sums of equity outside the public markets, thus delaying the need for an IPO or acquisition.²⁴¹ Simultaneously, on the demand side, Wall Street's taste for technology companies has shifted away from small IPOs and toward larger and more mature companies.²⁴² Because public markets assign larger companies higher valuations at the time of their IPOs and afterward, companies are encouraged to remain private while they scale up.²⁴³

In this environment, the typical lifespan of a venture capital fund has grown to ten years, as has the median age of venture-backed companies at the time of IPO.²⁴⁴ The four-year employee stock option vesting schedule, however, remains largely the same.²⁴⁵ Thus, the compatibility between vesting schedules and the time it takes for a startup to reach a liquidity event has been

240. See *id.* at 3, 12, 23; Morgan Bender et al., *U.S. Tech Funding—What's Going On?*, ANDREESSEN HOROWITZ (June 15, 2015), <https://perma.cc/584P-S3TN> (noting that returns from tech company investments have shifted from public to private investors); Barry Kramer et al., Fenwick & West LLP, *The Terms Behind the Unicorn Valuations 1* (2015), <https://perma.cc/DX2Y-5U7R> (analyzing thirty-seven U.S.-based venture-backed companies with valuations over \$1 billion and finding that “approximately 75% were led by investors who were not traditional VCs (e.g., mutual funds, hedge funds, sovereign wealth or corporate investors)”; see also Cable, *supra* note 195, at 638 (“In one particularly high profile example, the sovereign wealth fund of Saudi Arabia capped off a \$6 billion investment in Uber with a VIP tour of Silicon Valley . . .”).

241. See Erdogan et al., *supra* note 195 (“With ample private funding available and technology companies facing challenges in public markets, . . . more and more software companies are choosing to gain scale as private entities.”).

242. See Xiaohui Gao et al., *Where Have All the IPOs Gone?*, 48 J. FIN. & QUANTITATIVE ANALYSIS 1663, 1664 (2013) (“[T]he decline in IPOs has been most pronounced among small firms.”); Abelson & Narasin, *supra* note 195 (explaining that companies are staying private longer because “public market investors simply aren’t buying small tech companies”); Steven Davidoff Solomon, *A Year Later, the Missed Opportunity of the JOBS Act*, N.Y. TIMES: DEALBOOK (June 11, 2013, 5:19 PM), <https://perma.cc/S8YU-5QRZ> (attributing the disappearance of “small” IPOs to “larger structural shifts in the market and investors who are no longer willing to take the risk”).

243. See Erdogan et al., *supra* note 195 (citing Abelson & Narasin, *supra* note 195).

244. Compare LÉCUYER, *supra* note 26, at 264 (describing the “5-year time horizon” expectation of early Silicon Valley venture capitalists), with Andy Rachleff, *Demystifying Venture Capital Economics, Part 1*, WEALTHFRONT (June 19, 2014), <https://perma.cc/NV4R-KHQS> (noting that today’s venture capital funds typically have a “mandated 10-year lifespan”), and Ritter, *supra* note 194, at 5 tbl.4a (reporting the median age of tech firms at IPO each year from 1980 through 2016—a figure that has held between 9 and 11 years since 2009).

245. See *Employee Equity*, *supra* note 162 (“The standard at startups is 4 years with a 1-year cliff.”); Kupor, *supra* note 172.

compromised.²⁴⁶ Likewise, the link between the availability of liquidity for investors and founder on the one hand and for employees on the other hand is no longer considered the norm. During the long growth period when the startup remains private, founders—and to a lesser degree, investors—can enjoy liquidity without selling the company or issuing an IPO by selling some of their stock to other investors in late financing rounds,²⁴⁷ issuing a dividend,²⁴⁸ or receiving favorable loans from the company.²⁴⁹ These steps might mitigate investors' and founders' need for liquidity and further allow mature startups to delay holding a liquidity event.

B. The Change in Regulatory Conditions Affecting Silicon Valley

Another shift that allows companies to delay liquidity events and subsequent departure of entrepreneurial talent is the deregulation of private placements of stock, especially employee equity compensation. In 2012, the JOBS Act amended the Securities Exchange Act to raise the threshold at which companies become subject to public company reporting obligations.²⁵⁰ By

246. See *id.* (suggesting that four years may be too short a vesting schedule given how the modern startup takes longer to reach liquidity). For examples of venture capitalists' calls to lengthen the standard vesting schedule, see Jeff Bussgang, *Stock Vesting: Why Is Four the Magic Number?*, VENTUREBEAT (June 2, 2010, 6:00 AM), <https://perma.cc/TL8M-9Y48>; and Kupor, *supra* note 172. The argument that employees' vesting schedules should be compared to the lifespan of a venture capital fund fails to take into account that a limitation on job mobility is more burdensome than a limitation on capital liquidity. Moreover, employees' equity exposure is undiversified and more volatile than that of venture capital funds because employees' incentives draw their value from the common stock while investors typically receive preferred stock. See Benner, *supra* note 171. And unless the change is made concurrently by a substantial majority of employers (which is legally questionable in light of antitrust laws' prohibitions on anticompetitive agreements), any single employer attempting to change the scheme that has become virtually unanimous across the industry would encounter difficulty in attracting new talent. This challenge might not concern the most attractive employers, but others would need to offer significantly more cash or a more substantial equity stake to compensate for such a change. For further critique, see, for example, *The New 10-Year Vesting Schedule*, ZACH HOLMAN (May 9, 2016), <https://perma.cc/5M4V-FSHD>.

