Employee Intellectual Property Rights and Innovation-Driven Entrepreneurship Job Market Paper

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Abstract

Who owns an idea before it becomes an invention and how do strengthened employer ownership rights shape entrepreneurship? We exploit a 2008 Federal Circuit decision that widened the gap in employer ownership rights over employee inventions across states with and without employee-invention protections. Linking employment histories, patents, and venture-financing data, we examine entrepreneurial transitions among inventors and patent-adjacent workers employed by established firms. Stronger employer rights significantly reduce entrepreneurial entry among inventors relative to comparable patent-adjacent workers. We then use patent text and Cooperative Patent Classification (CPC) codes to examine the technological direction of inventors who found ventures. We found that founders in states without employee-invention protections pursued technologies further from their prior inventions relative to founders in states with employee-invention protections, even when employee protections were considered. Our findings suggest that ownership rules for employee inventions shape both entrepreneurial entry and the direction of subsequent innovation.

Keywords: intellectual property, inventor mobility, entrepreneurship, innovation

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1 Introduction

Does your employer own your brain? An employer owns more of a knowledge worker than most realize. An employer owns the report she wrote at 2 pm and, in some states, the idea she had while driving to the gym at 6 am. Yes, employees can quit, but employers increasingly use contractual language that lets them own an employee's idea before it becomes an invention, even when the employee conceives it outside their assigned responsibilities. This creates tension between employees who want to protect and monetize their ideas and employers who seek to commercialize and profit from them. The knowledge worker has the brain that recognizes the opportunity and creates the idea, but the employer may supply the complementary assets needed to develop it, or access to the customers who want it.

At the same time, the idea itself may not fit the firm's current products or strategy, and its value can be difficult to establish before it's revealed to the employer (Silverman, 1999; Kwon et al., 2022; Chattopadhyay et al., 2026). When employers claim stronger rights to ideas developed outside assigned duties, some employees leave before those ideas become attached to the firm, shifting innovation from internal development to entrepreneurial ventures (Hellmann, 2007; Gambardella et al., 2015; Kang and Lee, 2022). Therefore, brain and idea ownership may have important implications for where innovation occurs. In this study, we use quasi-natural variation in idea ownership to examine whether employees develop such ideas within incumbent firms, take them into a new venture, or avoid invention altogether.

Our framework for studying this question comes from the simple recognition that control over an idea is a question of authority. Someone has to decide how the idea gets used before its value can be proven, and this is a classic theory-of-the-firm problem (Coase, 1937). On one hand, keeping control inside the firm encourages the type of investment that no contract could fully specify (Teece, 1986; Aghion and Tirole, 1994). Employers who own an employee's idea have a reason to fund its development and combine it with what they already know.[1]

[1]Employers may also actively discourage employees from working on ideas outside their assigned tasks, even when those ideas could become profitable new ventures (Hellmann, 2007).

On the other hand, giving employees ownership of ideas strengthens their incentive to search for ideas whose effort and value are hard to reward through a contract alone (Baumann and Stieglitz, 2014; Contigiani et al., 2018). In Anton and Yao (1995), an employee who discovers something valuable can choose to share it with the employer and negotiate, or keep it quiet and start a new venture instead. These contrasting theories suggest it is hard to know which type of organization is best suited to develop the idea. If the firm where an idea starts is not always the firm best suited to grow it, then moving the idea outside the firm becomes the real problem, not just deciding who owns it.

This implication connects employee innovation-driven entrepreneurship to the market for ideas (Botelho et al., 2026). Ideas are heterogeneous, and the firms in which an idea originates need not be the firms best suited to use it. Akcigit et al. (2016) show that patents that fit poorly with their originating firms are more likely to be sold and become better aligned with their owners after sale. Yet a patent transaction is only one mechanism through which an idea can be reallocated. In technology markets, firms can sell or license an innovation to a firm with better complementary assets (Gans and Stern, 2003). But through entrepreneurial exit, ideas move together with the employee's knowledge and, potentially, coworkers and other complementary human capital. In this sense, entrepreneurship may function in an analogous manner as a market for ideas, though one in which the inventor, the idea, and the capabilities required to implement it are transferred jointly.

Despite the importance of this linkage between idea ownership and a new venture market for ideas, empirical evidence on how ownership rights relate to the allocation of ideas across organizational types remains limited. Most empirical studies begin after an invention has been disclosed or patented, and examine patent assignment, inventor mobility, R&D, or the subsequent diffusion of patented knowledge (Melero et al., 2020; Ganco et al., 2014; Singh, 2005). This focus necessarily misses ideas at the nascent early stages of innovation, before they are disclosed as part of the IP process or developed through commercialization. But studying this margin is difficult for three reasons. First, nascent ideas are ordinarily

unobserved. Second, firms endogenously select ownership policies and employees. Third, employees with strong entrepreneurial preferences may sort into firms that grant greater freedom over outside inventions.

To mitigate these challenges, we exploit a legal ruling that strengthened employer rights over inventions created by inventor-employees as a quasi-natural experiment. The ruling interpreted language in pre-invention assignment agreements, specifically "does hereby grant and assign" clauses, as automatically assigning employers rights to future inventions that fall within the scope of the employment agreement. This ruling was a federal court ruling, which widened the gap in employer rights over intellectual property between states with and without these protections.

We combine multiple sources of individual and firm-level data. Revelio Labs provides employment histories that allow us to follow workers from incumbent firms into alternative labor-market destinations. We distinguish employees who remain with the firm, move to another established employer, join an existing startup, or become founders. We then link founders and new firms to PitchBook to measure venture financing, investor participation, survival, employment growth, acquisitions, and other indicators of high-growth entrepreneurship.

For our first set of analyses, we focus on inventor-employees. We find that stronger employer IP rights reduce entrepreneurial transitions among inventor-employees in non-FTC states relative to those in FTC-protected states. The likelihood of becoming a founder declines by 0.37 percentage points. This is roughly 7.6% relative to the sample mean. Being a VC-backed founder also declines by 0.28 percentage points, or roughly 13.9% relative to the sample mean. Transitions to new firms, by contrast, are statistically indistinguishable from zero, while interstate mobility increases. This suggests the ruling is linked specifically to entrepreneurial entry rather than a general decline in worker mobility. To examine heterogeneity in this finding, we focus on workers with the job title of scientist or engineer. Inventor-employees hold a variety of job titles, but these two groups are more likely to feel

the bite of the law if they are pursuing an entrepreneurial idea outside their assigned duties. Consistent with this, we find that our results are stronger among workers titled scientist or engineer.

In our second set of analyses, we examine whether our results extend beyond inventors to the broader workforce. This extension is not obvious ex ante. If idea-ownership rules operate through firm-wide incentives rather than through inventors alone, their effects should ripple across the organization, shaping the entrepreneurial decisions of workers who never file a patent. Under the null hypothesis, however, these effects are concentrated among inventors specifically. Given that inventive activity clusters among knowledge-intensive workers, employees outside this group may lack the technical opportunities or entrepreneurial inclination necessary to act on ownership rules in the first place. Distinguishing between these two possibilities speaks to whether idea ownership is a general feature of the employment relationship or a mechanism specific to a narrow population of knowledge-intensive workers.

To make this second set of tests tractable, we take a random 10% sample of workers. These workers were employed at firms that had received at least one patent before 2008. None of these workers had been granted a patent themselves. We identify workers in patent-adjacent jobs using the job titles most common among people at the moment they first patented. This approach was deliberately inclusive. It captured many people in sales and customer-facing roles who later went on to patent and start new ventures. Our evidence is consistent with a weak trickle effect throughout the firm. The magnitude is smaller than among inventors, but it remains statistically significant across multiple specifications. We then test the coefficients directly. Legal rulings show a stronger relationship among established inventors, but both groups show a relationship that is different from zero. Finally, entrepreneurial entry declines for both groups, though the outcomes of the ventures that do form are mixed.

Finally, we use natural language processing (NLP) techniques to measure technological distance between founders, their startups, and their incumbent firms. We take this mea-

surement in three ways: (i) we compare founders' prior patenting with their post-founding patenting, (ii) we compare founders' post-founding patenting with the technological activity of their former employers, and (iii) we compare founders' prior patenting with the patent portfolios of the startups they later found. We use the technical language in patent claims and descriptions to construct measures of technological similarity. We then validate these measures using CPC classifications. This allows us to examine whether stronger employer IP rights are associated not only with whether inventive employees become entrepreneurs, but also with the technological direction of the founders and startups that emerge.

We find that founders remain close to their prior technological knowledge, while their post-founding inventions are more distant from the general technological activity of their former employers. In the overall sample, the non-FTC–FTC technological-distance gap narrows after the ruling. However, after accounting for differences in industry composition, the technological distance gap widens across all three measures. These descriptive findings suggest that employer ownership rights may be associated not only with entrepreneurial entry but also with the technological opportunities founders subsequently pursue.

Our findings contribute to research on the ownership, organization, and movement of innovative knowledge. We show that the allocation of IP rights in employment relationships has consequences beyond the division of innovation rents. This allocation shapes whether inventive activity remains within incumbent firms or is pursued through entrepreneurship (Agarwal et al., 2009; Ganco et al., 2014; Melero et al., 2020; Jeffers, 2023). In this way, we connect research on IP ownership and innovation with work on employee mobility, and spinout formation by identifying entrepreneurial entry as a distinct organizational response to stronger employer claims over employee inventions (Campbell et al., 2012; Kaul et al., 2024). We connect invention assignment rights to both entrepreneurial participation and the technological direction of the founders' patenting.

More broadly, our results show that ownership rights influence not only whether inventive workers move, but where they move and what kinds of ventures emerge from those

transitions. By linking employment histories to startup formation and subsequent venture outcomes, we provide evidence on how changes in employer control over inventive output affect the allocation of innovative human capital across organizational boundaries (Gorton et al., 2022; Argyres et al., 2020). This shifts attention from whether firms can appropriate returns from employee innovation to how those rights shape the organizational setting in which ideas are ultimately developed and commercialized.

2 Literature

Our study connects four related literatures on the ownership, organization, and movement of innovative knowledge. First, we examine how IP rights shape incentives to innovate. Because the employee's effort and the value of their ideas are difficult to contract upon before discovery, ownership determines the parties' bargaining positions and incentives to invest. Aghion and Tirole (1994) show that employee ownership can strengthen research incentives, while employer ownership can support financing and complementary investment. Subsequent strategy research emphasizes the corresponding benefits of organizing interdependent assets within firms. Firms can coordinate specialized resources, protect appropriation, and recombine knowledge through internal structures and inventor networks (Teece, 1986; Gans and Stern, 2003; Kaul, 2013; Argyres et al., 2020). Legal rules can also change organizational boundaries and the internal allocation of authority (Belenzon et al., 2023).

Second, employee mobility and entrepreneurship are channels through which knowledge crosses firm boundaries. Spinouts inherit technological knowledge and capabilities from their parent organizations, and the quality of the parent's capabilities can affect the offspring's subsequent survival (Agarwal et al., 2004; Gompers et al., 2005; Habib et al., 2013). Employee departures are especially consequential when high-performing workers become entrepreneurs rather than moving to established competitors, because the new ventures can appropriate knowledge and opportunities that otherwise might have remained with the incumbent (Campbell et al., 2012). Patent enforcement and other restrictions reduce mobility

for many inventors, although the most productive employees may continue to leave despite these restrictions (Ganco et al., 2014; Melero et al., 2020; Jeffers, 2023). This research establishes that organizational knowledge moves with employees, but generally does not observe whether changes in the ownership of still-nascent ideas alter the employee's choice between remaining, moving, and founding (Silverman, 2019).

Theories of employee entrepreneurship identify two reasons ideas leave incumbent firms. The first is bargaining failure: in Anton and Yao (1995), revealing private information about an idea weakens the employee's bargaining position, which can lead her to retain the idea and found an independent firm. The second is strategic mismatch: in Hellmann (2007), employees discover opportunities outside their assigned tasks that the firm declines to pursue because such experimentation interferes with its core activities. Gambardella et al. (2013) similarly show that firms cede more autonomy on projects far from their core, where their own contribution to value is smallest. Gambardella et al. (2015) provide supporting evidence: employee entrepreneurship rises with the inventor's assessed patent value but falls sharply when the firm commercializes or licenses the invention, suggesting ideas leave not because firms misjudge their value but because they choose not to exploit them. Erez et al. (2025) further distinguish deliberate withholding from passive nondisclosure, documenting that employees retain ideas over inadequate compensation, lack of recognition, or the feasibility of independent development.

A third literature treats innovation as an allocation problem, recognizing that the firm where an idea originates need not be best positioned to use it. Akcigit et al. (2016) show that patents fitting poorly with an originating firm's technological position are more likely to be sold and become better aligned with their owners after transfer. Firm boundaries and access to capital shape whether innovation is developed internally or sourced externally, as well as the productivity and mobility of inventors (Bena and Li, 2014; Seru, 2014; Bernstien, 2015). Reallocation also occurs through entrepreneurship: financially constrained incumbents spawn comparatively successful employee-founded firms, and corporate R&D

generates startups outside the parent's industry (Babina, 2019; Babina and Howell, 2024). Within VC portfolios, innovation moves through human and physical capital and strategic alliances (Lindsey, 2008; González-Uribe, 2020; Eldar and Grennan, 2023). In each case, ideas travel with the human capital and complementary resources needed to develop them, rather than as stand-alone patent sales. Effective reallocation thus depends on institutions that match nascent ideas to capital and expertise: R&D grants can help (Howell, 2017), but information frictions still impede investors' ability to identify promising ventures (Ewens, 2023; Marx et al., 2026), and VCs shape innovation post-investment through monitoring and cross-portfolio resource exchange (Hellmann and Puri, 2002; Bernstein et al., 2016; Ewens and Marx, 2017; Ewens et al., 2018).

