

**Innovation Motivation:**

**Behavioral Effects of Post-Employment Restrictions<sup>†</sup>**

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### *Abstract*

Traditional economic models view post-employment restrictions as necessary constraints stemming from the assumption that absent such contractual protections, employers would under-invest in R&D and employee training. This article enriches the analysis of human capital investment by exploring effects on employee motivation while keeping in mind the aggregate dimension of mobility over time. The article reports original experimental research demonstrating that contractual background affects motivation and performance: in a pure effort task, individuals abandoned the task at higher rates, spent less time on it, and failed more frequently to find the correct solution when bound by post-employment restrictions. At the same time, some of these effects, including time on task and quality of performance, largely disappeared in a task that invoked internal talent and creativity. The article links recent empirical evidence about positive spillovers with a behavioral analysis that suggests further positive effects, together offering a richer perspective of the costs and benefits of post-employment restrictions.

**It is an immutable law in business that words are words, explanations are explanations, promises are promises but only performance is reality.**

**– Harold S. Geneen, CEO of ITT 1959-77**

## **1. Introduction**

How much of human productive action is a function of intrinsic interest in the task at hand and how much is affected by external rewards, promises, and constraints? This Article provides a nuanced view of the costs and benefits of post-employment restrictions. Traditional economic models view post-employment restrictions, primarily covenants not-to-compete, as necessary limitations stemming from the assumption that absent such contractual protections, employers would under-invest in research, development, and employee training because of the increased risk that these employees will leave and use that training as competitors (Rubin and Shed 1981; Glick et al. 2002). This Article seeks to enrich the analysis of human capital development by studying the motivational effects of post-employment restrictions on performance during employment while attending to the dynamic nature of the employment market. The attempt is to test the following assumption: while post-employment restrictions may encourage firms to invest in employee skill and research and development (R&D), such restrictions may discourage employees from investing in their own human capital and work performance.

The Article reports the findings of an experimental study designed to observe the effects of post-employment restrictions on task performance. The reported lab experiment was incentive

compatible, providing pay for performance to the 1028 study participants. The results demonstrate that under certain conditions of contractual restrictions, when tasks involve pure effort (e.g., a search task), individuals will abandon the tasks at higher rates, spend less time on task, and fail overwhelmingly more often to find the correct solution. At the same time, the findings show that with tasks that invoke internal talent and creativity rather than pure effort, some of these effects, including diminished time on task and quality of performance, largely disappear. Significant gaps in task completion remain even under the more creative tasks.

The field of post-employment restrictions is a dynamic policy area, which has recently been spurring heated debates. No state enforces contractual agreements to prevent post-employment mobility and competition without restriction. Most states require that a non-competition clause be reasonable. Beyond reasonableness, the court renders the contract void. By contrast, a growing minority of states, most notably California, void most or all such contractual agreements without regard to their reasonableness. The findings of our experimental study suggest that the widespread market practice of using non-competes may have the inadvertent counterproductive effect of lowering employee performance. Although a rising number of recent empirical studies overwhelmingly suggest that lower controls over mobility increase economic growth and innovation, the studies attribute the findings largely to post-employment spillover effects, i.e., positive externalities of high-velocity labor markets and vibrant economic activity. Our results contribute to this growing body of empirical research and add the behavioral layer of those whose post-employment mobility is constrained, aligning with the recent findings on agglomeration economies and knowledge spillovers. More broadly, the findings contribute to the study of the dynamics between internal and external motivation. In particular, the findings

provide important evidence of a distinction between tasks that require pure effort and tasks that trigger creative and innovative production.

The Article proceeds as follows. Part II provides an overview of the legal variance in enforcing and voiding post-employment contractual restrictions. Part III introduces the orthodox economic model of Employment Intellectual Property (EIP) controls. It then introduces a more enriched view, offering a dual perspective over time of the effects of post-employment restrictions. This approach takes into account both the behavioral dimension of constrained individuals and the aggregate dimension of positive spillovers over time. We designed our experimental study to examine the behavioral aspect of this approach. Part IV presents our experimental design, methods, and results, drawing on existing behavioral literature to generate specific predictions about the motivational effects of post-employment restrictions. In Part V we discuss the study findings: First, we discuss recent empirical evidence on the positive effects of weaker mobility controls. These studies are then linked to the behavioral findings of the experiment. Finally, we discuss the implications of the findings and our enriched approach to both theory and practice. We conclude with directions for future research, suggesting that the implications of the study of innovation motivation is at the heart of broader human capital and intellectual property debates, including the optimal scope and allocation of patent, copyright, and trade secrets.

## **2. Jurisdictional Variation in the Law of Post-Employment Constraints**

Repression is not the way to virtue. When people restrain themselves out of fear, their lives are by necessity diminished. Only through freely chosen discipline can life be enjoyed and still kept within the bounds of reason. – Mihaly Csikszentmihályi

## **A. The Rule of Reason and Judicial Constraints**

Managers often say that their most valuable assets walk out the door every night. The departure of valuable employees is frequently a double blow for the company. Not only does the company lose a trained and talented individual, but its competitor also stands to gain from the loss by hiring a former insider as a key player in their operation. Because of this, EIP restrictions have become widespread in almost every industry. These restrictions include non-compete contracts, trade secrets, non-disclosure agreements, employee duties of loyalty, and employer-based assignment of ownership over inventions and creative ventures. Non-competes, designed to restrict an employee's post-employment ability to work for a competitor or start a competing company, have become an almost universal feature of employment contracts. Today, most companies require at least some of their employees to sign such restrictive covenants as part of their hiring or promotion process, and surveys show that nearly 90% of managerial and technical employees have signed them (Garmaise 2009).

Although restrictions on trade are generally unenforceable under the common law, non-competes are viewed as an exception. In most states, non-compete clauses are legally allowed but judicially restricted in their scope by an overarching judicial requirement of reasonableness (Lobel 2009). The common law rule of reason allows the courts to perform a case-by-case analysis of each contract, voiding those with negative consequences to either the employee or society. The courts first ask whether the non-compete is reasonably needed to protect the employer's legitimate business interests. Even if so, the court proceeds to weigh those interests against the hardship to the former employee or the likely injury to the public. If the burden to the employee or the public exceeds the benefit to the employer, the court will consider the non-

compete to be unreasonable (Malsberger 2004; Restatement of Contracts 1981). The court then pairs the triangular perspective of employer interest, employee hardship, and public welfare with a second tri-inquiry of the actual restriction: the reasonableness of its time, geography, and professional scope (Lobel 2009). In other words, the enforceability of a non-compete agreement is judged according to the rationality, legitimacy, and fairness of the spaces implicated, the restriction's duration, and the realm of competitive activity curtailed.