247. See, e.g., Henry Blodget, *Marc Andreessen, Fidelity, and Other Early Groupon Investors Have Already Dumped the Stock*, BUS. INSIDER (Aug. 20, 2012, 7:07 AM) <https://perma.cc/VT9G-MMTE>; see also, e.g., Yokum, *What Is Series FF Stock?*, STARTUP CO. LAW. (Dec. 22, 2007), <https://perma.cc/L2MR-SZ5X>.

248. See, e.g., Henry Blodget, *AirBnB Founders Are Using a Huge Chunk of the Latest Financing to Pay Themselves a \$21 Million Dividend*, BUS. INSIDER (Oct. 1, 2011, 5:40 PM), <https://perma.cc/B9YC-YPZJ>.

249. See, e.g., Julie Bort, *Snapchat Loaned Its Founder \$15 Million Last Year and He Paid It Back in 7 Months*, BUS. INSIDER (Feb. 2, 2017, 7:17 PM), <https://perma.cc/VD9D-HL5J>.

250. See Jumpstart Our Business Startups Act, Pub. L. No. 112-106, §§ 501-502, 601(a), 126 Stat. 306, 325-27 (2012) (codified as amended at 15 U.S.C. § 781 (2016)); see also Securities Exchange Act of 1934, Pub. L. No. 73-291, 48 Stat. 881 (codified as amended in scattered

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doing so, the JOBS Act loosened this regulatory constraint on companies' ability to grow in valuation and number of shareholders without going public.²⁵¹

Section 12(g) of the Securities Exchange Act sets a ceiling on the number of shareholders (referred to in the Act as those by whom securities are "held of record") a private company can have before it becomes subject to the Act's reporting requirements—that is, before it becomes a Securities and Exchange Commission (SEC) "reporting compan[y]."²⁵² Under section 12(g), companies with total assets exceeding \$10 million and with more than a specified number of shareholders must adhere to the reporting requirements of the Securities Exchange Act as if they were public companies.²⁵³ Thus, although section 12(g)

sections of 15 U.S.C.). The JOBS Act was intended to encourage growing companies to expand and hire more workers and, eventually, to list their shares on the exchanges. *See de Fontenay, supra* note 234, at 468-69; Solomon, *supra* note 242. The Act creates special rules for small, fast-growing companies to ease certain financial reporting requirements and to allow these companies to work with the SEC confidentially before filing public registration statements. *See* Susan Chaplinsky et al., *The JOBS Act and the Costs of Going Public*, 55 J. ACCT. RES. 795, 796-97 (2017); Jay R. Ritter, *Reenergizing the IPO Market*, 24 J. APPLIED FIN., no. 1, 2014, at 37, 37. The Act also allows early-stage businesses to offer and sell securities on crowdfunding platforms. *See* Jumpstart Our Business Startups Act § 302, 126 Stat. at 315-21 (codified as amended at 15 U.S.C. §§ 77d, 77d-1). For more on the JOBS Act's legislative history and key provisions, see Dhammika Dharmapala & Vikramaditya Khanna, *The Costs and Benefits of Mandatory Securities Regulation: Evidence from Market Reactions to the JOBS Act of 2012*, 1 J.L. FIN. & ACCT. 139, 148-55 (2016).

251. *See* Cable, *supra* note 195, at 625; de Fontenay, *supra* note 234, at 469; Tyler Adam, Note, *The JOBS Act: Unintended Consequences of the "Facebook Bill,"* 9 HASTINGS BUS. L.J. 99, 117 (2012). The net effect of the JOBS Act on job creation and capital raising is a matter of ongoing debate. *See* Mary E. Barth et al., *The JOBS Act and Information Uncertainty in IPO Firms*, ACCT. REV., Nov. 2017, at 25, 25 (finding that the JOBS Act "increases information uncertainty in the IPO market"); Chaplinsky et al., *supra* note 250, at 799 (finding no evidence that the JOBS Act "has reduced the direct costs of going public"); Michael Dambra et al., *The JOBS Act and IPO Volume: Evidence That Disclosure Costs Affect the IPO Decision*, 116 J. FIN. ECON. 121, 122 (2015) (estimating that the JOBS Act has led to twenty-one additional IPOs annually—a 25% increase over pre-JOBS Act levels); Ritter, *supra* note 250, at 46 (arguing that the JOBS Act will not increase the number of small-company IPOs because the main reason these companies remain private is their difficulty earning profits); Solomon, *supra* note 242 ("[T]he law so far does not appear to be having its intended effect: creating jobs by spurring [IPOs].").
252. *See* 15 U.S.C. § 78l(g) (limiting the number of persons by whom "a class of equity security" can be "held of record"); 17 C.F.R. § 240.12g-1(b)(1) (2017) (exempting an issuer of securities from registration if the "held of record" class is below the threshold); *see also* Usha R. Rodrigues, *The Once and Future Irrelevancy of Section 12(g)*, 2015 U. ILL. L. REV. 1529, 1536 (discussing how companies like Facebook, Google, and Apple were "forced" to go public prior to the JOBS Act's amendment of section 12(g) because they had more than 500 shareholders and therefore had to register and become "reporting companies").
253. *See* 15 U.S.C. § 78l(g); *see also* Adam, *supra* note 251, at 100. For the Securities Exchange Act's reporting requirements, *see* 15 U.S.C. §§ 78l, 78m. *See also* 17 C.F.R. § 229.301.