Finally, our work relates to a growing literature in labor economics that looks at specific labor contract terms and their influence on economic outcomes (Marx et al., 2015; Jeffers, 2023; Cowgill et al., 2026). While the literature has focused primarily on noncompete agreements, these terms often come in a bundle, and regulating or excluding one only leads to substitution to others. We see our research as contributing to this body of evidence with details on innovation-driven entrepreneurship and allocation of ideas across organizational form. By exploring whether these terms prevent an employee from leaving to develop a still-nascent idea through a new venture, we contribute to a broader understanding of business dynamism and new firm formation (Decker et al., 2014).

Our contribution is to connect these literatures by studying entrepreneurship as an organizational response to IP ownership rights in labor contracts. We ask whether strengthening employer claims relates to employees' decisions to remain and disclose their ideas internally, as the coordination and employer-hold-up arguments predict, or instead leave before their ideas become legally attached to the incumbent. By linking employment histories to startup formation and subsequent venture outcomes, we examine not only whether inventive workers move, but where they move, when they found, what resources move with them, and whether the resulting ventures appear better matched to commercialize their ideas. The analysis

therefore moves from the division of innovation rents to the allocation of innovative activity across incumbent firms and entrepreneurial ventures.

3 Institutional Background

3.1 Patent Assignee Defaults and Contract Law

Originally under U.S. patent law, the inventor was the presumptive original owner and assignee of a patentable invention. Then, two common-law doctrines began to change this default in the late 19th and early 20th century as the gilded age and electrification boom took shape. First, the "hired-to-invent" doctrine gave the employer equitable title when the employee was specifically engaged to produce the invention at issue. The "shop right" doctrine gives the employer a non-exclusive, royalty-free license when the employee used the employer's time, materials, or facilities. Both doctrines were narrow enough that labor contracts could bypass them.

Modern labor contracts in the United States are often associated with having fine print and including a mix of specific terms in the contract such as noncompete clauses, nondisclosure agreements, arbitration agreements, etc. also often include IP assignment agreements. In particular, pre-invention assignment agreements, signed as a condition of hire, routinely obligate the employee to transfer every invention conceived during the employment relationship, and often for some period afterward. Fisk (1998) traces the 19th century transition from a regime in which the employee-inventor retained ownership to one in which the corporate employer did, and shows that the shift was accomplished largely through state law and contract law rather than legislation or federal law. Recent survey evidence from Payscale.com suggests that 62% of organizations subject all their employees to these agreements and another 19% of organizations subjecting certain employees like engineers (Balasubramanian et al., 2024). In addition, legal scholars have documented that these clauses are near-universal in technology employment, are rarely negotiated, and are typically uncompensated beyond the wage (Cherensky, 1993; Merges, 1999; Lobel, 2015). The economically relevant consequence

is that the statutory default has little independent force. The allocation of invention rights between employee and employer is determined by the enforceability of the assignment clause.

3.2 State Freedom-to-Create Statutes

Beginning in the late 1970s, a minority of states legislated limits on how far these assignment clauses may reach. The archetype is Washington's 1979 enactment, which was closely copied elsewhere. The statutes render an assignment provision unenforceable as applied to an invention that satisfies three conjunctive conditions: the employee developed it (i) entirely on their own time, (ii) without the employer's equipment, supplies, facilities, or trade secret information, and (iii) the invention neither relates to the employer's business or demonstrably anticipated research and development nor results from work performed for the employer. For example, California's provision is considered representative, since it states that a clause purporting to require assignment of an invention meeting these conditions is declared contrary to public policy and unenforceable.[2] Table 1 lists the Freedom-to-Create (FTC) statutes in force by state before 2008.

The purpose behind these legislated limits was to encourage economic growth. The legislators argued that these changes could attract more high-skilled workers and expand local employment opportunities by encouraging new venture formation. In the language of the property-rights theory of the firm, the statutes impose a mandatory boundary on the residual rights of control over employee-created IP that may be transferred to the employer by contract (Grossman and Hart, 1986; Hart and Moore, 1990). Because the legislation preserves inventor ownership precisely over inventions that are unrelated to the employer's line of business, they bear directly on the entrepreneurial-entry margin we study.

The FTC statutes are similar in text yet dissimilar in strictness, and this matters for coding treatment. First, the "relates to the employer's business or anticipated research and development" carve-out does most of the work, and courts have construed it with vary-

[2]Cal. Lab. Code §§2870–2872. Section 2871 additionally bars an employer from requiring a void provision as a condition of employment, and §2872 imposes a notice obligation.

ing breadth. Where the carve-out is read expansively, the protected set shrinks toward the empty set for any inventor working near their employer's technological frontier (Howell, 2012). Second, the notice requirements differ. California, Illinois, Kansas, Minnesota, and Washington require the employer to notify the employee of the statutory limitation; North Carolina requires that the statute itself be furnished. Non-compliance can affect enforceability. These provisions plausibly determine whether inventors are aware of the protection, which is a precondition for any behavioral response. Third, Utah's Employment Inventions Act is structurally different: it defines what constitutes an employment invention rather than voiding overbroad assignment clauses, and Nevada's statute runs affirmatively in the employer's favor.

These distinctions explain an otherwise puzzling feature of the literature. The count of FTC states is not stable across published papers. Alok and Subramanian (2023) use seven, corresponding to the core group. Armstrong et al. (2026) use nine, adding Utah and Nevada. Including Nevada in the protective group is difficult to defend, since its statute assigns inventions to the employer by default. We therefore adopt the seven-state core specification as the baseline, report the eight-state (core plus Utah) and nine-state variants as robustness, and treat the sensitivity of estimates to this coding as an object of interest rather than a nuisance.

3.3 The Federal Overlay: The Present-Assignment Doctrine

Running alongside state law is a body of Federal Circuit doctrine that determines when title passes under an assignment clause. The distinction is between language of obligation and language of present conveyance. A clause providing that the employee "agrees to assign" future inventions creates only a contractual promise; the inventor retains legal title until a separate instrument is executed, and the employer holds at most equitable rights. A clause providing that the employee "does hereby assign" operates as a present conveyance of an expectant interest: legal title vests in the employer automatically, by operation of law, at

the moment the invention comes into being, with no further act required. The Federal Circuit established this rule in a series of cases beginning in 1991 and detailed in Internet Appendix B.

3.4 The 2008 Ruling: DDB Technologies v. MLB Advanced Media

David Barstow was a computer scientist at Schlumberger, the oilfield services company, from 1980 to 1994. His work there involved software for controlling sensors and recording data from instruments lowered down oil wells. On his own time, he and his brother Daniel worked on something else: a method for capturing a live event—a baseball game—as a stream of coded data and reconstructing it on a viewer's screen as a computer simulation. The idea became four patents, and in time the technology underlying the animated play-by-play displays familiar from sports websites.[3]

The brothers formed a company, DDB Technologies, to hold the patents, and in 2004 DDB sued Major League Baseball's digital media arm for infringement. MLB Advanced Media's response had nothing to do with whether it had infringed. It approached Schlumberger—Barstow's employer a decade earlier—and purchased whatever rights Schlumberger might hold in Barstow's inventions, together with a retroactive license. The logic was that a co-owner of a patent cannot be sued for infringing it. If Schlumberger had ever owned any part of these patents, MLB Advanced Media now did too, and the case would collapse.

Whether Schlumberger had ever owned them turned on one sentence Barstow had signed at the start of his employment. Paragraph 4 of his agreement provided that he "agrees to and does hereby grant and assign" to the company his entire right, title, and interest in inventions that related "in any way" to Schlumberger's business or activities, or that were "suggested by" or resulted from his work for it.

What is striking is how little the surrounding facts mattered. Schlumberger's own in-

[3]U.S. Patent Nos. 5,526,479; 5,671,347; and 6,204,862 (the computer simulation patents), and No. 5,189,630 (the pattern-matching patent). Two applications were filed, and one patent issued, while Barstow was still employed at Schlumberger.

house counsel and its laboratory director testified that they had known about the baseball project, had discussed it, and had concluded at the time that it was not the company's business. No one at Schlumberger ever told Barstow that his side project belonged to the firm. Schlumberger asserted no claim to the patents for more than a decade, and surfaced only when a defendant in unrelated litigation came looking for a way to defeat standing. None of this availed DDB. Because "does hereby grant and assign" operates as a present conveyance rather than a promise, anything falling within the clause's scope became Schlumberger's property at the instant of conception—automatically, silently, and with no further instrument executed by anyone. And precisely because title had passed by operation of law rather than through a promise someone later had to perform, the Federal Circuit affirmed that DDB could not invoke the statute of limitations or equitable defenses that a decade of employer inaction would otherwise have supported. The employer's inattention was legally irrelevant, because there had been nothing for the employer to do.

The Federal Circuit's central holding was that the automatic-assignment question is governed by federal law—specifically Federal Circuit law—rather than by the contract law of the state whose law the agreement selects. State law continues to govern ordinary questions of contract construction and scope, but whether a given form of words operates as a self-executing conveyance of a future invention is now a federal question with a uniform national answer.[4]

Two features of this holding matter for empirical design. First, it clarifies forum authority between state and federal law, rather than creating a new substantive rule, which dates back to 1991 and the Present-Assignment doctrine. Second, and consequently for a plausible identification strategy, its consequence was to make the employer's contractual claim predictable rather than merely strong. Before *DDB*, an employee-inventor contesting ownership could argue that the forum state's canons of construction should narrow or defeat the

[4]The court nonetheless vacated the dismissal and remanded, holding that DDB should have received jurisdictional discovery on whether the patents in fact fell within the agreement's scope. The automatic-assignment holding was not disturbed.

clause. After *DDB*, that entire line of argument was foreclosed. The employer's title became a matter of legal certainty ascertainable ex ante from the face of the instrument. Indeed, the decision was immediately understood in these terms by IP professionals, who characterized it as a substantial victory for employers and advised inventors accordingly.

Finally, it is worth noting what the litigation was actually about once the assignment question was settled, because it is the same question the FTC statutes exist to answer. The contested issue was scope: whether a baseball simulation "related in any way" to an oilfield services company's business. Texas, where the case was heard, had no employee-invention statute, so that question was resolved through ordinary contract construction, with the district court reasoning from two earlier Schlumberger patents naming Barstow and from a 1992 letter. In a protective state, the same question is answered by statute rather than by construction of the employer's own drafting, the carve-out is non-waivable, and in several states the employer bears the burden of establishing that the invention falls outside it. The gap between those two regimes and this plausibly exogenous shock to it is what we exploit in this study.

The post-2008 case law confirms both the durability of the present-assignment rule and the survival of the state statutes. The rule was reinforced in *Stanford v. Roche*, where the Federal Circuit and then the Supreme Court held that a later "hereby assigns" instrument defeated an earlier "agree to assign" promise, notwithstanding the Bayh-Dole Act. At the same time, the FTC statutes were not displaced. In *Whitewater West Industries, Ltd. v. Alleshouse*, decided in 2020, the Federal Circuit itself held a California assignment provision void under California Business and Professions Code §16600, and analyzed the applicability of Labor Code §2870 on its own terms.[5] Twelve years after *DDB*, the Federal Circuit was applying state statutory limits on assignment clauses without any suggestion that federal law had preempted them.

This subsequent case clarifies the characterization of the shock as narrower than a pre-

[5] 981 F.3d 1045 (Fed. Cir. 2020).

emption story. *DDB* did not weaken the state statutes. It hardened the employer's position everywhere the statutes do not reach. The statutes remained the operative constraint on assignment in the states that had them, and became the only remaining constraint anywhere. Therefore, the shock of the ruling is that it widened the gap in inventor property rights between protective and non-protective states.

3.5 Legal Connection Between Contractual Rights and Entrepreneurship

The mechanism connecting this doctrinal change to entrepreneurial entry is specific. Consider an employed inventor who conceives an invention outside the scope of their employer's business, on their own time and resources, and who contemplates founding a firm to commercialize it. In a non-protective state after *DDB*, if the employment agreement contains present-assignment language, legal title to that invention vested in the employer at conception. The would-be founder has nothing to contribute to the new venture and cannot establish clean chain of title. Because early-stage investors conduct IP diligence precisely on chain of title, it is a determinate legal conclusion that forecloses financing. In this sense, it is much stronger than latent litigation risk that is often scrutinized. In a protective state, the FTC statute voids the provision as applied to that invention, and title remains with the inventor. *DDB* thus operates on entry through a financing-feasibility channel emphasized in the incomplete-contracting literature. This distinction generates testable implications, which we discuss next.

Employer rights over inventions may affect entrepreneurship by changing the private return for the inventor-employee. An inventor who is considering starting a new venture assumes that they may have the right to start the invention. Stronger employer claims reduce the inventor's expected share of returns and increase the cost of securing the rights to the idea; therefore, founding becomes less attractive. The lack of owning the rights to the idea may affect how the founder's contribution makes the financing options limited. The inventor employee who has the idea must depend on whether the inventor can capture

enough of its value outside of remaining with the incumbent firm. This uncertainty around ownership and financing could lower the aptitude to start a new venture even if it could be valuable.

3.6 IP Assignment Rights in Relation to Other Employment Contract Terms

Empirical research into specific terms buried in ordinary employment contracts and whether those terms warrant regulation has grown in recent years. Non-compete clauses have received the most attention (Jeffers, 2023; Shi, 2023; Johnson et al., 2025; Cowgill et al., 2026; Starr, 2026), but the agenda extends to nondisclosure agreements (Hrdy and Seaman, 2024), mandatory arbitration clauses (Colvin, 2011; Knott and Reshef, 2025), anti-harassment policy (Chen et al., 2026), and in this study, to pre-invention IP assignment agreements.