Although the double triangular contours of reasonableness are widely adopted, the determination of reasonableness is highly varied and fact-intensive. As one author describes the range of court interpretations, “so disparate is the law concerning the legality of non-competition agreements that, with respect to an identical clause, in one state it can be declared reasonable and be enforced, in a second state it can be declared unreasonable and unenforceable, in a neighboring state it can be declared unreasonable but modified to be reasonable and enforceable, and in a fourth state declared reasonable but not be enforced because it is deemed contrary to the forum state's public policy” (Epstein 2007, 9.01).<sup>1</sup> Nevertheless, out of the vast seas of variance emerge patterns. While some states are more accepting of non-compete terms, others apply more rigorous tests. Courts vary on which reasons given by the employer seeking to enforce a non-compete, such as protecting trade secrets or recouping skill investment, are considered

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<sup>1</sup> An Ohio court colorfully described the difficulty of determining whether a non-compete is enforceable as diving into the vast seas and drowning in the murky waters: “No layman could realize the legal complication involved in [the] uncomplicated act [of signing a non-compete]. This is not one of those questions on which the legal research cannot find enough to quench his thirst. The contrary, there is so much authority it drowns him. It is a sea – vast and vacillating, overlapping and bewildering. One can fish out of it any kind of strange support for anything, if he lives so long. This deep and unsettled sea pertaining to an employee's covenant not to compete with his employer after termination of employment is really Seven Seas and now that the court has sailed them, perhaps it should record those seas so that the next weary traveler may be saved the terrifying time it takes just to find them.” Arthur Murray Dance Studios v. Witter, 105 N.E.2d 685, 687-88 (Ohio Ct. C.P. 1952). An illustration of the vast difficulty of predicting reasonableness for non-compete agreements is a test that one court produced in attempting to resolve such dispute, announcing that there are *forty-one* questions to be considered.

legitimate. There are serious costs to the seas of uncertainty. Yet one benefit of the great variance between states is the natural experiment it creates. As will be discussed in Part V, new empirical research exploits this natural experiment by coding state variation and testing for correlating differences in patenting rates, employee mobility, executive compensation, venture capital (VC) investment, and regional economic growth.

## **B. Absolute Prohibition and Legislative Reforms**

Only a handful of states prohibit all or most covenants not-to-compete between employers and ex-employees. These minority states, primarily California, Oregon, and Colorado, are unique in their strong stance against the enforceability of non-compete clauses. California is the most notable of the outlier states. For over a century, California has held a steadfast aversion to post-employment restrictions. The California Business and Professions Code voids “every contract by which anyone is restrained from engaging in a lawful profession, trade, or business.” (CAL. BUS & PROF. CODE § 16600, 2010). The statute expresses California’s policy of favoring open competition and its citizens’ right to pursue the employment and enterprise of their choice (*Beer & Wine Servs., Inc. v. Dumas*, Cal. Ct. App. 2003). Despite this longstanding policy, confusion pervaded the courts regarding the proper interpretation of the California law prohibiting non-competes until recently (*Hill Med. Corp. v. Wycoff*, 86 Cal. App. 4th 895, 900, 2001). In 2008, the California Supreme Court reaffirmed that in California, any non-competition agreement between an employer and employee is prohibited (*Edwards v. Arthur Andersen*, 189 P.3d 285 Cal. 2008). The court spoke strictly: even merely a partial or narrow restriction on an employee’s ability to practice the employee’s trade or profession will not be allowed.

A small but growing minority of states are following the California way. Colorado prohibits most non-compete restrictions and even has criminal sanctions for an employer that requires its employees to sign non-compete agreements. There are, however, certain permissible exceptions for contracts allowing an employer to recover the expense of educating and training an employee who has served an employer for a period of less than two years and for “executive and management personnel and officers and employees who constitute professional staff.” (COLO. REV. STAT. 8-2-113(d) 2005). In other words, Colorado draws a distinction between types of employees, allowing only higher skilled white-collar employees to be restricted by a non-compete. In 2008, Oregon similarly passed a new law to significantly restrict the enforcement of non-competes, expressing a concern about “a dangerous expansion in the use of non-competition agreements in Oregon.”<sup>2</sup> Like in Colorado, the new law enforces non-compete restrictions only against highly paid managers and professional staff.

In 2011, the Massachusetts legislature will vote on a bill that would restrict non-competes.<sup>3</sup> The bill is an initiative of the Alliance for Open Competition, a national group of venture capitalists, executives, and entrepreneurs dedicated to fostering innovation. Non-competes, according to the Alliance campaign, are stifling the emergence of start-up companies, “forcing innovative entrepreneurs to take on tremendous legal and financial risks, and hampering the ability to meet our fullest economic potential as a nation.”<sup>4</sup> The Alliance advocates that successful high-tech companies naturally perceive themselves as breeders of multiple start-ups,

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<sup>2</sup> Press Release, Oregon Bureau of Labor and Industries, Majority of Oregon Workers Now Protected from Noncompete Agreements Thanks to Passage of Labor Commissioner’s SB 248 (June 28, 2007) (on file with author).

<sup>3</sup> The bill is on House Docket 2018 and has been assigned House Bill No. 2293. Massachusetts already has a statute that prohibits non-competes in the broadcasting industry. 149 MASS. GEN. LAWS ANN. ch. 149 § 1. The law was passed as a result of strong lobbying by the American Federation of Television and Radio Artists (AFTRA).

<sup>4</sup> ALLIANCE FOR OPEN COMPETITION, <http://opencompetition.wordpress.com/>

leading to a multiplier effect across successive generations of technology companies. It warns that a legal regime that enforces non-competes is in effect the *silent killer*, retarding innovation and reducing the creation of start-ups. Debates such as the one initiated by the Alliance for Open Competition have been sparking around the world. Much like the American debates that result in the inconsistent enforcement of non-competes, countries as diverse as England, China, Israel, and Japan have been debating reforms of their EIP laws in an effort to strike an optimal balance between protections and mobility.