does not require companies to list their shares on the public market, once a company is required to register with the SEC and is subject to reporting requirements, it might as well enjoy the benefits of its public status. Therefore, the rule effectively pushes companies that trigger its requirements to initiate an IPO.²⁵⁴

Although only a relatively small number of companies ever found themselves at this threshold and were forced to go public,²⁵⁵ section 12(g) was recognized as a primary cause of the timing of some high-profile IPOs—including tech giants such as Apple, Microsoft, Facebook, and Google.²⁵⁶ At the time of their IPOs, these companies were not pushed to go public by a need to raise capital or by pressure from investors to provide them with liquidity.²⁵⁷ Instead, they were motivated by securities law: At the time, section 12(g) set a shareholder threshold of 500, including both investors who received shares in return for capital investments and employees who received shares as compensation.²⁵⁸ Because these companies relied heavily on equity compensation, they ran into the 500-shareholder threshold relatively early and thus faced the same periodic reporting requirements as public companies.²⁵⁹ The founders of these companies felt compelled to issue IPOs rather than

254. See Adam, *supra* note 251, at 100.

255. See Rodrigues, *supra* note 252, at 1530 (reporting that only about 3% of firms that went public between 2000 and the JOBS Act's passage in 2012 had more than 400 shareholders).

256. See OWEN W. LINZMAYER, *APPLE CONFIDENTIAL 2.0: THE DEFINITIVE HISTORY OF THE WORLD'S MOST COLORFUL COMPANY* 27 (2004); Hassan Shirvani & Barry Wilbratte, *Going Public—Microsoft, 1986*, J. CASE RES. BUS. & ECON. 2, <https://perma.cc/NQ96-BP34> (2010); Nicholas Carlson, *Why the SEC Will Force Facebook to Go Public*, BUS. INSIDER (Jan. 4, 2011, 11:34 AM), <https://perma.cc/M8EL-2XMP>; Eric Schmidt, *How I Did It: Google's CEO on the Enduring Lessons of a Quirky IPO*, HARV. BUS. REV. (May 2010), <https://perma.cc/KY8V-7HRG>; see also Rodrigues, *supra* note 252, at 1536-38.

257. See Rodrigues, *supra* note 252, at 1536-38 (noting that before the section 12(g) threshold compelled it to issue an IPO, Apple “seemed content to stay private” and that revenue from advertising sales had funded Google's and Facebook's operations prior to their IPOs); Shirvani & Wilbratte, *supra* note 256, at 2 (describing the circumstances surrounding Microsoft's IPO); Carlson, *supra* note 256 (describing heavy investment in Facebook prior to its IPO); Palash Ghosh, Opinion, *Facebook's Postponed IPO: A Wise and Patient Strategy*, INT'L BUS. TIMES (Sept. 21, 2011, 9:45 AM), <https://perma.cc/69VQ-HFU4> (describing the circumstances surrounding Facebook's IPO and noting that it had “no problems whatsoever raising cash whenever it want[ed]” and was in “no real hurry to go public”).

258. See Rodrigues, *supra* note 252, at 1536-38; Adam, *supra* note 251, at 100-01.

259. See de Fontenay, *supra* note 234, at 460 (Facebook); Rodrigues, *supra* note 252, at 1536-38 (Facebook and Google); Schmidt, *supra* note 256 (Google).

become de facto public companies subject to SEC reporting requirements without the benefits of going public.²⁶⁰

Although Google and Facebook are among the most valuable companies in the world, their IPOs are widely considered to have been disastrous.²⁶¹ For different reasons, the demand for these companies' stock upon their IPOs was not as high as anticipated.²⁶² The disappointing results of these high-profile IPOs gave rise to lobbying efforts aimed at protecting technology companies from the 500-shareholder threshold.²⁶³ Thus, shortly after the Google IPO, the SEC announced that it would no longer count employees who hold stock options as shareholders and would instead count them only once their options actually vested and they purchased stock.²⁶⁴ The new rule made it easier for companies to compensate employees with stock options while avoiding the 500-shareholder threshold. Yet it did not completely disable the IPO's function as a release valve. Companies were no longer subject to public reporting

260. See LINZMAYER, *supra* note 256, at 27 (Apple); Rodrigues, *supra* note 252, at 1537-38 (Facebook); Shirvani & Wilbratte, *supra* note 256, at 2 (Microsoft); Carlson, *supra* note 256 (Facebook); Schmidt, *supra* note 256 (Google).