Several features unify these contract terms. Each is presented on a take-it-or-leave-it basis at or after hire, rarely negotiated, and sometimes not even read by the employee. Each transfers something of value from worker to firm without an explicit, separately identified price. Each is governed almost entirely by state law, producing cross-state variation. And each has become the object of active legislative attention. What appears to matter in this setting is the aggregate strength of the incumbent's claim on the departing worker, rather than the particular contractual device through which that claim is asserted, suggesting more research is needed on other terms.

The single closest antecedent to our study is Jeffers (2023), which exploits state supreme court rulings that changed noncompete enforceability and matches that to LinkedIn employment histories, finding that increased enforceability reduces departures among knowledge workers, raises physical investment at incumbent knowledge-intensive firms, and reduces new firm entry in knowledge sectors. Our setting uses the 2008 Federal Circuit ruling as a legal shock that strengthens the incumbent employer's claim on the departing worker's inventions rather than the worker, but the predicted chain of events similarly leads to suppressed inventor-founded entry. While we both use legal variation, our settings are nonetheless dis-

tinct in a way that matters for both interpretation and policy. A noncompete restricts where the worker may go. A pre-invention assignment agreement restricts what the worker may take. A departing inventor subject only to a noncompete may found a firm outside the covered industry or wait out the restricted period; a departing inventor whose invention has already vested in the employer by operation of law has nothing to found a firm around, in any industry, at any date.

This indicates the two are substitutes in the employer's toolkit, and the substitution is observable. California is the clearest case. Business and Professions Code §16600 has voided employee non-competes since 1872, which means that in the state with the largest concentration of inventive activity in the country, invention assignment is the residual instrument through which an employer can restrain a departing inventor. That Labor Code §2870 exists at all reflects a legislative judgment that the residual instrument required its own constraint. And in *Whitewater West Industries v. Alleshouse*, the Federal Circuit voided an assignment provision under §16600 itself (i.e., it treated an invention-assignment clause as a restraint on the practice of a trade) and struck it down under the noncompete statute.[6] The doctrinal boundary between the two instruments is, in practice, porous.

This connection is largely absent from the noncompete literature. Reviews of the alternatives available to firms when noncompetes are unavailable typically enumerate nondisclosure agreements, nonsolicitation clauses, trade secret law, training repayment agreements, garden leave, forfeiture-for-competition provisions, and fixed-term contracts (Starr, 2026). Pre-invention assignment does not generally appear on these lists, despite being close to universal in technology employment and despite being the instrument that directly governs the asset a would-be founder needs.

Yet invention assignment may be the cleaner setting to understand the economic consequences. A recurring difficulty in the noncompete literature is that legal enforceability and economic effect are only loosely coupled. Firms use noncompetes at similar rates whether

[6] 981 F.3d 1045 (Fed. Cir. 2020). The court held the provision had a restraining effect of substantial character; it separately concluded that §2870 did not reach post-employment inventions on these facts.

or not courts will enforce them (Starr et al., 2021); unenforceable noncompetes still deter mobility; workers frequently believe enforceable what is not, and firms reinforce that belief (Prescott and Starr, 2024); and many workers are unaware of the clause at all until the employer raises it after departure (Cowgill et al., 2026). Starr (2026) draws the methodological implication directly: studying state policy variation alone cannot recover how actual noncompetes affect workers. Therefore, estimates in an enforceability design are belief-mediated objects.

Pre-invention assignment under the present-assignment doctrine differs in a way that mitigates this problem. Where a clause reads "does hereby assign," legal title to a qualifying invention vests in the employer at the moment of conception, automatically and without further act. Whether the inventor read the clause, and what the inventor believes about it, does not alter who owns the invention. More importantly for the entrepreneurial margin, the operative reader is not the inventor at all: it is counsel for the prospective investor, conducting chain-of-title diligence, for whom the question is determinate rather than probabilistic. The inattention channels that complicate the interpretation of noncompete enforceability estimates are therefore attenuated here, because the mapping from legal change to economic outcome is correspondingly more mechanical.

The ruling applied nationwide, so our assumption is not that FTC states were completely unaffected. Our identification comes from the larger change in employer rights in non-FTC states, where employees lacked additional statutory protections. We argue that this widened the gap in employer IP rights between FTC and non-FTC states.

4 Theoretical Framework

Existing theory explains why an employee with private knowledge may reveal an invention to the employer or instead form a start-up, and why firms may discourage projects that compete with employees' assigned tasks (Anton and Yao, 1995; Hellmann, 2007). We add a timing margin that is especially relevant for pre-invention assignment: before an idea is

fully developed, the employee can continue experimenting while concealing it. This is deliberate invention withholding rather than passive nondisclosure (Erez et al., 2025). Continued experimentation is valuable because it resolves technical and commercial uncertainty, but it also increases the probability that the idea becomes legally attached to the employer. Thus, stronger employer ownership through IP rights assignment reduces the option value of waiting inside the firm. The resulting response is not uniformly more internalization or less entrepreneurship. It is a sorting response, in which some employees disclose earlier, others leave earlier, and marginal ideas are abandoned.

4.1 Setup

An employee privately observes a nascent idea of type, $\theta = (v, s, z),$, where $v > 0$ is expected commercial value, $s \in [0, 1]$ is the idea's fit with the employer's technological core and complementary assets, and z measures the feasibility of external development, including portable human capital, access to finance, and the availability of complementary assets outside the firm. The outside option for the inventor-empoyee is based on the ability to develop and benefit fromt the idea outside of their employer. Financing options and completemanrty assets affect the options for external development. If the employee decides to disclose the idea to the employer with strenthen cliams it can reduce the expected value of z or increase its costs. However, the employer does not observe θ unless the employee discloses the idea.

Let $\alpha \in [0, 1]$ denote the strength and enforceability of the employer's claim over ideas developed during employment. A higher α may reflect broader assignment language, a more certain chain of title, or a greater probability that the employer can establish that an invention falls within the assignment. Because the assignment term is bundled into the employment contract and is not separately priced at the time an idea arrives, we hold the wage and any routine disclosure reward fixed over the short decision window.

At the nascent stage, the employee chooses one of four actions:

D : disclose the idea and seek internal development,

H : continue hidden experimentation while remaining employed,

X : exit and pursue the idea through a new venture,

A : abandon the idea.

The employee's payoffs from immediate disclosure, exit, and abandonment are

$$U_D(\theta) = d(v, s), \qquad U_X(\theta) = x(v, s, z), \qquad U_A = 0.$$

Internal development is more attractive when the idea fits the employer's assets and strategy, so $d_s > 0$. External development is more attractive when outside implementation is feasible, so $x_z > 0$. We impose the single-crossing condition

$$\frac{\partial}{\partial s}\left[d(v, s) - x(v, s, z)\right] > 0, \tag{1}$$

which allows the incumbent to have a comparative advantage in high-fit ideas while entrepreneurs or outside investors have a comparative advantage in lower-fit ideas.

Hidden experimentation produces information and may raise the idea's value, but it exposes the employee to an expected loss of control. Its value is

$$U_H(\theta; \alpha) = -k_H + \beta \mathbb{E}\left[V_1(\theta') \mid \theta\right] - \alpha L(\theta) \equiv \overline{h}(\theta) - \alpha L(\theta), \tag{2}$$

where $k_H > 0$ is the private cost of another round of experimentation, θ' is the updated idea type, and

$$V_1(\theta') = \max\{U_D(\theta'), U_X(\theta'), 0\}.$$

The term $L(\theta) > 0$ is the expected private loss if continued experimentation makes the

employer's title more likely to attach or easier to establish. It incorporates the probability that the idea becomes sufficiently concrete, related to the employer's business, or connected to employer time, information, personnel, or equipment, multiplied by the employee's loss from employer control. The normalization that U_D and immediate U_X do not depend locally on α is not essential. The results require only that continued hidden experimentation is more negatively exposed to stronger employer ownership than immediate disclosure or preemptive exit.

The employee chooses

$$a^*(\theta;\alpha) \in \arg\max_{a\in\{D,H,X,A\}} U_a(\theta;\alpha). \tag{3}$$

Let

$$B(\theta) = \max\{U_D(\theta), U_X(\theta), 0\}$$

and define the ownership threshold

$$\alpha_H(\theta) = \frac{\overline{h}(\theta) - B(\theta)}{L(\theta)}. \tag{4}$$

When the expression lies in $(0,1)$, the employee continues hidden experimentation if and only if $\alpha \leq \alpha_H(\theta)$.

Proposition 1 (Compression and polarization)**.** *Suppose $L(\theta) > 0$. An increase in employer ownership α weakly shrinks the set of employees who continue hidden experimentation. A type displaced from hidden experimentation switches to:*

1. *internal disclosure if $U_D(\theta) \geq \max\{U_X(\theta), 0\}$;*
2. *entrepreneurial exit if $U_X(\theta) > \max\{U_D(\theta), 0\}$; or*
3. *abandonment if $0 > \max\{U_D(\theta), U_X(\theta)\}$.*

Consequently, if the type distribution has positive density near both the disclosure and exit

portions of the boundary in (4)*, stronger employer ownership increases internal disclosure for one group and entrepreneurial exit for another, even though it reduces hidden experimentation for every affected type.*

Proof. Equation (2) is strictly decreasing in α, while the ranking of the three immediate alternatives is unchanged. Hence the hidden-experimentation region is decreasing in α. Once U_H falls below $B(\theta)$, the employee selects the largest element of $\{U_D, U_X, 0\}$, which yields the stated partition. Positive density on both switching sets makes both responses strict in the aggregate. □

The overall effect on if the inventor decides to disclose their idea sooner depends on the strength of whether the inventor may face lower expected returns from taking an idea outside of the firm.

Proposition 1 isolates the main mechanism. Strong employer ownership acts as a tax on remaining inside the firm with an undisclosed idea. For an employee who needs the incumbent's assets, the best response is to disclose and obtain internal support before further experimentation erodes control. For an employee with a viable outside option, the best response is to leave before the idea becomes more clearly attached to the employer. For a low-value idea, neither organizational form covers the cost of development, and the employee abandons it. Thus, the same ownership rule can tighten control inside the firm and move selected ideas outside its boundary.

To formalize the first part of this statement, let $c(\alpha)$ be the employer's probability of obtaining effective control over a disclosed invention, with $c'(\alpha) > 0$. Conditional on disclosure, stronger ownership mechanically raises employer control. Moreover, Proposition 1 permits $\Pr(D \mid \alpha)$ and $\Pr(X \mid \alpha)$ to rise simultaneously. Hence employer control over disclosed inventions and entrepreneurial exit are not competing comparative statics.

The distinction between conditional behavior and aggregate invention counts is important. Let $\lambda(\alpha)$ be the arrival rate of nascent ideas, allowing stronger employer claims to reduce ex ante search or experimentation incentives as in multitask theories of employee

innovation. The flow of disclosed ideas is

$$N_D(\alpha) = \lambda(\alpha)\Pr(D \mid \alpha). \tag{5}$$

Even when the conditional disclosure probability rises for the high-fit switching group, the observed number of formal workplace inventions can fall if $\lambda'(\alpha) < 0$ or if the mass shifted to exit and abandonment exceeds the mass shifted to disclosure. This distinction reconciles greater employer control over what is disclosed with less disclosed workplace discovery overall.

4.2 Organizational allocation and strategic fit

The next result maps the response to observable differences between internal inventions and employee-founded firms.

Proposition 2 (Fit-based allocation)**.** *Suppose* (1) *holds. For each* (v, z) *for which both organizational forms are viable, there is at most one cutoff* $\widehat{s}(v, z)$ *satisfying*

$$U_D(v, \widehat{s}) = U_X(v, \widehat{s}, z).$$

Among employees displaced from hidden experimentation, types with $s > \widehat{s}(v, z)$ *disclose internally, whereas types with* $s < \widehat{s}(v, z)$ *exit entrepreneurially. An improvement in external development capacity* z *weakly raises* $\widehat{s}$ *and expands the exit region; stronger incumbent-specific complementary assets weakly lower* $\widehat{s}$ *and expand the disclosure region.*

Proof. The difference $U_D - U_X$ is strictly increasing in s by (1), which gives uniqueness and the ordering around the cutoff. Since U_X is increasing in z, a higher z shifts $U_D - U_X$ downward and raises the fit required for internal disclosure. A larger contribution of incumbent-specific complementary assets shifts $U_D - U_X$ upward and has the opposite effect. □

Proposition 2 blends the bargaining logic of Anton and Yao (1995) with the strategic-

mismatch logic of Hellmann (2007). Revelation places the employee in a weaker bargaining position, but internal development is nevertheless attractive when the incumbent has valuable complementary assets (Teece, 1986). By contrast, low-fit ideas are precisely those for which the incumbent contributes less and may be unwilling to depart from its core strategy. They are also the ideas most likely to be reallocated across firm boundaries. This parallels the finding that technologically distant patents are more likely to be sold and become better matched after transfer (Akcigit et al., 2016), except that entrepreneurial exit transfers the idea together with the inventor's tacit knowledge and human capital.

4.3 Technological Distance and Entrepreneurial Entry

Research suggests that firms in highly innovative sectors can be litigious, using the legal system to retain innovative talent and protect ideas developed within the firm. At the same time, firms must decide whether it is worth supporting and pursuing the ideas generated by employees (Gambardella et al., 2015; Ganco et al., 2014). Theory suggests that firms make this determination in part by considering whether an idea falls within the scope of the firm's core strategy (Cirillo et al., 2014). If it does not, the firm may decide not to pursue the idea or may attempt to internalize it rather than allow the employee to develop it independently (Melero et al., 2020; Hellmann, 2007) . This can leave the inventor with the choice of remaining at the firm or exiting to pursue the idea elsewhere.

At the same time, research also finds that employees do not always disclose their inventions to the firm. Inventors may withhold ideas depending on their relationship with the employer and their tenure at the firm, with more senior employees more likely to disclose ideas and younger employees more likely to withhold them (Erez et al., 2025). This creates an additional tension for firms where retaining both innovative employees and the ideas they generate can be particularly important.