### **3. Talent Wants to Be Free: The Rule of Reason Meets the Rules of Science**

#### **A. A Broader Approach of Dynamic Investment**

Utopic cyber-thinker Stewart Brand is famously credited with coining the phrase “information wants to be free.” These words quickly became the motto of movements calling to eradicate restrictions on intellectual property. However, a closer read of Brand’s words reveals that he understood the “desires” of information as more complex and the world as full of multiple and conflicting pushes and pulls. The quote comes from the first Hackers’ Conference in 1984 where he elaborated:

On the one hand information wants to be expensive, because it's so valuable. The right information in the right place just changes your life. On the other hand, information wants to be free, because the cost of getting it out is getting lower and lower all the time.

Here lies the classic tension between protecting and promoting the flow of information, knowledge, and talent. We want to make sure information is produced, but we also want to know that once the information is produced it is put to good use. Restricting the flow of talent is an

even greater puzzle. It targets the knowledge embodied in a person and their personal relations. It prevents the flow of the input rather than the output of valuable innovation. In other words, although post-employment restrictions raise the same set of questions about intellectual property in general—the problem of creating incentives for ingenuity without over-constraints—they entail particular types of cost and benefits. The deadweight loss of the temporal monopoly created by post-employment restrictions is the constrained person herself. The complexities inherent in these effects have led Landes and Posner (2003, 371) to admit that “it is not even clear that enforcing employee covenants not to compete generates social benefits in excess of its social costs” (2003, 371). Moreover, unlike information to which we cannot attribute desires, people truly have wants and motivations. People are affected by the social and legal controls under which they operate. Talent wants to be developed, but it also wants to be free and put to good use. Such is the non-compete puzzle. The policy goal is to reach the optimal balance that will encourage investment and development in human capital, training, research, and development. We want to allow companies to appropriate the returns on their investment in human capital. But as with information, even more so with people: incentives and benefits are complex and textured.

Traditional economic models view non-competes as a necessary limitation stemming from the fact that absent such contractual protection, employers would under-invest in employee training (Becker 1975). Further, because employees generally lack the resources to self-finance their training costs, economic analysis usually predicts that EIP controls will promote efficient investment in innovation and human capital development (Rubin and Shed 1981; Glick et al. 2002; Posner et al. 2004). The orthodox model thus explains post-employment controls as necessary to encourage optimal investment within the corporation.

Recent developments suggest that the orthodox model is incomplete. New data about knowledge economies and the ways in which non-competition law and doctrine affect innovation and knowledge diffusion challenge the conventional wisdom on the benefits of post-employment controls. Protecting human capital and trade secret investments is often in the immediate interest of a company, but the growing body of recent theoretical and empirical studies suggests that too much control can become a double-edged sword—although information leakage and job-hopping by talented workers may provide competitors with undue know-how and technologies, constraining mobility may negatively affect employee performance. Over the long run, knowledge spillover and information sharing may also foster new levels of creativity and innovation that benefit companies and the economy as whole.

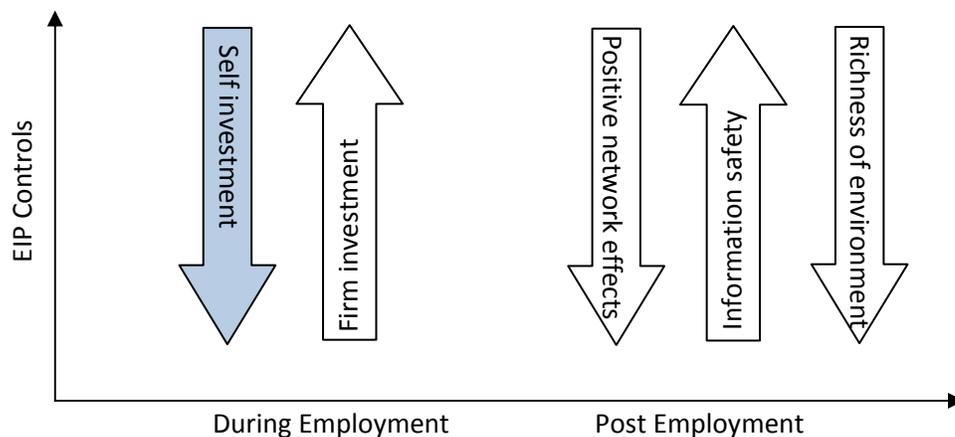
These broader assumptions are captured in our Dyadic-Dynamic Investment (DDI) perspective introduced below. To test the dyadic behavioral aspect, we studied performance bound by non-competes in an experimental setting. We present the experimental setting in the next section and then discuss our findings along with other recent empirical evidence to explain both the dyadic and dynamic effects.

**The Dyadic Aspect: Time 0 (During employment):**

- 1) EIP controls may encourage firms to invest in their managers' human capital.
- 2) EIP controls may discourage employees to invest in their own human capital.
- 3) EIP controls (or sticks) may alternate with EIP carrots, such as performance-based compensation, further affecting employee motivation.

**The Dynamic Aspect: Time 1 (Post-employment):**

- 4) EIP controls may prevent loss of valuable employees and misappropriation of proprietary information.
- 5) EIP controls may reduce efficient employee-firm fit, “new blood,” entrepreneurship, social capital, network density, and positive knowledge spillovers.
- 6) EIP controls may lead to brain drain, with patterned flows of capital and talent from high to low control regions.



Almost half a century ago, Kenneth Arrow (1984) argued that competition, not central control, is what fuels innovation. Writing specifically about human capital, Arrow (1962, 615) observed that “mobility of personnel among firms provides a way of spreading information.” Arrow believed that ideas would travel with workers between companies, thereby creating more useful knowledge and strengthening competition in the market. Contemporary markets and new data provide empirical support for Arrow’s assertion. Drawing on new experimental and empirical data, we suggest that EIP controls, primarily through non-compete contracts, may reduce overall investment. In time 0, this happens when variance in self-investments in one’s

human capital, stimulated by external prospects and/or internal performance incentives, is of greater effect than the investment of a company (Garmaise 2009). In the repeat game represented by time 1, overall gain happens when the effects of positive spillovers outweigh the negative externalities of human capital and information flows.

## **B. The Dyadic Aspect: Motivation and Performance – Predictions and Prior Research**

The experimental environment introduced in this article attempts to isolate the effects of post-employment restrictions while controlling for other factors, such as external rewards, external goals, and task environment. Productive employment is inadvertently tied to the motivation of employees to perform. Our analysis predicts that regulatory and contractual environments affect employee motivation and performance. Motivation has been studied intensely from both an economic perspective (i.e., incentives) and a psychological perspective, looking at the psychological processes underlying it. More recently, both perspectives converge around the study of the interplay of internal and external drivers of motivation (Amir and Ariely 2008; Feldman and Lobel 2008, 2010; Gneezy 2010). We turn to this extensive body of work to examine how incentives and variance in regulatory regimes might affect individual motivation and behavior.