261. See, e.g., Erin Griffith, *How Facebook Overcame Its Disastrous IPO*, FORTUNE (May 18, 2015), <https://perma.cc/6J74-LGJ5>; Bob Pisani, *Google's IPO Was a Disaster . . . at the Time*, CNBC (updated Aug. 19, 2014, 6:27 AM ET), <https://perma.cc/AC2M-TMXH>.

262. Google chose to structure its IPO using the controversial Dutch auction method. See Schmidt, *supra* note 256. The company solicited bids from investors and ordered them from highest to lowest, then calculated the highest price at which it could sell all of its shares and set that as the IPO price. See *id.* This model and the low commission Google negotiated with the underwriters were cause for some resentment on the bankers' side and led to a disappointing share price. See Daniel Gross, *Four Ways Google Failed: How the IPO Didn't Change Wall Street*, SLATE (Aug. 20, 2004, 3:01 PM), <https://perma.cc/GD8H-VHG2>. The sentiment in the industry is that Google's IPO, initially promising, was a failed experiment. See, e.g., *id.*

Facebook's IPO was also a disappointment, with the shares failing to experience the "usual first-day run-up" in price despite being "the most ballyhooed [IPO] in recent memory and the largest U.S. technology company IPO of all time." See Usha Rodrigues, *Securities Law's Dirty Little Secret*, 81 FORDHAM L. REV. 3389, 3391 (2013). Some argue that because employees were selling their shares on secondary online platforms, investors did not have to wait for Facebook to go public; the company was already actively traded before its IPO. See *id.* at 3391-92; Erin Griffith, *Illiquid Till Exit: Is the Golden Era of Secondary Share Sales Over for Startups?*, FORTUNE (July 21, 2014), <https://perma.cc/822S-P537> (describing Facebook's IPO as the "Wild Wild West of secondary shares").

263. See de Fontenay, *supra* note 234, at 460 (attributing Congress's eventual change of the threshold in the JOBS Act to Facebook's "vocal displeasure" over being forced to issue an IPO prematurely); Adam, *supra* note 251, at 113 (describing a letter in which thirty-eight executives complained to Congress about the 500-shareholder rule's negative impact on job creation and the U.S. economy).

264. See Rodrigues, *supra* note 252, at 1537; see also Exemption of Compensatory Employee Stock Options from Registration Under Section 12(g) of the Securities Exchange Act of 1934, 72 Fed. Reg. 69,554, 69,566-67 (Dec. 7, 2007) (codified as amended at 17 C.F.R. § 240.12h-1 (2017)).

obligations just because they had issued employee stock options, but this relief would last only as long as those options remained unexercised.²⁶⁵ Whenever an employee exercised a stock option for the first time, she began to count as a shareholder, driving the company that much closer to the threshold and thus toward going public.

In 2008, Facebook switched from awarding options to awarding restricted stock units (RSUs), a kind of equity-based security that, unlike stock options, does not involve an exercise decision by the employee.²⁶⁶ The SEC granted further relief by providing the company's RSUs a special exemption from the 500-shareholder threshold.²⁶⁷ As the length of startups' pre-IPO periods began to expand, employees sought liquidity in alternative ways, such as by selling their rights to third-party buyers.²⁶⁸ These sales added new shareholders to the headcount, further complicating the startups' standing with the 500-shareholder threshold and the SEC.²⁶⁹ Thus, commentators identified the active trade in Facebook's shares as a key reason for the timing of its IPO.²⁷⁰

265. See Rodrigues, *supra* note 252, at 1537.

266. A detailed discussion on the mechanics of RSUs is beyond the scope of this Note. For more on the differences between stock options and RSUs and how the latter evolved in Silicon Valley, see Andy Rachleff, *How Do Stock Options and RSUs Differ?*, WEALTHFRONT (Feb. 6, 2014), <https://perma.cc/NCR8-UN7A>.

267. On February 13, 2012, the SEC issued a no-action letter granting relief from the Securities Exchange Act's registration requirement when a company reaches the 500-shareholder limit due to the issuance of RSUs. See Fenwick & West LLP, SEC No-Action Letter, 2012 WL 457968 (Feb. 13, 2012).

268. See Rodrigues, *supra* note 252, at 1538-39 (discussing the pre-IPO sale of Facebook shares on the secondary market by employees and ex-employees). Online platforms allowing tech employees to sell their much-coveted equity compensation to third-party investors began in 2009. See *id.* at 1538; Susan Pulliam & Telis Demos, *How Wall Street Middlemen Help Silicon Valley Employees Cash In Early*, WALL ST. J. (updated Mar. 27, 2015, 4:41 PM ET), <https://perma.cc/R3NR-64V2>; see also Elizabeth Pollman, *Information Issues on Wall Street 2.0*, 161 U. PA. L. REV. 179, 195-202 (2012) (describing the evolution of online marketplaces for private companies' stock and detailing the trading volumes and the information available on two such marketplaces). On the challenges this form of trading brings to the traditional securities regulation distinction between public and private firms, see Adi Osovsky, *The Curious Case of the Secondary Market with Respect to Investor Protection*, 82 TENN. L. REV. 83, 113-30 (2014); and Rodrigues, *supra* note 262, at 3402-17.