The DDB ruling strengthened employers' rights over employee inventions, but the effect of this change depended on the protections that existed before the ruling. Prior research

shows that firms affected by the ruling increased R&D spending, while also facing greater concerns about maintaining employees therefore employee incentives rose to innovate (Jang et al., 2025; Suh, 2023). This suggests that stronger employer rights may increase the value firms place on keeping innovative activity inside the firm, while at the same time increasing the risks employees face when attempting to pursue related ideas outside of it.

What happens to technological direction depends on which ideas face the most constraints. If ideas closer to the former employer's technological domain are more difficult to commercialize independently, stronger employer rights may disproportionately deter entry based on those ideas. Founders we observe could then develop technologies farther from the former employer, even if no inventor changes an initial project. Or inventors who do enter may pursue different technologies because of these constraints. The first is about selection into entrepreneurship. The second is about adaptation. Both can generate a change in the technologies observed among founders. This argument fits distance from the former employer most directly. A matching prediction for distance from the inventor's own prior work also requires that this prior work be related to the technologies exposed to employer claims.

For inventors considering entrepreneurship, stronger employer rights may therefore affect not only whether they exit, but also the types of technological opportunities they pursue after leaving. If founders face a greater risk that inventions closely related to their prior work could be claimed by the former employer, they may be more likely to pursue technologies as a founder that are farther from the technological activities of the incumbent firm.

Proposition 3 (Technological Distance and the Value of External Development)**.** *Let* $s \in [0, 1]$ *represent an idea's technological fit with the employer, as defined above, and let* $T = 1 - s$ *denote its conceptual distance from the employer's technological core. Ideas with higher* s *are more closely related to the incumbent's technological activities, while ideas with higher* T *are more distant.*

Suppose that the employee's payoff from developing an idea through a new venture is

$$U_X(v, s, z; \varepsilon) = x(v, s, z) - \varepsilon C(s),$$

where $C(s) > 0$ *represents the expected loss associated with employer ownership claims and* $C'(s) > 0$*. This loss may reflect the expected cost of establishing rights, the possibility of enforcement, or reduced returns from independently commercializing the idea. The assumption that* $C'(s) > 0$ *captures the possibility that ideas more closely connected to the employer face greater ownership-related constraints.*

For a given idea value v *and external development capacity* z*, the employee pursues the idea through entrepreneurship when the payoff from exit exceeds the payoff from internal disclosure and abandonment:*

$$U_X(v, s, z; \varepsilon) = x(v, s, z) - \varepsilon C(s). \tag{6}$$

1. $d(v, s)$ *is increasing in* s*;*

2. $U_X(v, s, z; \varepsilon)$ *is strictly decreasing in* s*;*

3. $C(s) > 0$ *and* $C'(s) > 0$*; and*

4. *the distribution of idea fit* s *is fixed across ownership regimes.*

Then, among employees choosing between immediate exit, disclosure, and abandonment, stronger employer ownership weakly reduces the set of ideas pursued through entrepreneurship. When the entrepreneurial cutoff lies in the interior of the fit distribution, the average conceptual distance from the employer, $T = 1-s$*, among ideas pursued through entrepreneurship weakly increases.*

Proof. Define the relative payoff from entrepreneurship as

$$G(s, \varepsilon) = x(v, s, z) - \varepsilon C(s) - \max\{d(v, s), 0\}.$$

Entrepreneurial exit is chosen when $G(s, \varepsilon) \geq 0$. Because U_X is strictly decreasing in s, while $\max\{d(v, s), 0\}$ is nondecreasing in s, G is strictly decreasing in s. Thus, when an interior cutoff exists, entrepreneurship occurs for ideas with $s \leq s^*(\varepsilon)$, where

$$G(s^*(\varepsilon), \varepsilon) = 0.$$

An increase in ε reduces G for every idea because $C(s) > 0$. Therefore, the cutoff $s^*(\varepsilon)$ weakly decreases: some higher-fit ideas that would previously have been pursued through entrepreneurship no longer meet the exit condition. With the distribution of s fixed, removing ideas from the higher-fit end of the entrepreneurial set weakly reduces average fit among the remaining entrepreneurial ideas. Since $T = 1 - s$, their average technological distance from the employer weakly increases. □

4.4 Timing: preemptive exit from the attachment hazard

To obtain a timing prediction, let m_t denote idea maturity and let $L(m_t, \theta)$ be the expected control loss from another period of hidden experimentation, with $L_m > 0$. At date t, the value of waiting one more period is

$$W_t(\theta; \alpha) = -k_t + \beta \mathbb{E}\left[V_{t+1} \mid \theta, m_t\right] - \alpha L(m_t, \theta). \tag{7}$$

Let $S_t(\theta) = \max\{U_{D,t}(\theta), U_{X,t}(\theta), 0\}$ be the best stopping payoff and define the stopping time

(8)

Proposition 4 (Preemptive timing)**.** *Suppose that stronger employer ownership lowers the value of waiting relative to every immediate stopping action, and that $L(m_t, \theta) > 0$. Then the optimal stopping time $\tau^*(\alpha)$ is weakly decreasing in α. The effect is strict for types that cross a stopping boundary. Among eventual founders, stronger employer ownership induces earlier*

entrepreneurial exit; among eventual internalizers, it induces earlier disclosure. Because $L_m > 0$, the timing response is strongest when an additional period of experimentation would materially increase legal or factual attachment to the employer.

Proof. For every t, (7) is decreasing in α, so the stopping set $\{\theta : S_t \geq W_t\}$ expands with α. The first hitting time of an expanding stopping set cannot increase. Strictness follows for a type whose wait-versus-stop inequality reverses after the change in α. □

The timing result is distinct from a conventional mobility restriction. A noncompete primarily raises the cost of leaving after an opportunity is identified. Employer ownership can instead accelerate departure because remaining employed while the idea matures increases the expected loss of the asset around which a venture would be formed. The employee therefore exits while the idea is less mature, less documented, and less likely to have generated a formal patent record. This is the sense in which stronger ownership can move still-nascent ideas outside the firm even as it strengthens the firm's title to inventions that are disclosed or developed internally. Our model yields the following predictions:

Prediction 1: Entrepreneurial entry and mobility. Stronger employer ownership changes the allocation of inventive employees across organizational boundaries. The lower external returns for the inventor employee may reduce founding. Entrepreneurial entry may decline if stronger ownership raises the cost of pursuing employee-generated ideas externally, while affected inventors may instead move to other firms or regions.

Prediction 2: Selective rather than uniform entrepreneurship. The entrepreneurial response should vary with the feasibility of external development. In particular, when outside finance is available, employees may be better able to pursue ideas outside the incumbent firm. Financing options are dependent on the feasibility of the venture, which could be affected by ownership rights of the ideas. Venture capital funding is a measured outcome as a means to test this. Stronger employer ownership may therefore have different effects on VC-

backed entrepreneurial entry than on entrepreneurship overall. However, stronger ownership need not increase entrepreneurship overall, because some marginal ideas may instead be abandoned.

Prediction 3: Strategic distance. Start-ups induced by stronger employer ownership should be farther from the former employer's technological core, product market, or customer base than internally disclosed ideas. Ideas closely related to the employer face greater ownership-related constraints, which may reduce entrepreneurial entry of ventures.

5 Research Design and Data

5.1 Research Design

The DDB ruling created a uniform federal rule for when present-assignment clauses automatically transfer ownership to employers, while state FTC laws continued to protect some employee inventions. As a result, the ruling widened the gap in employer IP rights between FTC and non-FTC states.

Our empirical strategy uses this change to compare inventor outcomes in non-FTC states with those in the seven core FTC states before and after the ruling. Identification relies on the assumption that, without the ruling, entrepreneurship would have followed similar trends in both groups of states.

5.2 Ruling Out Alternative Empirical Approaches

Before providing our exact empirical specification, it is worth discussing alternative empirical approaches given the lengthy series of events to get to this *DDB* court ruling. For example, a natural starting point may be to want to exploit the staggered adoption of the FTC statutes themselves. Alok and Subramanian (2023) do this, comparing patenting in seven adopting states against synthetic controls, and find that adoption raised patent counts and patent quality along several dimensions. Yet their design has meaningful limitations. First, the statutes were enacted for the express purpose of attracting technology employment

and stimulating in-state venture formation. Adoption is therefore plausibly a response to expected future innovation trajectories, and the estimand is contaminated by whatever unobserved political-economy shock produced both the statute and the subsequent patenting. Second, they have staggered adoption that spans roughly a decade. Under treatment-effect heterogeneity, the two-way fixed-effects (TWFE) estimators forms comparisons in which already-treated units serve as controls for later-treated units, and can place negative weight on some treatment-effect parameters (Goodman-Bacon, 2021). Given that heterogeneity is expected here, since statutory strictness varies, they should use robust estimators (Callaway and Sant'Anna, 2021). Third, labor contract practices adjusts to a statute over years often through the hiring of new employees. Given that treatment date is legislative, but the economic treatment is gradual, this blurs event-study timing and weakens the ability to conduct pre-trend tests.

A second potential alternative is to use a judicial rather than legislative shock. Armstrong et al. (2026) use *Alcatel USA, Inc. v. Brown*, in which a Texas trial court held in 2002 and affirmed by the Texas Court of Appeals in 2004 that an employer could claim ownership of an employee's abstract idea under a pre-invention assignment agreement, and that the employee was required to disclose it in full. The case attracted unusual media attention. Their design codes inventors in the protective states as unaffected and inventors elsewhere as treated after 2004, and finds that affected inventors became roughly fifteen percent less likely to change employers, produced more general innovations, and had their patents disclosed sooner. This design solves the endogenous FTC-adoption problem, since a judicial decision in a particular dispute is plausibly orthogonal to the innovation trajectories of firms elsewhere. Two features nonetheless limit it. First, *Alcatel* is a decision of a Texas intermediate appellate court. It binds no court outside Texas. The design's identifying assumption is then that the decision altered expected outcomes for inventors in the other 49 states through a persuasive-precedent channel. The authors are candid on this point and defend it by reference to the decision's salience. But the assumption is strong, and it is untestable in the sense that the legal-force

channel and the alternative media-attention and publicity channel cannot be separated. Therefore, a skeptical reader may ask why inventors in Massachusetts should revise beliefs about Massachusetts law upon reading about a Texas judgment. Second, *Alcatel* concerned an unusually aggressive claim—an abstract idea, conceived years before employment began—rather than a rule of general application. It is a salient fact about how far a claim can go, not a change in the jurisdictional governing standard.

Therefore, neither prior empirical design using FTC states isolated a legal change that (i) is binding rather than persuasive throughout the United States, (ii) occurs at a single sharply dated moment, and (iii) affects states differently depending on whether they already protected employee inventions. Yet our design, the 2008 Federal Circuit ruling, has all three properties.

5.3 The 2008 Federal Circuit Ruling as a Quasi-Natural Experiment

The Federal Circuit possesses exclusive appellate jurisdiction over cases arising under the patent laws.[7] Its construction of an assignment clause's operative effect is therefore binding on every federal district court in the country, and there is no possibility of a circuit split to generate cross-sectional variation in the governing rule.

This is the sense in which the ruling improves on *Alcatel* as an instrument, and it is worth stating the comparison precisely, because it is not a claim about geographic reach in the ordinary sense. *Alcatel* was in principle known nationwide; what it lacked was legal force outside Texas. *DDB* has legal force everywhere by statute. Where Armstrong et al. (2026) must assume that a persuasive precedent moved beliefs uniformly across jurisdictions, we require only that parties and counsel respond to controlling authority in their own forum. The identifying assumption is correspondingly weaker, and it is the assumption that the entire practice of litigation is organized around.

In addition, given that the shock is a judicial decision rather than a legislative wave,

[7] 28 U.S.C. §1295(a).

all units are treated at the same instant: February 13, 2008. The design is therefore a canonical two-period, two-group difference-in-differences (DiD), and the recent literature on staggered adoption and concerns about negative weighting (Callaway and Sant'Anna, 2021) is inapplicable by construction. Under common timing, the TWFE estimator recovers the average treatment effect on the treated under parallel trends without further restriction on treatment-effect heterogeneity. This is a non-trivial advantage over statute-adoption designs, and it should be stated as such rather than left implicit. Finally, the sharpness of the date is itself useful. Legislative treatment dates are ambiguous (introduction, passage, effective date, first enforcement); a Federal Circuit opinion issues on a day.

Treatment intensity is determined by the interaction of a uniform national legal change with pre-existing state law. Because FTC laws still protected some employee inventions, the ruling gave employers more control in non-FTC states, widening the gap between states with and without these protections. The estimating equation is therefore

$$y_{ist} = \alpha_i + \lambda_t + \beta \left(\mathbf{1}\{\text{Non-FTC state}\}_s \times \mathbf{1}\{t \geq 2009\} \right) + \mathbf{X}'_{st}\gamma + \varepsilon_{ist}, \tag{9}$$

where the treated group comprises inventors in non-protective states and the comparison group comprises inventors in the seven core protective states. For entrepreneurial entry, the sign of β is theoretically ambiguous: stronger employer ownership may induce some employees to exit earlier, while causing others to abandon their ideas. We therefore let the empirical results determine which force dominates. Because the ruling was decided in February 2008, we exclude 2008 from the estimation sample as a transition year and define the post period as 2009 onward.

The dispute in *DDB* arose from a 2004 patent infringement action brought by a small entity against Major League Baseball's digital media arm, concerning technology for simulating baseball games. The ownership question surfaced only because the defendant acquired an interest from the inventor's former employer during discovery. Nothing about the posture of the case connects it to the innovation trajectories, financing conditions, or founding

propensities of inventors elsewhere. The panel's resolution of the choice-of-law question was a doctrinal by-product of a jurisdictional dispute in an unrelated infringement suit.