The study of human motivation is a vibrant and growing field of research, yet legal inquiry has lagged behind in adopting contemporary insights. Moreover, while the study of motivation has been the subject of academic inquiry for over a century, with literally thousands of studies and experiments on the subject, few of these studies have linked motivation to law and contract (Bateman and Crant 2003; Feldman and Lobel 2010). This disconnect limits the potential of these results to inform concrete law and policy (Amir et al. 2005). In particular, in

the study of intellectual property (IP) law and strategy, there has been a stark absence of behavioral data on contractual and regulatory variance (Buccafusco & Sprigman 2009). Still, we can draw on known psychological mechanisms to set forth experimentally testable predictions as to the impact of these regulatory regimes on performance and motivation. We elaborate on these predictions below.

When looking at the fundamental drivers of motivation, researchers consistently find that the most significant interaction of incentives (intrinsic and extrinsic) occurs with the types of goals, characteristics of the task, and qualities of the work environment. For example, task difficulty influences performance in a non-trivial manner. Early on, Atkinson (1958) showed that task difficulty is related to effort in a curvilinear inverse function. The highest levels of effort occur when a task is moderately difficult, and the lowest levels occur when a task is either very easy or very hard. In general, expectancy—the belief that effort will lead to the performance needed to attain the rewards—is linearly and positively related to effort, and gives rise to the goal gradient effect, whereby effort increases as one is closer to goal attainment (Hull 1935; Amir and Ariely 2008). That is, goals are indeed key in generating motivation and performance. In experiments where people were either told to “do their best” or were given specific goals, the latter, more explicit instruction consistently led to higher performance (Latham and Yukl 1976; Latham et al. 1978). Put simply: “[W]hen people are asked to do their best, they do not do so. This is because do-your-best goals have no external referent and thus are defined idiosyncratically” (Locke and Latham 2002, 706). Moreover, studies show that ownership over the goals of the task can determine the level of motivation generated, such that if employees participate in setting goals, they will set higher goals and will have higher performance than those who were assigned goals from above (Lee et al. 1989). In the experiment, we consequently

expect restrictions on future employment to decrease the perceived ownership and control over one's job and negatively influence performance.

Motivation drivers are often divided into “intrinsic” and “extrinsic” (Feldman and Lobel 2010). Extrinsic motivation is linked to actions that are driven by external commands or rewards such as payments (Deci and Ryan 2000; Harackiewicz and Sansone 2000). Conversely, intrinsic motivation occurs when the behavior is chosen from within the individual, for example, because of inherent joy or a sense of moral duty (Kasser and Ryan 1996; Deci et al. 1999). The interplay between intrinsic and extrinsic motivators is complex and not independent from the characteristics of the task and its environment. Existing research shows that when financial incentives (extrinsic drivers) are high, people perceive the pay as the main motivator for their action, and may thereby perform *worse* than when the financial incentive is small (and thereby allowing room for intrinsic motivation to drive performance) (Festinger and Carlsmith 1959).<sup>5</sup> Similarly, a series of recent research on honesty and ethical reporting finds that, in many cases, intrinsic motivation drives individual behavior much more than extrinsic drivers (Mazar et al. 2008; Feldman and Lobel 2010), leading experimental economists Fehr and Falk (2002, 714) to argue that “the introduction of monetary rewards decreases task-specific intrinsic motivation under identifiable conditions.”

Based on the existing literature, the experimental study was designed to examine the effects of post-employment restrictions on motivation and performance while being attuned to task characteristics, and in particular, controlling for the level of difficulty and creativity inherent

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<sup>5</sup> Interestingly, in a recent study, researchers demonstrate that extrinsic incentives that are too large may lead to choking under pressure (Ariely et al. 2008). Moreover, Uri Gneezy proposes the impact of financial incentives to be “W” shaped, an inverse “U” shape for both gains and potential penalties, such that individuals offered moderate levels of incentives under-perform at either very high or very small levels, again, interacting with the specific task conditions (Gneezy 2010 unpublished).

in the tasks. Task difficulty and task creativity are both known in the psychology literature to affect motivation. The impact of task difficulty yields a simple prediction in line with lay expectations: the more difficult the task, the greater the motivation required to sustain and complete it; the lower the difficulty, the lower the likelihood of aborting (Newell and Simon 1972). The degree of creativity required by the task has however a more complicated effect. Extrinsic rewards may indeed serve as drivers for effort exertion, but they do not always inspire greater creativity. For example, psychologists studying motivation of both adults and children find that often, when individuals receive rewards for their creativity, they produce lower-quality products (Kohn 1993; Amabile 1996). Intrinsic motivation inherently drives creativity and too much extrinsic drive may curtail it. In the context of copyright ownership for example, scholars have claimed that “[c]reativity, as lived, is more than a response to incentives, working from fixed and random preferences” (Tushnet 2009, 521).

To allow greater generalizability, the experiment employed both effort driven tasks (i.e., a matrix search task, from Mazar et al. 2008) and creativity driven tasks (i.e., a remote associates task – from Mednick and Mednick (1962, 1967)). Based on the literature on external incentives, we expected post-employment restrictions, which by definition increase the opportunity cost of performing the task, to reduce motivation in the task, leading to lesser completion and lesser performance. However, following the literature on the relation between intrinsic motivation and task type, we expected the latter effect of reduced performance quality to be significantly more pronounced in an effort-based task than in a creativity task. This is because the completion of creativity tasks has been shown to be fueled primarily by intrinsic drivers. We therefore expected participants with enough intrinsic motivation to be less affected by the negative external incentive imposed by the contractual post-employment restrictions.

## **Experimental Design and Findings**

To identify the effect of post-employment restrictions on performance and motivation, we designed an online experiment aimed to simulate market employment, identifying the effects of post-employment restrictions, primarily non-competes, on different types of work tasks, invoking either pure effort or more creative production.

### ***Participants***

One thousand twenty-eight participants were recruited through web-list advertisements. Participants were told that participation in the experiment could yield financial rewards. The resulting sample was quite representative of the high-skilled marketplace: nearly all participants had an undergraduate degree (99%), 43% had graduate degrees, and 40% of the participants had at least four years of work experience (54% were employed at the time of the experiment, while 45% were pursuing a graduate degree at a professional school).