269. See Rodrigues, *supra* note 252, at 1539 (explaining the ability to make partial sales on the secondary market and the result that "each sale—rather than substituting new shareholders for old—added to the growing shareholder-of-record tally"); see also Peter Lattman, *Share Rules Could Prompt an Offering by Facebook*, N.Y. TIMES: DEALBOOK (Dec. 28, 2010, 9:01 PM), <https://perma.cc/K5LP-VLAH>.

270. See, e.g., Rodrigues, *supra* note 252, at 1537-39; Steven Davidoff Solomon, *Facebook May Be Forced to Go Public amid Market Gloom*, N.Y. TIMES: DEALBOOK (Nov. 29, 2011, 7:58 PM), <https://perma.cc/ANA8-PRRA>.

Following the Facebook IPO, Silicon Valley companies responded in two ways: They started clamping down on unapproved transfers of equity compensation by employees via the secondary markets (making it all the more difficult for employees to cash out),²⁷¹ and they lobbied to increase the 500-shareholder limit.²⁷² They argued that this provision discouraged job creation and economic growth by forcing companies to choose between going public before they are ready to do so and being able to hire a talented workforce that can only be recruited with the promise of equity compensation.²⁷³ The result of this campaign was Title V of the JOBS Act.²⁷⁴

The JOBS Act responded to Silicon Valley's lobbying efforts by raising the threshold at which companies become subject to public company reporting obligations from 500 shareholders to either 2000 shareholders or 500 shareholders who are not accredited investors.²⁷⁵ In addition, and more importantly, the JOBS Act further allowed companies, when counting their shareholders, to exclude securities held by employees and service providers

271. See Katie Benner, *Airbnb and Others Set Terms for Employees to Cash Out*, N.Y. TIMES (Aug. 10, 2016), <https://perma.cc/RZ28-A4RX> (reporting that several tech startups—including Pinterest, SpaceX, and Airbnb—adopted new policies allowing employees “some controlled opportunities” to sell their shares but only in return for agreeing to “more explicit restrictions” on what they can otherwise do with their equity); Griffith, *supra* note 262 (explaining that companies are increasingly heeding their venture backers' advice not to allow employees to sell shares prior to an IPO); *The New 10-Year Vesting Schedule*, *supra* note 246 (“[C]ompanies [are] clamping down on private sales of employee stock after Facebook's IPO.”); Steven Davidoff Solomon, *Palantir Buyback Plan Shows Need for New Silicon Valley Pay System*, N.Y. TIMES: DEALBOOK (June 28, 2016), <https://perma.cc/QPU2-NPCY> (“[M]any venture-backed companies place restrictions on the ability of employees to sell the stock they receive in an option exercise until there is a liquidity event like an initial offering or sale.”).

272. See *Twitter and Gilt Fight SEC 500-Shareholder Rule*, FIN. POST (Dec. 14, 2011, 1:09 PM EST), <https://perma.cc/4SNQ-AYMH>.

273. See *id.*

274. See de Fontenay, *supra* note 234, at 460 (attributing the JOBS Act's change of the 500-shareholder rule to Facebook's “vocal displeasure”); Rodrigues, *supra* note 252, at 1540 (similarly attributing the reform to pressure from Silicon Valley); see also Jumpstart Our Business Startups Act, Pub. L. No. 112-106, tit. V, 126 Stat. 306, 325-26 (2012) (codified as amended at 15 U.S.C. § 781 & app. at 266 (2016)).

275. See Jumpstart Our Business Startups Act, §§ 501-502, 601(a), 126 Stat. at 325-27 (codified as amended at 15 U.S.C. § 781); see also Rodrigues, *supra* note 252, at 1530 (discussing the change in the threshold). The definition of “accredited investor” is set forth in Regulation D. See 17 C.F.R. § 230.501 (2017). Under this definition, accredited investors include natural persons “whose individual net worth, or joint net worth with that person's spouse, exceeds \$1,000,000,” excluding the value of the person's primary residence. *Id.* § 230.501(a)(5). The definition also includes those “who had an individual income in excess of \$200,000 in each of the two most recent years or joint income with that person's spouse in excess of \$300,000 in each of those years and ha[ve] a reasonable expectation of reaching the same income level in the current year.” *Id.* § 230.501(a)(6).

who received them under an equity compensation plan.²⁷⁶ It thereby removed section 12(g)'s limitation on startups' ability to recruit employees and pay them with equity while staying private.²⁷⁷ Thus, the current environment is characterized not only by economic conditions that allow companies to stay private should they wish to do so but also by an eased regulatory scheme that no longer forces companies to go public against their will.