Two further points support exogeneity. Federal Circuit judges have life tenure and no electoral or fiscal exposure to the states whose inventors the ruling affects. And the specific holding—allocation of the automatic-assignment question between federal and state law—is a lawyer's question with no identifiable constituency lobbying on either side.

5.4 Identification Discussion

We discuss the challenges to identification and our approach to mitigating them. First, as we discussed in our institutional background (see section 3, *FilmTec* established present-assignment in 1991 and *DDB* resolved whether federal or state law governs it. If sophisticated employers had already drafted around state law, this ruling may not have much bite. That probability was not zero, which is precisely why the question reached the Federal Circuit. But the volume of practitioner commentary and revision dates in employment agreements filed as exhibits to SEC filings suggest the ruling had bite.

A second-related concern is that the ruling was issued in February 2008 and the Great Financial Crisis (GFC) occurred at the end of that year. New business formation collapsed, and the collapse was geographically uneven in a way correlated with our treatment. California was among the housing markets most severely affected by the GFC [8] and this is consequential for entrepreneurship because housing wealth constitutes an important source of collateral for new businesses (Adelino et al., 2015). To mitigate this concern, we use a triple difference design contrasting inventor-founders with non-inventor founders within the same state-year and firm-year, which differences out any state-level demand shock and any firm-level financial shocks that do not operate through invention ownership.

Third, there are potentially confounding legal changes in the post period. For example, employment lawyers could respond by rewriting agreements into present-assignment form. If

[8] Arizona, California, Florida, and Nevada are typically coded as severely impacted between 2007–2009 (Mian et al., 2015; Gerardi et al., 2017).

all lawyers did this, then the stock of legacy contracts would erode with employee turnover and contract revision cycles. This implies that any estimated relation between IP ownership rights and entrepreneurship should attenuate past 5 years, and one that distinguishes the mechanism from a permanent level shift. Furthermore, there have been several major patent-related legal events.[9]. None interacts mechanically with the state partition, but this also suggests that the post-period window length may be sensitive.

Empirical Design

Treatment Case analysis suggests that the ruling strengthened employer ownership rights over covered employee inventions where state statutory protections did not apply, thereby increasing the difference in effective property-rights protection between protective and non-protective states. Let $\text{NonFTC}_s = 1$ for states without one of the seven core freedom-to-create statutes and let $\text{Post}_t = 1$ after the February 13, 2008 ruling. The main treatment is consequently

$$\text{Treat}_{it} = \text{NonFTC}_{s_i^0} \times \text{Post}_t,$$

where s_i^0 is the employee's pre-ruling exposure state. We use the baseline state, rather than the contemporaneous state, to prevent post-treatment migration from changing treatment status.

1. Baseline difference-in-differences and event study. The federal ruling occurred in February 2008. Therefore, 2007 is the omitted year, with 2008 as the transition year, and 2009 starts the post period.

For worker i in year t, estimate

$$Y_{it} = \alpha_i + \lambda_t + \psi_{o(i,t)\times t} + \beta\big(\text{NonFTC}_{s_i^0} \times \text{Post}_t\big) + \varepsilon_{it}, \tag{10}$$

[9] *Bilski* decided in 2010; *Stanford v. Roche* decided in 2011; the America Invents Act signed into law in 2011, and *Alice* decided in 2014 all shifted patenting outcomes in the post-window (Abrams and Wagner, 2013; Chien et al., 2025). In the pre-period window, *eBay* decided in 2006 also relates to strategic patenting (Mezzanotti, 2021)

where α_i are worker fixed effects and $\psi_{o(i,t)\times t}$ are occupation-by-year or job-category-by-year fixed effects. The corresponding event study is

$$Y_{it} = \alpha_i + \lambda_t + \psi_{o(i,t)\times t} + \sum_{k\neq -1} \beta_k \left[\text{NonFTC}_{s_i^0} \times \mathbf{1}\{t - 2008 = k\}\right] + \varepsilon_{it}. \tag{11}$$

2. Innovation-exposure triple difference. We employ a triple-difference approach to examine whether the post-ruling effect on founding is greater among employees with higher exposure to innovation in treated states relative to control states. We define highly innovation-exposed workers as scientists and engineers.

E_i is a predetermined indicator of innovation exposure based on the inventor's pre-ruling occupation. The triple-difference specification compares the post-ruling change in outcomes between innovation-exposed and less-exposed inventor-employees in NonFTC states with the corresponding change in FTC-protected states. β captures the differential post-ruling effect for innovation-exposed inventor-employees in NonFTC states relative to otherwise comparable inventor-employees in FTC states.

$$Y_{it} = \alpha_i + \lambda_{s_i^0\times t} + \mu_{f_i^0\times t} + \eta(E_i \times \text{Post}_t) + \beta\big(E_i \times \text{NonFTC}_{s_i^0} \times \text{Post}_t\big) + \varepsilon_{it}, \tag{12}$$

where $\lambda_{s_i^0\times t}$ absorb all state-year shocks, including the financial crisis, and $\mu_{f_i^0\times t}$ absorb shocks to the employee's pre-ruling employer.

3. Measuring Technological Distance Our dataset gives us the opportunity to use patent claims, patent descriptions, and CPC classifications to measure the technological distance between founders' patents, their incumbent firms, and the startups they later found (Jaffe, 1986; Arts et al., 2018, 2023). We constructed both founder and firm portfolios, with the transition year of 2008 excluded. Patent timing is based on the patent application year, while startup and employer associations come from our combined Revelio and PitchBook

dataset. We examine technological distance using both CPC classifications and text analysis of patent claims and patent descriptions. For both approaches, we calculate the distance between the founder's patent portfolio and the patent portfolios of the incumbent firm and the startup.

There are three measures that we define formally as:

1. *Founder Redirection* assesses how much the founder's patent technology changed after founding.

$$TD_i^{M6} = 1 - \cos\left(\text{Founder Pre}_i, \text{Founder Post}_i\right). \tag{13}$$

2. *Distance from Former Employer* measures how far the founder's patents are post founding from the technology of their incumbent employer.

$$TD_i^{M8B} = 1 - \cos\left(\text{Former Employer Other Inventors}_i, \text{Founder Post}_i\right). \tag{14}$$

Startup Redirection measures the technological distance between the founder's pre-founding patent portfolio and the startup's post-founding patent portfolio.

$$TD_i^{M9} = 1 - \cos\left(\text{Founder Pre}_i, \text{Startup Post}_i\right). \tag{15}$$

Our measures focus on two main areas: the founder's startup technology and its distance from the founder's prior work and the incumbent firm's patents. For this process, we use PitchBook verticals and a set of technical keywords associated with those verticals. We then use natural language processing to create vectors representing the technological content of the patents. This allows us to compare the incumbent firm's patent portfolio with the technological profile of the founder's startup, as well as the founder's own patents at the incumbent with the technology associated with the startup. A sample of the classification can be found in the Appendix in Table C.

The second group of measures focuses on the founder's patenting before and after founding. Here, we compare the founder's patents produced while at the incumbent firm with the patents produced after founding. We also compare the founder's post-founding patents with the patent portfolio of the incumbent firm. These measures allow us to examine whether founders continue working in similar technological areas after founding or move in a different technological direction.

For the text-based measures, we use the technical language contained in the patent claims and descriptions to construct patent and patent-portfolio vectors. We calculate technological distance as:

$$\text{Technological Distance} = 1 - \text{Cosine Similarity}. \tag{16}$$

A value closer to zero indicates greater technological similarity, while a value closer to one indicates greater technological distance.

As a second measure, we use the official Cooperative Patent Classification (CPC) system to capture technological distance based on patent classifications rather than patent text. We repeat the portfolio-based comparisons using the more fine-grained CPC groups. This provides a separate way to determine whether the patterns observed in the text-based measures are also present when using formal patent classifications.

Finally, we use Pearson and Spearman correlations to examine the relationship between the text-based and CPC-based measures. The Pearson correlation captures how closely the values of the two measures move together, while the Spearman correlation examines whether they produce similar rankings of technological distance.

4. Pre- and Post-Ruling Comparison Following the 2008 DDB ruling, we compare the change in technological distance between founders and their incumbent firms in non-FTC states, where employer rights were strengthened, with the change in FTC states, where the ruling did not alter employer rights. We want to determine whether the technological

distance increased more in non-FTC states after the ruling, which would indicate a widening gap between the two groups of states. We take the proportion of the distance measures and then conduct an industry-weighted analysis using the PitchBook vertical data.

The weight is defined as:

$$
\begin{aligned}
w_j &= \frac{N_j}{\sum_j N_j}, \\
\Delta^{\text{nonFTC}}_{\text{weighted}} &= \sum_j w_j \, \Delta^{\text{nonFTC}}_j, \\
\Delta^{\text{FTC}}_{\text{weighted}} &= \sum_j w_j \, \Delta^{\text{FTC}}_j, \\
\Delta\text{Gap}_{\text{weighted}} &= \Delta^{\text{nonFTC}}_{\text{weighted}} - \Delta^{\text{FTC}}_{\text{weighted}}.
\end{aligned}
\tag{17}
$$

We calculate the pre- and post-ruling changes within each vertical and weight each vertical by its share of measurable assignments. The weights are normalized by the industry verticals in order to prevent smaller industries from having the same influence as the large verticals as industry composition reflects heterogeneity of patents.

6 Results

6.1 Descriptive Statistics

Table 2 presents descriptive statistics for the main variables used in the analysis. The unit of observation is an inventor-year, with 6,709,626 inventor-year observations. Inventors average 0.306 patent applications. Approximately 4.9% of inventor-year observations are classified as founders, while 2.7% involve a move to a startup. Approximately 63.6% of observations are located in NonFTC states. Women account for 11.6% of the sample, and 6.5% are classified as underrepresented minorities.

6.2 FTC Ruling on Inventor Outcomes

We first examine the identifying variation underlying our difference-in-differences estimates. If state protections had already been fully contracted around prior to 2008, we would expect the treatment and control states to exhibit differential trends before the ruling. Figure 1, however, shows that the probability of becoming a founder follows similar trends in FTC and NonFTC states prior to the court ruling.

Figure 1 therefore provides support for our identifying assumption for the founder outcome. The dynamic event-study estimates show little evidence of differential trends in founding between FTC and NonFTC states prior to the ruling. Following the ruling, however, the rate at which inventor-employees leave their incumbent firms to found new ventures declines in non-FTC states relative to FTC states. Event studies for the other primary outcomes are reported in the appendix and provide weaker support for the parallel-trends assumption. Because FTC and NonFTC states may have followed different underlying innovation and entrepreneurial trajectories even in the absence of the ruling, we do not rely solely on exact parallel trends for identification.

Table 3 reports the baseline difference-in-differences estimates. The coefficient of interest is the interaction between NonFTC and the post-ruling period, which captures the change in inventor outcomes in non-FTC states after the ruling relative to the corresponding change in FTC states. The baseline specification includes inventor and year fixed effects, with the preferred specification additionally including job-category-by-year fixed effects.

We find no statistically significant change in the probability of moving to a new firm. However, inventor-employees in non-FTC states become 0.12 percentage points more likely to move jointly to a new firm and a new state and 0.15 percentage points more likely to move to a new state following the ruling. Relative to the sample means, these estimates represent increases of approximately 22.0% and 23.2%, respectively. These results suggest that stronger employer IP rights did not broadly suppress inventor mobility. Instead, within-state moves to new employers remain unchanged while interstate mobility increases.

For our primary outcome of starting a new venture, we observe a statistically significant 0.37 percentage-point decline in the probability of becoming a founder in non-FTC states relative to FTC states following the ruling. Relative to the sample mean of 4.9%, this represents an approximately 7.6% decline in founding. We observe similar statistically significant declines in alternative measures of founding, VC-backed founding, and moves to startups. Taken together, the baseline difference-in-differences estimates indicate that stronger employer IP rights primarily reduced transitions into entrepreneurship rather than mobility to other employers more generally.

The cross-sectional analysis yields a similar pattern. The probability of becoming a founder declines by 0.32 percentage points. The direction and magnitude of the entrepreneurship results are therefore broadly consistent with the within-inventor estimates. The full cross-sectional results are reported in Appendix D.

We next examine whether these effects are concentrated among inventors whose work is more directly tied to innovation. Table 4 estimates a triple-difference specification using a predetermined measure of innovation exposure based on the inventor's last pre-2008 occupation. The results provide limited evidence that the effects of the ruling are systematically stronger among inventors in more innovation-intensive occupations. The triple interaction is positive and statistically significant for VC-backed founding and for moves to a new firm, while the estimates for geographic mobility, and the primary founder outcomes are generally small and statistically indistinguishable from zero. These estimates point to selective differences in organizational and entrepreneurial transitions, but provide limited evidence that the effects of stronger employer IP rights are systematically concentrated among more innovation-exposed inventors.

To examine whether the effects of the ruling are specific to inventors rather than reflecting broader changes in worker mobility, we augment the inventor sample with a 10% randomized sample of non-inventor workers in Table 5. Descriptive statistics for the sample are available in Appendix D. The findings for the pooled analysis shows that the ruling does not have a

significant effect on founding a new venture among non - inventor comparable workers, with the inventor-specific differential is negative and significant. The findings are similar for the venture capital backed founders. The broader mobility outcomes, such as moving to a new firm and state increase for both inventors and the non - inventor workers. These findings support our primary analysis which suggest that the ruling did not simply suppress worker mobility generally; rather, its negative effects are concentrated in entrepreneurial transitions among inventors.

6.3 Technological Distance

Research suggests that firms can be litigious and may use litigation to retain inventive talent within the company. At the same time, companies decide whether to pursue employees' ideas based on their technological niche and their understanding of the opportunity.