### ***Design***

Participants were randomly assigned to one of six conditions: half of the participants were assigned to the Matrix Search task (the effort-based task), while the other half to a Remote Associates task (the creative task).<sup>6</sup> Orthogonally, a third of the participants were assigned to an Absolute Non-Compete condition, a third to a Royalties (Partial Non-Compete) condition (whereby restrictions can be opted out of by pay back), and the last third to a control (No

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<sup>6</sup> A pre-test conducted in the lab with different participants from the same population revealed the Remote Associates task to be perceived as much more difficult than the Matrix Search task (Means 4.44 vs. 2.95 respectively, on a 7-point scale,  $t(216) = 6.47, p < .001$ ).

Restriction) condition. This constructed a two (task type) x three (EIP restriction) between-subjects design.

### *Procedure*

Participants followed the link to the experiment website, which was created using SurveyMonkey.com. Survey participants accessed the experiment website from an uncontrolled location of their choosing. The first page welcomed participants and explained the basic experimental setup. The experiment comprised of two phases: the first phase involved completing a task and receiving payment according to performance in the task (Phase I), and the second phase (Phase II – not reported here) would happen sometime in the future, involving another such task. Participants in the control (no-restriction) condition progressed to the actual task description. However, participants in the Non-Compete condition read that, because of a non-compete clause, they would be prohibited from performing the same type of task in Phase II as their task in Phase I. Participants in the Royalties/Buy-out condition read that because of their non-compete clause their payment in Phase II would be somewhat reduced, and 20% of their earnings would be withheld.

Participants next read specific instructions of their upcoming task. Participants in the Matrix Search condition were instructed to find and check two numbers in each matrix that sum up to exactly ten. They were told that the goal of the task is to solve the matrices as fast as possible. Participants in the Remote Associates task were instructed to find a fourth word that is most closely associated with the trios of words presented. Further, all participants in all conditions faced the same payment scheme that read:

For each correctly solved set, you can earn \$0.50. Moreover, if you finish the task quickly you can gain a bonus. The bonus is structured such that you are better off solving correctly than guessing, but if your overall speed in the task is fast you can gain a larger reward.

Participants proceeded to perform their task, which lasted approximately 10 minutes, and then completed a post-task survey.

### ***Dependent Measures***

The strongest measure of motivation to complete the task successfully is just that: completion. We recorded the number of participants that dropped out of the experiment. Participants who dropped out received no payment or compensation at all.<sup>7</sup> The next measures for motivation in the task involve time spent and quality of performance or accuracy. We further collected post-completion measures regarding the level of enjoyment from the task (7-point scale ranging from 1 = not at all enjoyed, through 4 = somewhat enjoyed, to 7 = very much enjoyed), as well as demographics such as age, gender, education, employment status, and experience.

In sum, the three main dependent measures (DM) are:

- A. Task completion
- B. Performance
- C. Enjoyment

DM -A and -B are incentive compatible behavioral measures linked to real economic consequences, while DM-C is a self-reported post-experiment measure.

### ***Results***

#### **Quitting the Task**

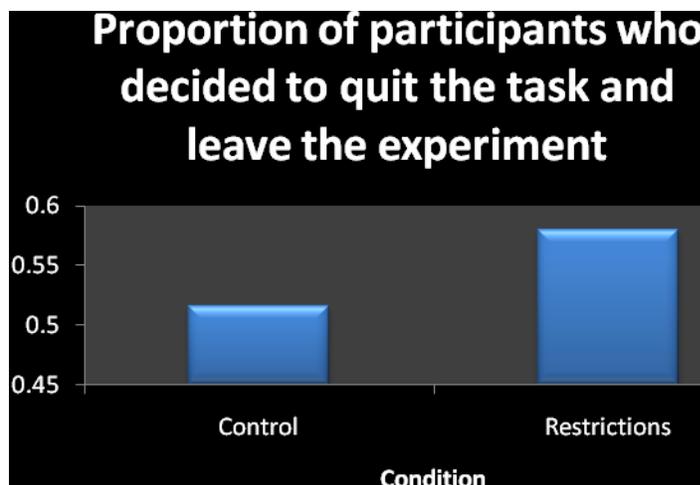
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<sup>7</sup> A web-based experiment delivers the best setup for measuring net motivation and completion, as dropping out of the experiment does not normally involve inconvenience or embarrassment.

As in all elaborate web-based experiments, some participants left the experiment web page and aborted the study. Although in most cases the experimenter worries that this may cause sample selection effects and therefore will check to make sure the departures from the experiment are not correlated with specific conditions, in this experiment drop-out rates were one of our important dependent measures. The strongest economically meaningful behavior that stems from task motivation is forgoing payment and leaving the experiment.

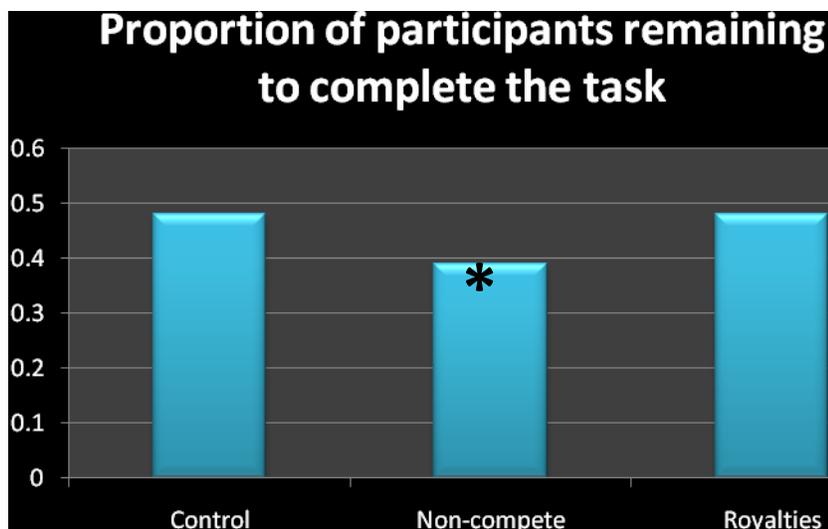
We predicted that post-employment restrictions would increase drop-out rates. We therefore compared the proportion of participants who dropped out of the study in the different conditions (Figure 1). As predicted, participants were more likely to drop out when working under the restrictions than when not (57.9% vs. 51.6%,  $\chi^2(1) = 4.54, p = .035$ ).