C. Talent Mobility in an Age of Limited Liquidity

This combination of an economic environment in which successful startups can raise an almost unlimited amount of capital from private investors and a regulatory environment that makes it easier for startups to stay private has facilitated an upsurge of large, private technology companies with valuations in excess of \$1 billion.²⁷⁸ These companies, called "unicorns" after the elusive mythological creature, are not so rare any longer. In 2013, when venture capitalist Aileen Lee coined the term "unicorn," she found that only thirty-nine venture capital-backed software startups in the United States had topped the \$1 billion valuation mark in the decade between 2003 and 2013.²⁷⁹ Since the term was coined, however, the unicorn club has become increasingly crowded. By July 2017 there were over 100 such companies in the United

276. For a description of the current regulations, see 17 C.F.R. § 230.701(c). Under Rule 701, issued by the SEC in 1988 and expanded since then, see *Cable, supra* note 195, at 624, service providers are "consultants and advisors" who are "natural persons" that "provide *bona fide* services" to the company. See 17 C.F.R. § 230.701(c)(1).

277. See de Fontenay, *supra* note 234, at 460 ("[O]ver 100 unicorns are still resolutely avoiding going public, and Congress has made it even easier for them to hold their ground."); Adam, *supra* note 251, at 117 (arguing that increasing the shareholder threshold "will have unintended consequences, including decreasing the number of companies going public"); Erdogan et al., *supra* note 195 (explaining that the JOBS Act "enabl[ed] many companies to remain private" by raising the threshold to 2000 shareholders and by excluding "employees in stock-compensation plans and 'crowd-funding' investors . . . from the shareholder tally").

278. See de Fontenay, *supra* note 234, at 460-61; Erdogan et al., *supra* note 195 (reporting that there were twice as many unicorns in 2013 as in 2012, when the JOBS Act was enacted); Alexis C. Madrigal & Kevin Roose, *How Can Uber Raise So Much Money Without Going Public?*, SPLINTER (Feb. 19, 2015, 2:04 PM), <https://perma.cc/P7B5-YRWV> (offering three explanations for why we see "ever-larger sums flowing to start-ups in the private market"); Matt Weinberger, *Stripe Is Now Worth \$9 Billion—Its CFO Explains Why There Are "No Plans" for an IPO Anytime Soon*, BUS. INSIDER (Dec. 22, 2016, 6:13 PM), <https://perma.cc/GWG9-CJH2> ("The reason Stripe isn't rushing into the public markets, Gaybrick says, is simply that it doesn't need to.").

279. See Aileen Lee, *Welcome to the Unicorn Club: Learning from Billion-Dollar Startups*, TECHCRUNCH (Nov. 2, 2013), <https://perma.cc/XHU3-PGAJ>; see also Erin Griffith & Dan Primack, *The Age of Unicorns*, FORTUNE (Jan. 22, 2015), <https://perma.cc/5CFJ-QBUA>.

States.²⁸⁰ Collectively, they were valued at approximately \$360 billion and have raised more than \$73 billion in capital.²⁸¹ Topping the chart in 2017 were Uber, valued at around \$68 billion with over 12,000 nondriver employees, and Airbnb, valued at around \$30 billion with roughly 3000 employees.²⁸² For comparison's sake, when Google went public, it had approximately 2300 employees and a market capitalization of \$27.5 billion,²⁸³ and when Facebook went public, it reported having about 3500 employees and a market cap of \$101 billion.²⁸⁴ The average age of current U.S. unicorns is close to nine years.²⁸⁵ Thus, the lock-in effect of stock options continues to restrict the mobility of early employees of these successful companies well beyond the four-year vesting period while these companies linger on their way to an IPO.²⁸⁶

To ease employee dissatisfaction, some unicorns have begun to allow their employees to sell some of their stock to outside investors using online secondary marketplaces and other platforms.²⁸⁷ Likewise, a growing number of unicorns started offering their employees limited liquidity by facilitating tender offers and performing share buybacks.²⁸⁸ According to NASDAQ

280. See *The United States of Unicorns: Every US Company Worth \$1B+ in One Map*, CB INSIGHTS (July 25, 2017), <https://perma.cc/CX8N-35BB> (reporting 105 U.S. unicorns, including six worth over \$10 billion).

281. See *id.*

282. See Connie Loizos, *Airbnb's Managing Director of International Business Development Has Also Left*, TECHCRUNCH (Oct. 24, 2017), <https://perma.cc/6DLU-GFNH> (reporting that Airbnb had 3100 employees as of May 2017); Riley McDermid, *Uber Will Let Former Employees Have More Time to Exercise Private Stock Options*, S.F. BUS. TIMES (updated May 16, 2017, 10:53 AM PDT) <https://perma.cc/3TAM-E6JP> (reporting that Uber had more than 12,000 employees); *The United States of Unicorns*, *supra* note 280 (reporting the valuations of Airbnb and Uber). Uber's reported valuation has since declined to \$48 billion. See Mike Isaac, *Uber Sells Stake to SoftBank, Valuing Ride-Hailing Giant at \$48 Billion*, N.Y. TIMES (Dec. 28, 2017), <https://perma.cc/GQ9Y-3GDR>.

283. Cable, *supra* note 195, at 620.

284. *Id.* at 621.

285. Kyle Stanford, *Unicorn Count in the US Growing Slowly, Exits Still Hard to Find*, PITCHBOOK (Sept. 20, 2017), <https://perma.cc/UN4X-LSEL>.