We measure the technological distance of employee-inventors who went on to found a company. Table 7 provides the descriptive statistics. We show that the text analysis and CPC measures have similar ordering, although CPC distances are slightly larger. Founders also stay closer to their own prior technology than to the broader technology of their former employer, while startup technology shows substantial redirection. Figure 2 shows that technological redirection is not uniform across industries, with software and emerging technology sectors showing more redirection, whereas health and life science areas tend to stay closer to prior technological knowledge. As a measurement validation, both measures are positively related at the category level and identify similar high- and low-distance areas.

The founder redirection measure has the lowest distance, meaning that founders are descriptively working on relatively similar technologies even after founding their companies. In contrast, the latter two measures indicate greater technological distance between founders and the technological activity of their former employers, as well as between the startup's post-founding technology and the founder's prior patent portfolio.

We next examine whether these relationships changed before and after the 2008 rul-

ing for non-FTC and FTC states. In the overall sample in Table 8, the nonFTC–FTC technological-distance gap narrows across all three measures. For founder redirection, non-FTC distance remains relatively stable while FTC distance increases. For distance from the former employer, both groups become more technologically distant, although the increase is larger among FTC founders. For startup redirection, technological distance declines in both groups, with a larger decline among nonFTC founders.

Because technological distance varies substantially across industries in Table 9, we also examine the changes within PitchBook verticals and weight each vertical according to its share of measurable observations. Once we account for industry using this weighted analysis, the pattern changes which is observed in Figure 3. The weighted nonFTC–FTC gap widens by 0.0560 for founder redirection, 0.0261 for distance from the former employer, and 0.0099 for startup redirection in Figure 4.

Industry-weighted comparisons show the distance gap between non-FTC and FTC widens across all three measures. These measures each capture distinct relationships: founders' post-founding work compared with their own prior work, founders' post-founding work relative to the former employer's other inventors, and startups' post-founding portfolios compared with founders' prior work. These comparisons describe the technological composition of founders who have measurable patent portfolios.

Figure 5 displays the source of this widening differs across the three measures. For founder redirection, technological distance declines in both groups, but the decline is substantially larger among FTC founders. For distance from the former employer, nonFTC distance increases while FTC distance declines. For startup redirection, both groups again experience declines, but the decline is larger among FTC founders. These patterns suggest that the post-ruling difference is strongest in the founder's own technological trajectory and separation from the former employer, while the relative change in startup redirection is smaller.

7 Robustness

Our main results show that founding and VC-backed founding fall in non-FTC states relative to FTC states, suggesting that stronger employer ownership leads more inventors to forgo entrepreneurship than to leave early and start firms. To examine the mechanisms, we conduct a series of robustness checks to examine whether our main findings are sensitive to alternative outcomes and/or measures of inventor-employee behavior.

Startup Quality The decline in entrepreneurial enterprises raises a related question: whether the ruling also affects the quality of the ventures associated with inventor-employees who entered entrepreneurship. In Table 6 we examine whether the ruling affected not only the likelihood of founding a company but also the quality of the ventures that were created. We measure whether the startup was ever financed, whether the startup survived for several years, whether it was acquired, or whether it eventually had an IPO.

Inventor-employees in the treated states are less likely to receive financing, be acquired, or complete an IPO. However, the probability of being associated with a venture that survives at least five years is higher in non-FTC states relative to FTC states. Thus, the startup-quality results are mixed: financing, acquisition, and IPO outcomes decline, where as five-year survival increases. These results do not indicate a uniform decline across all dimensions of venture performance. Instead, the ruling is associated with a lower incidence of several outcomes typically linked to financing and high-growth entrepreneurship, alongside a small increase in venture survival.

In Appendix D, we run the analysis conditional on an inventor becoming a founder, but given that it is conditional on being a founder, this can induce selection bias, although we find similar results.

8 Discussion

Our research shows that stronger employer intellectual property rights widened the gap in inventor entrepreneurship between states with and without employee protections. One mechanism that may explain this pattern is that inventor employees may weigh more than whether an idea is promising when deciding to pursue entrepreneurship. If an employer owns or may have a claim to an invention, uncertainty over ownership and the possibility of enforcement can reduce the expected benefits of developing the idea independently. These concerns may also make it more difficult to secure financing for a new venture. Our finding of a decline in VC-backed founding is consistent with this possibility. Among the founders who go on to start companies, we also find a widening gap in industry-weighted technological distance between the two groups of states, suggesting that employer rights may shape the technologies represented in new ventures.

The regulatory question surrounding seemingly ubiquitous employment contract terms that seem to influence employee mobility, new business formation, and ultimately economic growth is active. For example, the Federal Trade Commission (FTC)'s 2024 rule banning most non-competes was vacated in *Ryan LLC v. Federal Trade Commission*, on the ground that the ban exceeded the agency's statutory authority. Therefore, state law continues to define the landscape, and states have been legislating actively across the full range of restrictive terms.

Invention assignment as contracted upon through state labor law is now part of that wave. New Jersey and New York have recently enacted FTC statutes [10], joining the states that adopted them in the late 1970s and 1980s. These enactments have proceeded with limited evidence on the consequences of the underlying right (Alok and Subramanian, 2023; Armstrong et al., 2026), and the studies reach alternative conclusions.

[10] New York enacted S. 5640/A. 5295, codified at N.Y. Labor Law § 203-f ("Inventions Made by Employees") New Jersey enacted Assembly Bill No. 492, P.L. 2017, ch. 346, codified at N.J. Stat. Ann. § 34:1B-265 ("Employee rights to certain inventions")
In New York bill the justification argued that the overly broad assignment can "The reasons are clear; these clauses prevent employees from trying new ideas that can one day turn into new businesses"

We see our study as contributing to this policy debate in two ways. First, we add evidence to the conflicting studies showing that this provision has meaningful economic consequences for new business formation. Second, and we believe, more importantly, we show that this constraint matters in a way similar to noncompetes but which does not receive as much scrutiny. That regulators scrutinize noncompetes closely while leaving invention assignment essentially unexamined provides them with a partial view of labor contracting. The relevant policy object is the bundle of terms, not any single clause within it. That any single provision's measured influence is difficult to separate from that of the bundle is important. Therefore, we believe IP assignment rights should be considered an important piece of the bundle.

Given our findings, we use NLP-based patent text measures to examine the technological distance between founders' prior work, their post-founding patenting, the technological activity of their former employers, and the startups they later found. These results show that stronger employer IP rights are associated with differences not only in whether inventive employees transition into entrepreneurship, but also in the technological direction of observed founders after entry. In particular, the industry-weighted results show the largest relative change in founders' own technological trajectories, followed by their distance from the former employer, while the change in startup redirection is smaller. The software and manufacturing sectors had the largest technological distance gaps. This pattern is consistent with research showing that patents can influence entry into software markets and that firms seek to protect valuable technological knowledge. In manufacturing, prior research also shows how patent enforcement can limit the transfer of knowledge when inventors leave for new ventures.

Ownership plays a role in who gets to pursue entrepreneurship as a route for developing ideas. The decline in inventor founding fits with stronger employer claims, making entrepreneurship less attractive or feasible. The industry-weighted technology comparisons further indicate differences in the technologies represented among observed founders. To-

gether, these findings suggest ownership rules shape both who takes part in entrepreneurship and what ideas get developed along that route. They don't show which constraint in between drives the entry response, or whether tech differences come from selection or adaptation.

Private incentives don't necessarily show where an idea would create the most total value. A project may be more valuable in a new venture because of its strategy, resources, or complementary assets, yet provide an insufficient private return to the inventor under the applicable ownership arrangement. Conversely, leaving may disrupt valuable collaborations or access to incumbent resources, while employer control could support internal investment.

This extension helps move the paper beyond documenting whether entrepreneurial transitions decline and toward understanding which technological trajectories are most affected by stronger employer claims over employee innovation. An important next step is to examine more directly which types of ideas are most vulnerable to employer claims and whether the effects differ depending on how closely those ideas relate to the incumbent firm's existing technological domain.

9 Conclusion

This study examines how strengthened employer IP rights relate to entrepreneurial outcomes. Following the 2008 Federal Circuit ruling, we find that entrepreneurship declined in non-FTC states, suggesting that employer IP control rights influence the allocation of inventive ideas between incumbents and startups. Importantly, these declines are concentrated in entrepreneurial transitions among inventors: within-state moves to new employers are unchanged, while interstate mobility increases.

These findings speak to the importance of institutional context in shaping knowledge-intensive labor markets and startup formation. Ownership rules influence not only firm boundaries but also how talent and ideas move across organizations. The findings suggest that changes in IP regimes can have unintended consequences for entrepreneurial activity, with implications for both firms and regional innovation systems.

We also examine whether these changes are reflected in the technological direction of the founders who do go on to start companies. Using patent text and CPC-based measures, we find that founders remain relatively close to their own prior technological knowledge but move farther from the technological activity of their former employers, while startup technology also shows substantial redirection. In the industry-weighted analysis, the non-FTC–FTC technological-distance gap widens after the ruling, with the largest relative change occurring in founders' own technological trajectories. Because these measures are observed among founders with measurable patent portfolios, these patterns may reflect both changes in founder behavior and changes in which inventors go on to found companies.

More broadly, our results suggest that IP assignment rights are another important part of employment contract terms, similar to non-competes, that in aggregate can meaningfully shape economic outcomes. This also suggests that policymakers should consider how these different employment terms are bundled together rather than evaluating them in isolation.

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Starr, Evan P., J.J. Prescott, Norman D. Bishara. 2021. Noncompete agreements in the us labor force. *Journal of Law and Economics* **64**(1) 53–84.

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Teece, David J. 1986. Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. *Research Policy* **15**(6) 285–305.

Figures and Tables

Figure 1: Event Study of Transition to Entrepreneurship

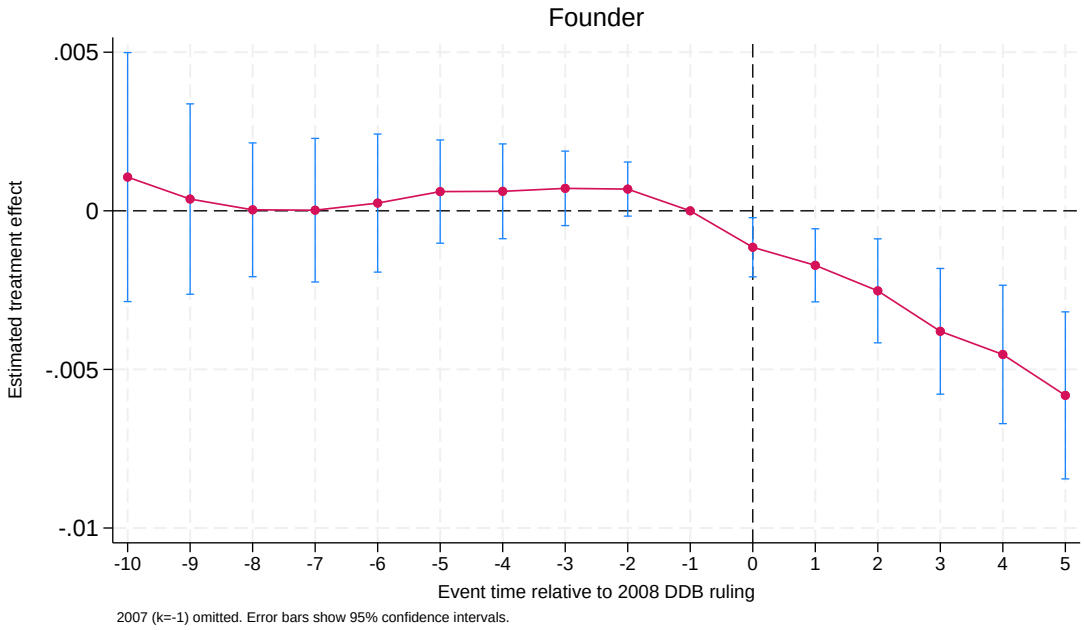
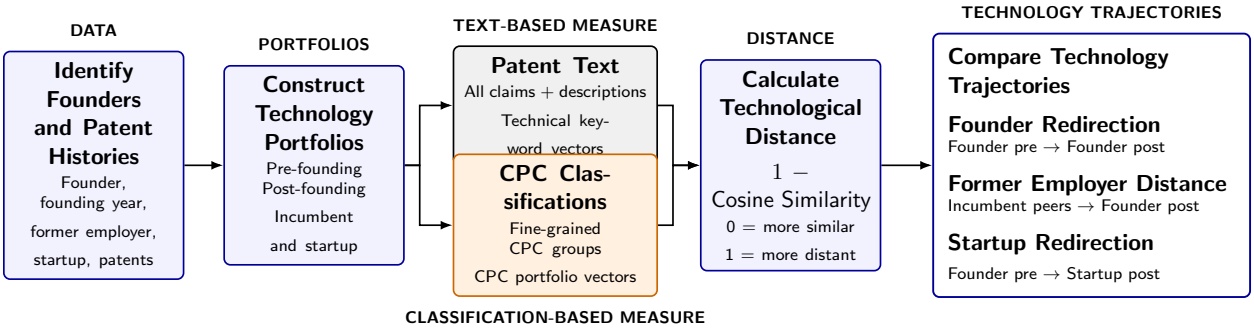
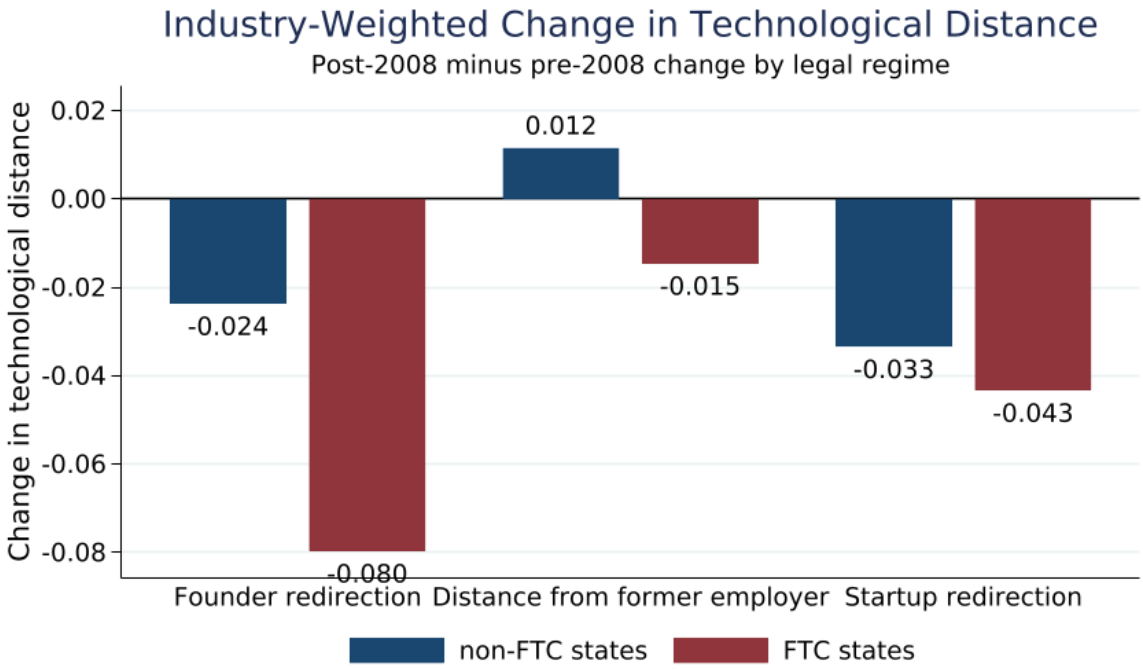


Figure 2: Construction of Technological Distance Measures.