-- Figure 1 --



A closer look reveals that most of the drop-outs occurred in the Non-Compete condition (61% drop rate). There was a 20% increase in the drop-out rates of participants who were told that in future assignments they would not be able to choose the same task, i.e., were under a non-compete regime. In the creative (Remote Associates) task, both IP restrictions reduce the motivation to complete the task (35% and 38% relative to 48% in the control). Collapsing across tasks, we find a significant negative effect in the Non-Compete condition and virtually no effect in the Royalties condition (figure 2).

-- Figure 2 --



\* Non-compete different at  $p = .008$

Put in economic terms, as each experiment completion promised to yield approximately \$5 on average, participants forwent \$180 more in Phase I in the Non-Compete condition than in the other conditions, in addition to the chance to return in Phase II and earn even more.

## Performance

Beyond the strong behavioral indicator of quitting the task, we predicted that even among the selected sample that completed the task there would be motivational differences between conditions. Such differences should be observable in variables pertaining to actual quality of performance. For the two tasks we used, we measured performance by the number of matrices/word trios skipped and the number of matrices/word trios solved correctly (Table 1). As is evident, those participants that decided not to leave the task were no more likely to skip matrices/word trios in the restricted conditions than were their control counterparts. However, those participants that did complete the easier search task (Matrix) were far more likely to provide erroneous answers than control participants completing the same task in both restricted conditions: participants were *twice* as likely to make mistakes (in summing two numbers to equal 10) (Table 1, column 2) (see also Figure 3 - Appendix) ( $t(231) = 2.04, p = .042$ ). This reduced motivation is also directionally evident in the amount of time participants spent completing the task (Table 1, column 1), though these results do not reach statistical significance.

In contrast, as predicted, participants in the Remote Associates task (invoking more intrinsic motivation) had similar performance levels (error rates, skipped answers, and time spent) across all conditions (See also Figure 4 – Appendix). Finally, among the selected sample of participants that decided to remain and complete the experiment, we find no significant differences in reported enjoyment. We further find no effects for gender or age (work experience is highly correlated with age in our data ( $r = .74$ ) and thus yielded no new insights).

**-- Table 1: Performance and enjoyment measures for participants completing the tasks --**

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Skipped	Error	Time	Reported
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		answers	rate	spent	Enjoyment
Remote Associates	Non-Compete	103%	97%	89%	116%
	Royalties	105%	105%	97%	105%
Matrices	Non-Compete	97%	<b>222%*</b>	78%	95%
	Royalties	107%	<b>195%*</b>	91%	98%

\* Significantly greater than control participants,  $p < .05$

In sum, regardless of task, participants were much more likely to quit under a non-compete clause, and of those self-selected to complete the task, non-compete restrictions led to decreased performance in the search task, but not in the creativity task.

#### 4. Discussion: The Double-Edged Sword of Protection

##### A. Dynamic Effects: Mobility and Spillovers

A growing number of recent empirical studies on innovation, knowledge spillovers, industry growth, and agglomeration economies overwhelmingly suggest that the flow of people and information significantly affects markets. Empirical findings consistently show that social interaction is necessary to seed the first ideas for groundbreaking inventions (Hansen 1999; Singh 2005). They further show that the density of professional and inventor networks are highly correlated with the number of inventions in the network. In other words, the greater the size and density of the network, the more creative each member of the network becomes. Connections between innovators predictably increase the number of co-authored patents in an area, but perhaps more surprisingly, also increase the overall number of patents. These findings also hold true for networks across technical fields, where interdisciplinary collaborations can similarly stimulate new product development. Within network science, the field of economic geography

has vastly grown in the past decade. The spread of ideas is patterned by the density of the network, the geographic proximity of the transmission, and the complexity of the information being diffused (Marsden and Friedkin 1993). For example, one study indicates that in a dense metropolitan area, the number of patents per person is about 20% greater than another metropolitan area half as dense (Carlino et al. 2005). Another influential study finds that innovative companies are more likely to quote research from a local university than from a more distant university in patent applications (Jaffe et al. 1993; Almeida and Kogut 1997). Mobility of workers and a concentrated influx of economic investment appear to fuel one another within local economies in virtuous upward cycles. The virtuous cycle appears geographically bound: worker mobility supports spillovers and networks, which in turn enhance regional innovation and growth, leading to increased opportunities and inflow mobility.

At the firm level, there is growing empirical evidence that companies, particularly in high-tech industries, are in fact more likely to *increase* their R&D efforts and expenditures when information spillover increases between firms in the industry (Henriques 1990; Suzumura 1992; von Graevenitz 2004). In particular, at least in certain industries where R&D is a core activity, high employee turnover is shown to have a positive correlation with productivity (Almeida and Kogut 1999). Moreover, employee mobility is found to have bi-directional positive knowledge spillovers, benefitting not only the receiving employer but also the sending (ex-)employer (Corredoira and Rosenkopf 2010).

The most recent and most revealing empirical studies specifically take on the question of legal variance on post-employment restrictions in connection with mobility, growth, and innovation. The Silicon Valley, legendary for its success stories of employees leaving stable,

good paying positions, only to become highly successful industry leaders when their gamble pays out, is a good place to begin (Bankman and Gilson 1999). Gilson (1999) hypothesized that the Silicon Valley experienced greater growth than Boston's high technology area because of the differences in non-compete enforcement, suggesting that California's refusal to enforce non-competes created more labor mobility and spurred more new companies. Subsequently, more recent studies have examined whether legal variances in the enforcement of post-employment restrictions impact levels of employee mobility. Looking at the computer and high-tech industries, data shows that the Silicon Valley indeed has more job-hopping than other high-tech regions (Fallick et al. 2006) and greater inventor network density (Fleming and Marx 2006). Studies also find that other high-tech communities in California but outside of Silicon Valley have greater job mobility than parallel communities in other states (Fallick et al. 2005).

Most recently, expanding the research beyond California shows that non-California regions not enforcing or weakly enforcing non-competes have also experienced greater inventor mobility. An inadvertent change in Michigan law, from a California-type prohibition on non-competes to a non-compete enforcing state, has enabled a longitudinal study observing patterns of mobility in the same place under two legal regimes. Using the U.S. patent database, which lists the names of individual inventors and their location, the study found that after non-competes became enforceable in Michigan, there was a significant decrease in mobility, most strongly by valuable or "star" inventors.<sup>8</sup> The Michigan law change provided evidence that non-compete enforcement in a region may drive away inventors who have the greatest human and social capital while retaining those who are less productive and connected (Marx 2010). In a

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<sup>8</sup> Michigan inventor mobility dropped by almost 34% once non-competes became enforceable, with a stronger effect of approximately an additional 15% for specialized inventors and highly cited "star" inventors (Fleming and Marx 2006).

subsequent study, MIT management professor Matt Marx observed almost 100,000 inventors in Michigan, asking whether career paths, not just mobility, were affected by the enforceability of non-competes. Marx found that Michigan employees were more likely to take occupational detours once non-competes became enforceable. In other words, they were more likely to lose several years of their professional paths after the legal reform. Michigan ex-employees were also more likely to join larger companies, confirming that one way to avoid the threats of a non-compete is to seek shelter.