286. See Kupor, *supra* note 172 (arguing that this asymmetry “defeats the very power of startups for sharing and leveling gains among those who contributed to building the company”); Loizos, *supra* note 170 (noting that this trend makes “companies with skyrocketing valuations . . . particularly dangerous for employees” who don’t have the “tens or hundreds of thousands” of dollars necessary to exercise their options within ninety days of termination of employment); Loizos, *supra* note 173 (discussing this phenomenon with respect to Uber in particular).

287. See Benner, *supra* note 271; Solomon, *supra* note 271.

288. See NASDAQ Private Market, 2016 Private Company Liquidity Report: Year in Review (2017), <https://perma.cc/GAM3-ZLLU> (“As companies stay private longer, they are using private tender offers (otherwise known as ‘liquidity programs’) to offer their employees and shareholders partial, controlled liquidity . . .”). For an explanation of
footnote continued on next page

Private Market, which assists such company-sponsored liquidity programs, its platform facilitated over \$1 billion in secondary transactions in 2016, with current employees accounting for more than 70% of participants.²⁸⁹ These solutions are designed to allow companies to have their cake and eat it too—reducing the pressure from employees to provide liquidity without diminishing the retention incentive generated by equity compensation. To accomplish both objectives, the employers set conditions before allowing employees to sell shares to third parties: Purchase offers are typically limited to a portion of the employee’s vested stock (usually no more than 20%), conditioned on the employee’s agreement to prohibitions on trading the remaining shares, and sometimes require employees to enter into noncompete agreements with the company.²⁹⁰

Thus, the unicorn era has brought a new challenge to Silicon Valley’s development, as a drizzle of small, intermittent liquidity events is unlikely to allow the same level of employee mobility as IPOs. Without the release valve previously triggered by section 12(g)’s shareholder limit, high-value employees might remain effectively handcuffed to successful firms just as if they were subject to powerful noncompetes. In such cases, the loss is not only that of the handcuffed employee but also that of the economy as a whole. Absent a regulatory change or a sudden awakening of the public markets, Silicon Valley might see fewer spinouts, less knowledge spillover, and a depletion of the skilled-employee pool.

Though it is perhaps too early to assess the long-term effects of the current employee liquidity crunch, and though a causal relationship cannot be inferred from the limited data available, there are reasons for concern. Babina et al. estimate that the decline in high-tech IPOs in the early 2000s can explain approximately 8.2% of the “missing employment” in high-tech startups between 2000 and 2014—that is, jobs that would have been created had the pace of IPOs, and their attendant entrepreneurial stimulation, not slowed.²⁹¹ Other

tender offers, see *Tender Offer*, INVESTOPEDIA, <https://perma.cc/XC5Y-HAL9> (archived Mar. 2, 2018) (“A tender offer is an offer to purchase some or all of shareholders’ shares in a corporation . . .”).

289. See NASDAQ Private Market, *supra* note 288; see also *About Us*, NASDAQ PRIV. MKT., <https://perma.cc/PM5U-JGZK> (archived Mar. 23, 2018).

290. See, e.g., Benner, *supra* note 271; Ari Levy, *With an IPO on the Shelf, SoFi Lets Employees Sell 20 Percent of Vested Stock*, CNBC (updated May 8, 2017 2:58 PM ET), <https://perma.cc/J87D-W8FZ> (describing SoFi’s program allowing current and former employees to sell 20% of their vested shares on the secondary market); Solomon, *supra* note 271 (describing Palantir’s buyback plan allowing employees to sell up to 12.5% of their shares, with a \$500,000 cap, conditioned on employees’ agreement not to compete with Palantir or solicit its employees for twelve months).

291. See Babina et al., *supra* note 220, at 2, 28-29; see also *id.* at 29 (“[O]ur calculations indicate that IPOs can have a meaningful impact on startup employment.”).

recent reports point out that Silicon Valley experienced a decline in the number of new entrepreneurs over the period from 2013 to 2015²⁹² and that between 2012 and 2014 Silicon Valley had a net loss of nearly 25,000 firms due to more firms closing than opening.²⁹³ Whereas investments continue to flow into late-stage rounds of funding for unicorns, seed-stage financing is not experiencing the same growth.²⁹⁴ A possible explanation for this dynamic is that while early employees of unicorns stay with their startups, waiting for liquidity, the ecosystem misses not only a new generation of spinouts but also a new generation of angel investors.²⁹⁵ Given these trends—which operate in favor of strong and established companies and against new startups—some commentators have already pronounced that we are seeing “the end of the startup era.”²⁹⁶

Conclusion

Shockley’s maltreatment of his employees led to the “Declaration of Independence of the Digital World.”²⁹⁷ It also gave birth to a generation of ex-employees who went on to become entrepreneurs and investors who believed in creating a coalition of interests with their employees. This generation extended stock options—a perk previously reserved for managers—to all

292. See JOHN MELVILLE ET AL., COLLABORATIVE ECON., SILICON VALLEY COMPETITIVENESS AND INNOVATION PROJECT—2017 REPORT 14 (2017), <https://perma.cc/U6HY-AGSR> (charting the growth rate of new entrepreneurship from 2006 to 2015 in Silicon Valley and other high-tech labor markets).