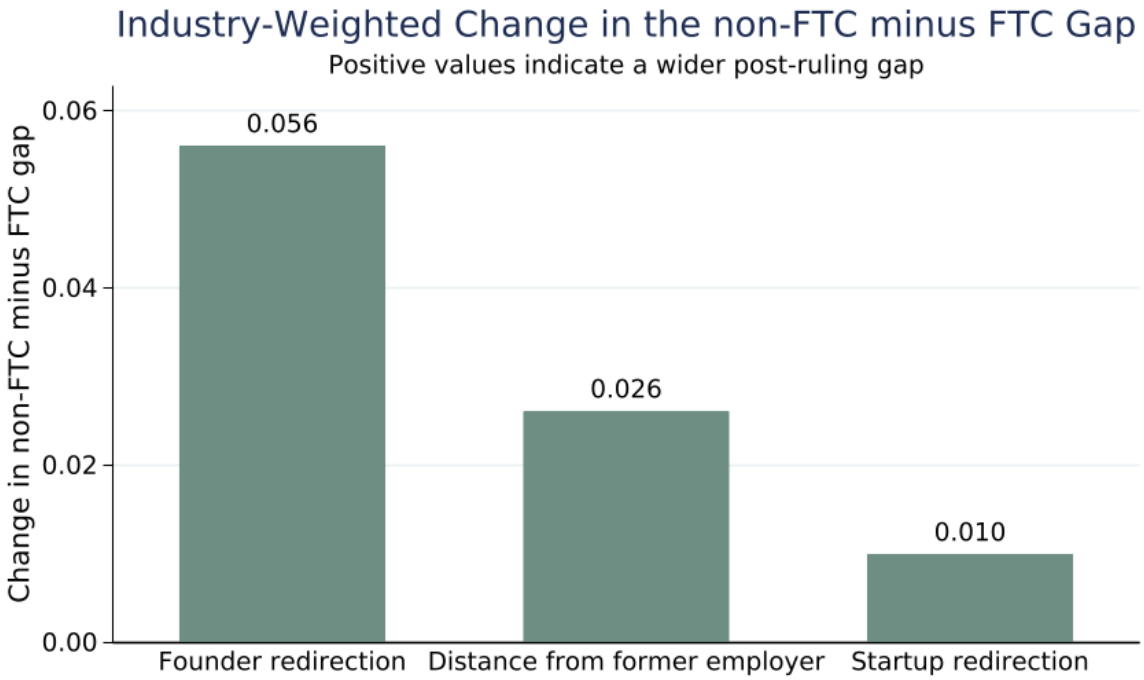
Founder and patent histories are used to construct pre- and post-founding technology portfolios. Technological content is represented independently using patent text and CPC classifications. Technological distance is measured as one minus cosine similarity. The resulting measures capture founder redirection (M6), distance from the former employer (M8B), and startup redirection (M9).

Figure 3: Industry-Weighted Changes in Technological Distance



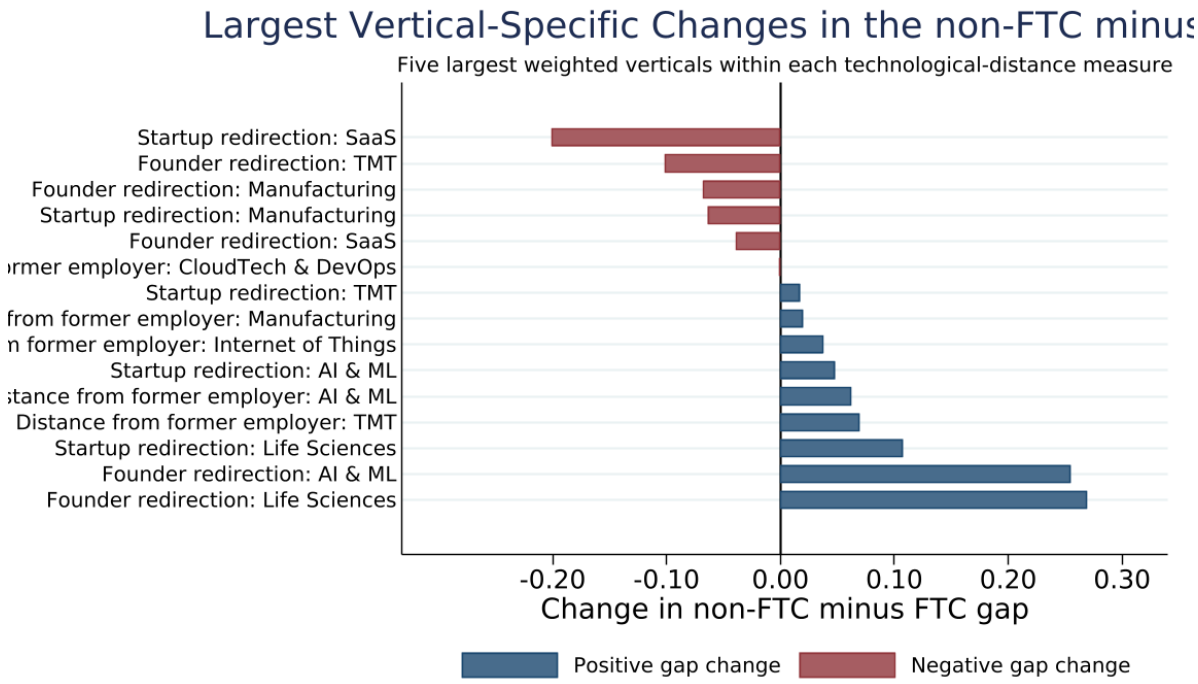
Notes. This figure shows the technological distance patents of founders, by treatment status, before and after the DDB ruling. Estimates are calculated within PitchBook verticals and weighted by each vertical's share of measurable assignments. Positive values indicate an increase in technological distance after the ruling.

Figure 4: Industry-Weighted Change in the non-FTC–FTC Gap



Notes. This figure shows the change in the non-FTC–FTC technological-distance gap of patent class before and after the DDB vs MLB Advanced Media. Positive values indicate that the gap widened after the ruling. Estimates are weighted by each PitchBook vertical's share of measurable assignments.

Figure 5: Largest Vertical-Specific Changes in the non-FTC–FTC Gap



Notes. This figure shows the change in the non-FTC–FTC technological-distance gap for the five largest PitchBook verticals within each measure. Positive values indicate a widening gap, while negative values indicate a narrowing gap.

Table 1: State Employee-Invention Statutes

Panel A. Core Freedom-to-Create States		
State	Citation	Character
California	Cal. Lab. Code §§2870–2872	Core form; notice required
Delaware	Del. Code tit. 19, §805	Core form
Illinois	765 ILCS 1060/2 (Employee Patent Act)	Core form; notice required
Kansas	Kan. Stat. Ann. §44-130	Core form; notice required
Minnesota	Minn. Stat. §181.78	Core form; notice required
North Carolina	N.C. Gen. Stat. §66-57.1	Core form; statute must be furnished
Washington	Wash. Rev. Code §§49.44.140, .150	Core form; notice required
Panel B. Variant Freedom-to-Create States		
State	Citation	Variant
Utah	Utah Code §§34-39-1 to -3	Defines "employment inventions" affirmatively
Nevada	Nev. Rev. Stat. §600.500	Inventions are the employer's absent contrary agreement

Notes. This table presents state-level employee-invention statutes that were in force before 2008. Nevada is listed for completeness. Given that Nevada's statute runs in the opposite direction, it is not grouped with the protective states.

Table 2: Descriptive Statistics

Variable	Mean	SD	p10	p50	p90	N
Patent Applications	0.306	1.721	0.000	0.000	1.000	6709626
Patents Granted	0.306	1.687	0.000	0.000	1.000	6709626
Moves to New Firm	0.033	0.178	0.000	0.000	0.000	6709626
Moves to New Firm & State	0.005	0.073	0.000	0.000	0.000	6709626
Moves to New State	0.006	0.080	0.000	0.000	0.000	6709626
Is Founder	0.049	0.216	0.000	0.000	0.000	6709626
Is Founder (Alt.)	0.053	0.224	0.000	0.000	0.000	6709626
Is VC-Backed Founder	0.002	0.048	0.000	0.000	0.000	6709626
Moves to Startup	0.027	0.161	0.000	0.000	0.000	6709626
Treated State	0.636	0.481	0.000	1.000	1.000	6709626
Post-2008	0.495	0.500	0.000	0.000	1.000	6709626
Female	0.116	0.320	0.000	0.000	1.000	6709626
White	0.787	0.410	0.000	1.000	1.000	6709626
Asian	0.148	0.355	0.000	0.000	1.000	6709626
Underrepresented Minority	0.065	0.247	0.000	0.000	0.000	6709626
Advanced Degree	0.477	0.499	0.000	0.000	1.000	6709626
Number of Positions	1.197	0.503	1.000	1.000	2.000	6709626
Firm Prestige	0.409	0.453	-0.315	0.537	0.895	6709626
Seniority	3.815	1.570	2.000	4.000	6.000	6709626

Table 3: Baseline DiD: Year, Inventor, and Job-Category-Year FEs

Panel A: Mobility Outcomes

	(1) New Firm	(2) New Firm & State	(3) New State
NonFTC × Post	0.0013	0.0012***	0.0015***
	(0.0014)	(0.0003)	(0.0004)
N	6,709,565	6,709,565	6,709,565

Panel B: Entrepreneurial Outcomes

	(4) Founder	(5) Founder (Alt.)	(6) VC Founder	(7) Startup Move
NonFTC × Post	-0.0037**	-0.0045***	-0.0028**	-0.0037***
	(0.0015)	(0.0015)	(0.0011)	(0.0012)
N	6,709,565	6,709,565	6,709,565	6,709,565

Notes. Sample restricted to inventors with a patent application before 2008. All models include inventor, year, and job-category-by-year fixed effects. Standard errors are clustered by baseline state. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 4: Innovation-Exposure Triple Difference

Panel A: Mobility Outcomes

	(1) New Firm	(2) New Firm & State	(3) New State
Innovation Exposed × Post	-0.0053***	-0.0015***	-0.0016***
	(0.0007)	(0.0006)	(0.0006)
Innovation Exposed × NonFTC × Post	0.0018*	0.0002	0.0002
	(0.0009)	(0.0006)	(0.0006)
Observations	5,756,621	5,756,621	5,756,621
Inventor FE	✓	✓	✓
Baseline-State × Year FE	✓	✓	✓
Baseline-Employer × Year FE	✓	✓	✓

Panel B: Entrepreneurial Outcomes

	(4) Founder	(5) Founder (Alt.)	(6) VC Founder	(7) Startup Move
Innovation Exposed × Post	-0.0132***	-0.0137***	-0.0027***	-0.0071***
	(0.0016)	(0.0017)	(0.0003)	(0.0010)
Innovation Exposed × NonFTC × Post	-0.0032	-0.0031	0.0014***	0.0018
	(0.0022)	(0.0024)	(0.0005)	(0.0014)
Observations	5,756,621	5,756,621	5,756,621	5,756,621
Inventor FE	✓	✓	✓	✓
Baseline-State × Year FE	✓	✓	✓	✓
Baseline-Employer × Year FE	✓	✓	✓	✓

Notes. Innovation exposure is based on the inventor's last pre-2008 occupation. The sample is restricted to inventors with a patent application before 2008. All models include inventor, baseline-state-by-year, and baseline-employer-by-year fixed effects. Standard errors are clustered by baseline state. The triple interaction is the DDD estimate. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 5: Pooled Treatment Effects for Inventors and Comparable Workers

Panel A: Mobility Outcomes

	(1) New Firm	(2) New Firm + State	(3) New State	(4) Moves to Startup
NonFTC × Post	0.0051*	0.0018**	0.0020**	-0.0012*
	(0.0026)	(0.0007)	(0.0009)	(0.0007)
Post × Inventor	0.0008	-0.0039***	-0.0048***	0.0022***
	(0.0011)	(0.0004)	(0.0005)	(0.0007)
NonFTC × Post × Inventor	-0.0045**	-0.0005	-0.0005	-0.0024***
	(0.0019)	(0.0005)	(0.0006)	(0.0008)
N	49,827,042	49,827,042	49,827,042	49,827,042