Reduced mobility suggests that on average, the number of quality matches between employee and employer is reduced in a non-compete world. The findings about patterned career paths also suggest that not only mobility in general, but entrepreneurship in particular, is hurt by non-competes when a new start-up finds it difficult to recruit other employees to the venture.<sup>9</sup> The negative effect on entrepreneurship is supported by studies observing differences among states with stronger and weaker post-employment restrictions with regard to economic growth. In 2003, management scholars Stuart and Sorenson tested the effect of initial public offerings (IPOs) on founding rates of biotech firms in jurisdictions that enforce non-competes versus those that do not, revealing that more biotech companies were founded in states that do not enforce non-compete agreements. In a new study, Sorenson and Samila (2010) examine the effects of VC across states depending on the enforcement of non-competes. Crossing layered data on actual investment, growth and innovation results, and non-compete enforcement allows the disentanglement of the effects of the legal regime from the many other factors that vary across

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<sup>9</sup> Moreover, the use and enforcement of intellectual property protections varies systematically with different types of companies. For example, larger companies with sufficient legal and financial resources can be more aggressive to drive out competition even when their legal claims are on weak grounds (Bolton and Scharfstein 1990).

places.<sup>10</sup> The findings show that, relative to regions that enforce non-compete covenants, an increase in the local supply of VC in states that restrict the enforcement of non-competes has significantly stronger positive effects on the number of patents, the number of firm starts, and employment. In other words, the same VC dollar amount funneled into a region that restricts non-compete covenants will result in more patenting, a larger number of start-ups, and higher income jobs. The differences in these effects persist overtime, and regions with weaker enforcement of non-compete contracts continue to enjoy lasting gains. The results of the study are robust and clearly support the existence of a “California effect.”

To remove a possible outlier impact, the researchers replicated the results excluding the Bay Area and other Californian regions. The pattern and significance of their results remained the same: states that do not enforce or weakly enforce non-competes experience *twice* the increase in patents compared with those that do enforce them in response to an influx of VC. They also experience a similar increased rate in the birth of new companies. Furthermore, these states enjoy *three times* the employment growth in response to VC investment than that of states enforcing non-competes. The benefits are not only to the start-up segment of a region. The region as a whole experiences growth: “both incumbents and entrants...benefit from the greater mobility of employees.”<sup>11</sup>

## **B. The Behavioral Dimension: Mobility and Motivation**

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<sup>10</sup> The study looks at a panel of over 300 metropolitan areas in the United States from 1993 to 2002. For each area, the researchers gathered data from several sources, including census based data, patent database, and VentureXpert, a well-established database on venture capital activity. The study matched patent filings to each metropolitan according to the inventor’s address. The study also measures the level of entrepreneurship in each of the metropolitans, based on the Census Bureau data on new business establishments.

<sup>11</sup> The doubling of venture capital investment in an average metropolitan results in an increase of 15 to 36 more firms if the region does not enforce non-competes and 3607 to 5350 more jobs. This means that the job growth must come not only from the startups themselves, but from established firms.

Samila and Sorenson's 2010 study concludes bluntly: "not only does the enforcement of non-compete agreements limit entrepreneurship . . . but also it appears to *impede* innovation." At the same time, as in the previous studies, they focus on the explanatory power of spillovers and job matching in light of the data rather than possible behavioral effects. The perspective introduced in this article, supported by the experimental study, suggests however that some of the positive effects of weak enforcement of post-employment restrictions can be attributed to the dyadic aspects of the employment relationship. Several new studies support this enhanced approach: Relying on state-by-state codification of the strength of non-compete enforcement, Mark Garmaise (2009) shows that tougher non-compete enforcement strongly reduces executive mobility, reduces R&D spending and capital expenditures per employee, lowers executive salaries, and shifts compensation from bonuses and performance based pay to a heavy reliance on a base or fixed salary. The study concludes that "non-competes do bind human capital to firms, but in doing so they change the *quality* of that capital." Perhaps most important among the study's findings is that companies invest less in research and development (R&D) when non-competes are strongly enforced. These findings provide evidence that other contributory positive effects of weak post-employment constraints, beyond positive spillovers, are at play. The orthodox economic model relied on the intuitive understanding that the more strictly a non-compete is enforced, the more a company will invest in building human capital, research, and development. Otherwise, the company will fear that its investments will be lost. At the same time however, our dyadic approach, which Garmaise's findings support, suggests that the employee herself also realizes that under a non-compete regime, her ability to move to, or to be recruited by, a different company is reduced. For the employee, this knowledge may discourage investment in her own skills, because a competitive tournament over her talent is a less likely

event. Importantly, in our approach, this realization by the employee is completely rational and should matter empirically. In our experiment we find that it does.

The behavioral aspect is also implied in a last set of empirical studies, which inquires into a different branch of employment laws. Acharya et al. (2009, 2010) test the connections between dismissal laws and innovation. Their findings, using state-by-state variance of legal protections against dismissal and data on patent filings and citations, suggest that stronger employee protections result in more and better patenting activity. Although these studies examine a different field of employment regulation, their findings are relevant to our study as they too suggest an ex-ante effect (or Time 0 in the DDI perspective) of regulatory variance on the behavior of employees. The findings provide clues about links between mobility, employment relations, employee motivation and job performance. Acharya and his collaborators believe that protective laws have the countervailing effect of providing firms a commitment device to avoid punishing short-run failures, which in turn spurs employees to undertake risky but innovative activities.

Our experiment demonstrates that certain conditions of post-employment contractual restrictions may negatively impact motivation, as is evident from the greater rates in which individuals abandon tasks. This result was present in both types of tasks. For those who did not leave, the results began to vary between the task that involved pure effort (Matrix Search) and the task that demanded more creative effort (Remote Associates) with regard to the time spent on task and the quality of performance. While the contractual non-compete condition overwhelmingly increased failure rates, and to a lesser, marginally significant extent, decreased time spent on task in the Matrix Search task, the experiment did not yield the same results with

regard to the Remote Associates conditions. Driven primarily by intrinsic motivation and conditional on not quitting the task, the latter task yielded similar performance under both more restricted conditions and the unrestricted condition.