293. See JOINT VENTURE SILICON VALLEY & INST. FOR REG’L STUDIES, 2017 SILICON VALLEY INDEX 37 (2017), <https://perma.cc/R28B-S3DB> (charting the number of companies opening, moving in, closing, and moving out, along with the net “establishment churn,” in Silicon Valley between 1995 and 2014).

294. See PITCHBOOK & NAT’L VENTURE CAPITAL ASS’N, *supra* note 239, at 5 (reporting a large increase in Series D+ financing since 2009 despite flatter trends in earlier-stage financing); *id.* at 9 (reporting that angel and seed-stage activity dropped by around 20% in 2016 but that the decline slowed in 2017 and “the market stabilized to some extent”).

295. See Dan Primack, *Seed Deals Are Being Driven Down by Unicorns Staying Private Longer*, AXIOS (Dec. 18, 2017), <https://perma.cc/78NZ-FW8W> (noting that “big angel money” is much more likely to come from “newly-minted Silicon Valley millionaires” than from “St. Louis orthopedists” and that the trend of startups staying private for longer prevents any refreshing of the group of potential investors).

296. See Jon Evans, *After the End of the Startup Era*, TECHCRUNCH (Oct. 22, 2017), <https://perma.cc/YP74-R7SQ> (“Here [in Silicon Valley] it feels like the golden age of the startup is already over. . . . [T]oday’s graduates are much more likely to work for Mark Zuckerberg than follow in his footsteps.”); see also Ross Baird, *Dear Silicon Valley: America’s Fallen Out of Love with You*, TECHCRUNCH (Oct. 8, 2017), <https://perma.cc/V3EB-H2U5>; *Tech Firms Shell Out to Hire and Hoard Talent*, ECONOMIST (Nov. 5, 2016), <https://perma.cc/59LK-QS7U>.

297. See *supra* text accompanying notes 26-28.

knowledge workers so they could build successful companies with groups of people working toward a common goal. That goal involved taking the company public, or at least providing liquidity to all involved. Combined with California's strong public policy against enforcing noncompetes, this model provided Silicon Valley with a distinctive balance between two opposing forces—employees' incentive to take advantage of their accumulated human capital by moving to competitors or starting their own businesses and employers' desire to retain employees as long as they remain valuable to the company. Indirectly, this combination also provided Silicon Valley with a solution to the collective action problem arising from each employer's incentive to prevent employees' departure while benefiting from knowledge spillover from other firms.

For many years the economic and legal conditions surrounding private placements of stock limited companies' ability to grow outside the public markets. These conditions have changed due to the flow of capital into the private markets and the deregulation of this domain. Specifically, the JOBS Act removed a limitation on private companies' ability to recruit thousands of employees and offer them equity compensation while staying private. Thus, the new regulatory scheme gives large, successful companies that prefer to remain private the ability to do so.

This Note points out that companies' new tendency to delay holding liquidity events is concerning not only because it dwindles public markets but also because it has the potential to reduce employee mobility and knowledge spillover. Without liquidity, stock options' lock-in effect might significantly impede the departure of experienced employees from the most successful startups and cause inefficient retention in large, private companies. Thus, the creation of new, successful spinouts could be hindered.

Consequently, this Note contributes to two ongoing discussions. First, it argues that the discussion about economic growth and noncompete enforcement should begin to address the role of broad-based employee stock options and their effect on employee turnover in private companies. This Note highlights the need for further research into startup employees' mobility patterns and those patterns' connection to compensation, startups' valuations, and noncompete enforcement.

Second, this Note contributes to the discussion about the JOBS Act by shedding light on the broader implications of employee illiquidity for efficient allocation of talent. It further points out that the problem of locked-in employees is not just unfortunate for the individual employees involved but also a potential threat to the efficiency of the regional economy. This Note emphasizes the need to further study the relationship between illiquidity, employee departures, and declining innovation.

This Note suggests that ensuring reasonable liquidity horizons for tech employees is in the public interest. A subtle balance exists between facilitating

retention of talent during a period in which it is critical to the firm's initial success and survival on the one hand and unduly restraining employee mobility in a way that hampers the economy on the other. In the past, equity compensation encouraged skilled employees to depart mature startups and develop the next generation of companies. Today, however, with the reduction in liquidity events, equity compensation may lose its efficiency and become counterproductive.

As others have noted before me, startup employees' equity compensation has never been studied in a systematic fashion.²⁹⁸ Little is known about the tradeoff between cash and equity in compensating startup employees, the weight startup employees assign to equity compensation in their employment decisions, and the information guiding employees in making those decisions. If the theory laid out in this Note regarding the role of equity compensation in the allocation of entrepreneurial talent manages to capture reality, then it is time to revisit the way the securities regulatory regime views equity-compensated employees.

298. See, e.g., Booth, *supra* note 7, at 280-82; Cable, *supra* note 195, at 641.