Panel B: Founder Outcomes

	(5) Founder	(6) Founder Alt.	(7) VC Founder
NonFTC × Post	-0.0015	-0.0017	-0.0004
	(0.0013)	(0.0014)	(0.0003)
Post × Inventor	0.0096***	0.0109***	0.0044***
	(0.0006)	(0.0006)	(0.0008)
NonFTC × Post × Inventor	-0.0024**	-0.0030***	-0.0024**
	(0.0010)	(0.0010)	(0.0009)
N	49,827,042	49,827,042	49,827,042

Notes. Pooled DiD estimates compare the baseline inventor cohort with a fixed 10% random sample of non-inventor workers. All models include individual and year fixed effects and exclude 2008. Standard errors are clustered by baseline state. The triple interaction reports the inventor-specific treatment differential. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 6: Startup Quality of Inventor-Employees That Transition

	(1) VC-Backed	(2) Financed	(3) Survives 5 Years	(4) Acquired	(5) IPO
NonFTC State	-0.0196*	-0.0220*	0.0050**	-0.0014**	-0.0110**
	(0.0098)	(0.0110)	(0.0021)	(0.0006)	(0.0045)
Observations	495,350	495,350	17,585	495,350	495,350

Notes. Cross-sectional inventor-level outcomes. Outcome equals 1 if the inventor ever satisfies the corresponding quality criterion after 2009. Non-founders and founders not satisfying the quality criterion are coded as zero. The post-treatment interaction is not used because the data are collapsed to the inventor level. Baseline-state fixed effects are omitted because they absorb treatment status. Controls include baseline job category, number of positions, prestige, degree, and demographics. Standard errors are clustered at the baseline-state level. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

Table 7: Technological Distance and Agreement Across Summary Statistics

	Mean Technological Distance		Text–CPC Pearson Correlation	
Measure	Text	CPC	Business Verticals	Pre-Founder CPC Subclasses
Founder Redirection	0.42	0.71	0.72	0.78
Distance from former employer	0.79	0.95	0.74	0.29
Startup Redirection	0.73	0.89	0.81	0.86

Notes. M6 captures founder redirection, M8B captures distance from other observed inventors at the former employer, and M9 captures startup redirection relative to the founder's prior patent portfolio. Text distance uses all claims plus descriptions; CPC distance uses CPC groups. Correlations are Pearson correlations across category-level means.

Table 8: Overall Changes in Technological Distance Before and After the 2008 Ruling

	nonFTC (Treatment)			**FTC (Control)**			Change in Gap
Measure	Pre	Post	Change	Pre	Post	Change	nonFTC − FTC
Panel A. Mean technological distance							
Founder Redirection	0.419	0.418	-0.001	0.381	0.435	0.054	-0.055
Distance from Former Employer	0.770	0.790	0.020	0.767	0.804	0.037	-0.017
Startup Redirection	0.741	0.723	-0.019	0.736	0.735	-0.002	-0.017
Panel B. No detected technological overlap (%)							
Founder Redirection	22.665	20.867	-1.798	18.767	20.819	2.052	-3.850
Distance from Former Employer	35.009	30.681	-4.329	31.667	25.637	-6.030	1.701
Startup Redirection	25.819	36.269	10.451	21.510	30.870	9.360	1.091

Notes. nonFTC is the treatment group, and FTC is the control group. Panel A reports mean technological distance, measured as one minus cosine similarity using patent text. Panel B reports the percentage of measurable comparisons with no detected technological overlap; changes are expressed in percentage points. Pre denotes founding before 2009, and Post denotes founding in 2009 or later. Change is Post minus Pre. The final column reports the respective measurement gap by treatment status.

Table 9: Industry-Weighted Changes in Technological Distance

	nonFTC			FTC			Weighted Gap
Measure	Pre	Post	Change	Pre	Post	Change	Change
Founder Redirection	0.384	0.360	-0.024	0.436	0.356	-0.080	0.056
Distance from former employer	0.730	0.742	0.012	0.780	0.765	-0.015	0.026
Startup Redirection	0.736	0.702	-0.033	0.750	0.707	-0.043	0.010

Notes. PitchBook verticals are weighted by their share of measurable vertical assignments within each technological-distance measure. The weighted gap change equals the weighted nonFTC change minus the weighted FTC change. PitchBook verticals are multi-label categories.

Internet Appendices

A Variable Definitions

.1 Variable Definitions

Entrepreneurship outcomes: By matching Revelio employment histories to PitchBook company data, we obtain detailed measures of startup and venture-backed employment:

- **Is Founder:** This is an indicator equal to one if the innovator holds an entrepreneurial title. Keywords for entrepreneurial title include "founder," "co-founder," "entrepreneur," "founding team," "founding member," "founding engineer," "owner," and "co-owner." This variable is exclusively defined based on Revelio raw job titles.

- **Is Founder (Alt):** This is an indicator equal to one if the innovator holds an entrepreneurial title. Keywords for entrepreneurial title include "founder," "co-founder," "entrepreneur," "founding team," "founding member," "founding engineer," "owner," and "co-owner." In addition, those holding executive positions (CEO, CTO, COO, President) are included when they either describe the company in either the keyword description or name as ("startup," "stealth," "pre-launch," "spinout," "spinoff," "accelorator," "incubator," or the name of specific accelorator, such as ycombinator or techstars.);

- **Is VC-backed Founder:** Indicator equal to one if the innovator holds an executive title at a VC-backed company, where data on the VC funding comes from Pitchbook deals and matching between Revelio and Pitchbook.

- **Moved to Startup:** Indicator equal to one if the inventor works at a startup firm, identified through Revelio keywords: (1) keyword matching in PitchBook company descriptions ("startup," "stealth," "pre-launch," "spinout," "spinoff"); (2) participation in major accelerator programs (Y Combinator, Techstars, 500 Startups, MassChallenge, Sequoia Arc, Plug and Play, among others); or (3) company age of five years or less at the time of the position.

B Legal Details

B.1 Legal Title in Patent Law

The Federal Circuit court established that the legal title vests in the employer automatically through a series of case laws, which include:

1. *FilmTec Corp. v. Allied-Signal, Inc.* in 1991 and, in a companion case decided the same day, held that "will be assigned" does not effect a present assignment.[11]

2. *Speedplay, Inc. v. Bebop, Inc.* extended it in 2000.[12] The doctrine is consequential and has been persistently criticized for its soundness.

3. *Stanford v. Roche*, and the Supreme Court denied certiorari on the question whether *FilmTec* should be overruled in 2012.[13]

[11] *FilmTec Corp. v. Allied-Signal, Inc.*, 939 F.2d 1568 (Fed. Cir. 1991); *Arachnid, Inc. v. Merit Industries, Inc.*, 939 F.2d 1574 (Fed. Cir. 1991).

[12] 211 F.3d 1245 (Fed. Cir. 2000).

[13] *Board of Trustees of the Leland Stanford Junior University v. Roche Molecular Systems, Inc.*, 563 U.S. 776 (2011) (Sotomayor, J., concurring; Breyer, J., dissenting); *Picture Patents, LLC v. Aeropostale, Inc.*, cert. denied (2012).

C Examples of Claim-Text Classification

The text-analysis procedure searched patent claims for technical terms contained in the vertical-specific keyword dictionary. Matched terms are shown in red. The vertical represents the project-specific, keyword-based classification, while the CPC code represents the patent's official technology classification.

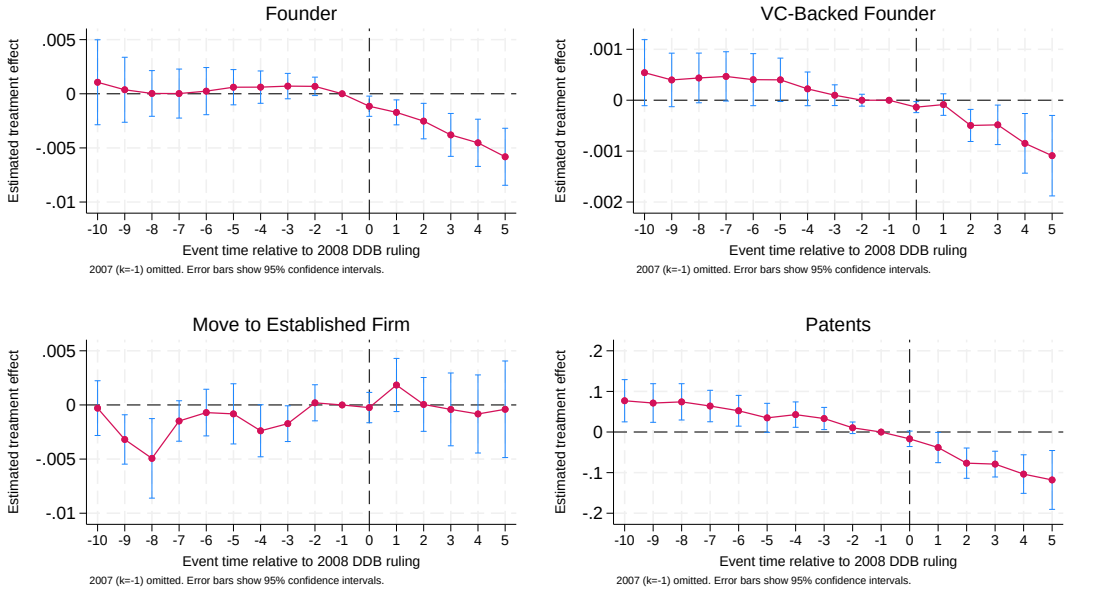
Table B.1: Examples of claim-text matching and CPC classification

Patent	Claim-text evidence	Assigned vertical	Inventional CPC group(s)
US20170274585	*A method for additive manufacturing, comprising: depositing a first composite filament on a build surface; softening the first composite filament...*	3D Printing	B29C67/0055; B29C67/0088; B33Y10/00; B33Y30/00; B33Y50/02
US20210082453	*A method comprising: identifying sound recording data on a user device; generating... an acoustic classification neural network comprising a convolutional neural network layer...*	Artificial Intelligence & Machine Learning	G10L25/30; G06N3/0454; H04S7/40; G06K9/00624; G06K9/6267
US20140277692	*A method for building a pickface... in an automated storage and retrieval system... providing an autonomous rover configured to transfer case units...*	Supply Chain Tech	B65G1/1373
US20170072572	*An end effector for an articulated arm in a robotic system... an enclosed flexible membrane... that contains a fluid...*	Robotics and Drones	B25J15/0616; B25J15/065; B25J18/00
US20140102162	*A method of shaping a thin-walled component... after said deep drawing, forging the feature...*	Manufacturing	B23P17/00; B23Q3/00; B23P11/00; B21D22/26; B21D24/04

Notes: Red text identifies the dictionary term that generated the vertical match. It does not imply that every word in the surrounding claim was used for classification. A patent may receive multiple CPC groups. The Artificial Intelligence & Machine Learning, Manufacturing, Robotics and Drones, and Supply Chain Tech dictionaries are context-sensitive because their terms can occur across multiple application areas.

D Appendix A

Figure B.1: Event-Study Estimates: Innovation, Mobility, and Entrepreneurship



Notes. This figure reports event-study estimates for the main outcomes around the 2008 DDB Technologies v. MLB Advanced Media ruling. Event time is measured relative to 2008, with 2007 ($k = -1$) omitted as the reference year and 2008 ($k = 0$) treated as the transition year. The panels report estimates for becoming a founder, becoming a VC-backed founder, moving to an established firm, and patenting. All specifications include inventor, year, and job-category-by-year fixed effects. Standard errors are clustered at the baseline-state level, and error bars represent 95% confidence intervals.

Table B.2: Baseline DiD Cross-Sectional: Year FE with Controls (NonFTC vs FTC States)

Panel A: Mobility Outcomes

	(1) New Firm	(2) New Firm & State	(3) New State
NonFTC × Post	0.0025*	0.0014***	0.0017***
	(0.0013)	(0.0004)	(0.0005)
N	6,709,626	6,709,626	6,709,626

Panel B: Entrepreneurial Outcomes

	(4) Founder	(5) Founder (Alt.)	(6) VC Founder	(7) Startup Move
NonFTC × Post	-0.0032**	-0.0039***	-0.0029**	-0.0028**
	(0.0012)	(0.0012)	(0.0012)	(0.0011)
N	6,709,626	6,709,626	6,709,626	6,709,626

Notes. Sample restricted to inventors with a patent application before 2008. All models include year fixed effects and controls. Standard errors are clustered by baseline state. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table B.3: Descriptive Statistics for Comparable Non-Inventor Workers

Variable	Mean (SD)	N
NonFTC Baseline State	0.741 (0.438)	43,344,445
Post-2009	0.574 (0.495)	43,344,445
Innovation Exposed	0.707 (0.455)	43,344,445
Moves to New Firm	0.126 (0.332)	43,344,445
Moves to New Firm and State	0.021 (0.144)	43,344,445
Moves to New State	0.025 (0.155)	43,344,445
Is Founder	0.032 (0.177)	43,344,445
Is Founder (Alternative)	0.034 (0.181)	43,344,445
Is VC-Backed Founder	0.000 (0.022)	43,344,445
Moves to Startup	0.016 (0.125)	43,344,445
Number of Positions	1.203 (0.512)	43,344,445

Notes: This table reports descriptive statistics for the comparable non-inventor workers used in the pooled analysis. Comparable workers are drawn from a fixed reproducible 10% person-level random sample of non-inventors, with complete longitudinal histories retained for sampled workers. All observations require a usable pre-2008 baseline treatment state, and 2008 is excluded as the transition year. N reports observed employee-year-state observations. Descriptive statistics for the baseline inventor sample are reported separately in the main analysis.