These findings are consistent with our conceptual analysis: Non-competes, under certain conditions, may discourage employees to invest in their work performance. Empirically, the motivational effects help explain recent field data. Non-competes are now ubiquitous among a broad range of employees, including managerial, creative, research, development, marketing, and sales employees. These professions and job positions involve a range of types, effort, and skill requirements, pointing to the importance of unpacking the possible effects of post-employment restrictions on motivation and performance. In practice, the behavioral effects may be even stronger, as recent data indicates that a high percentage of employees reluctantly sign non-competes that are presented to them after they accept the job offer and without negotiation (Arnow-Richman 2006). Illustrative are the words of a recent graduate with a degree in private aviation management describing his decision to sign a non-compete:

It was a week away from college. I would sign anything – I would sign my life away. You don't think of those things when you're interviewing for the position. All you can think of is becoming the CEO of the company in ten years and staying with that company forever. And then reality sets in and you're underpaid and there are other companies out there.<sup>12</sup>

Future research will benefit from further investigation of the variance in the effects of constraints in the context of different types of tasks and skills. Moreover, future experiments may inquire into how legal variance in contractual agreements and regulatory constraints affect motivation.

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<sup>12</sup> Marx's (2010) study finds that nearly 70% of those signing non-competes were asked to sign them they had accepted the offer, probably after turning down other offers, leading the Marx to argue that "ceding the rights to one's expertise may hardly be a voluntary act."

From a policy perspective, the research provides a more nuanced view of the costs and benefits of EIP controls. Importantly, every company benefits from being able to hire talented employees and enjoys the knowledge spillovers of other companies, but at the same time, wants to prevent its own employees from leaving. The broader perspective we present and its supporting empirics point to the possibility of an optimal equilibrium where, in a repeat game, everyone agrees in advance to eschew a particular kind of one-shot advantage, such as requiring their employees to sign non-competes. In many instances, corporations recognize that part of a successful business model is the production of knowledge, even when such knowledge cannot immediately be captured in monetary gains. When everyone benefits from positive knowledge spillovers ex-post but all are able to prevent their own information and talent from leaking to the outside world, we face a collective action problem—an ongoing prisoner’s dilemma where everyone is better off with the optimal free flow of information but single players instead maintain secrecy and create high walls. Laws restricting the range of restraints of knowledge and human capital flows, such as the legal voidance of non-compete contracts adopted in California, can be viewed as addressing this collective action problem.

The perspective presented, encompassing the results of our experimental study along with an analysis of recent field studies, suggests that a large number of jurisdictions may have too much, not too little, protection against post-employment mobility, resulting in too many walls around information, talent, and creative resources. By relying on traditional models, EIP policy risks distortion that impedes dissemination and entrepreneurial dynamism. By and large, these studies elaborate on the explanatory powers of positive spillovers when addressing the differences among states in allowing constraints on job mobility and information (Frischmann and Lemley 2007). The behavioral aspect concerning the effects of post-employment constraints

on employee motivation and performance adds additional considerations. Although corporate and regional success and growth can be measured using systematic data, it is far more difficult to observe variances directly in the behavior of workers bound by restrictive EIP. The results of the experimental study suggest that under certain conditions, a contractual background of post-employment restrictions will suppress motivation. These results were also present, albeit to a lesser degree, in the condition of partial restrictions that provided a mobility buy-out for the employee. At the same time, the findings also show that when intrinsic motivation is strong, performance effects are diminished, while quitting rates remain. Future research can further elaborate on these differences. The integration of behavioral and regulatory design questions understands individuals, their work environment, and the legal regime in which they operate as symbiotic (Lobel 2005, 2009; Feldman and Lobel 2008, 2010). Given the complexity observed in the experiments, policy and market actors would benefit from more refined analysis of the costs and benefits of labor market mobility and EIP controls—an analysis that considers the motivations of the target of such restrictions and the characteristics of their work environment.

The Article focuses on post-employment restrictions and therefore bears direct lessons for law and policy of post-employment mobility. The implications of the research are, however, broader. Innovation motivation is at the heart of intellectual property debates, including the optimal scope and allocation of patent, copyright, and trade secrets. In a recent article, Buccafusco and Sprigman (2010) note that surprisingly, intellectual property has been subject to relatively little study of the implications of new insights from behavioral economics. This gap in the research is particularly curious because, “IP, perhaps more than any other substantive area of law, is grounded in the rational actor model that undergirds classical economics” (Buccafusco and Sprigman 2010). IP scholars are increasingly interested in the possibilities and benefits of

innovative regimes with weak IP controls (Oliar and Sprigman 2008; Bernstein 2010; Moffat 2010). A better understanding of how contractual and legal arrangements affect individual motivation is central to developing more informed and responsive policy. At the heart of policy debates on intellectual property is the quest for the optimal ingredients and strategies for the architecture of innovation, performance, and motivation.

## **5. Conclusion**

Do we tame our creativity? In 1928, Joseph Schumpeter described the challenge of innovation as one of resistances and uncertainties in doing what has not been done before. Schumpeter believed that successful innovation is accessible and appealing to only a distinct and rare type of individual—one who is risk-taking, defies reason, and has the unique inclination to imagine the unimaginable (Schumpeter 1928). Despite the uniqueness of the entrepreneurial spirit, however, today's workplaces innovate daily. Consequently, preventing talent from leaving and protecting company secrets against competition are key concerns for innovation-driven businesses. EIP controls, however, can be a double-edged sword. Several interrelated developments have coalesced in recent years, creating contemporary realities that call for a better understanding of EIP controls. In practice, today's labor market is far more mobile than in the past and competition in certain industries has heightened. The accumulation of empirical data about how mobility interacts with economic growth and innovation raise new questions about optimal strategies and policies and the heightened significance of EIP has meant record numbers of disputes and conflicts. High jurisdictional variation and uncertainty raise serious concerns about the inefficiencies of current arrangements. The findings of this study show that post-employment constraints affect work outcomes in complex ways. The findings support a broader

economic analysis, suggesting that EIP constraints should be considered in light of their dyadic and dynamic effects.

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## **Appendix:**

### **The Experiment - Phase 1**

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Welcome to our job market simulation. Below you will be asked to perform a task as if working for a company. Once you are done, your performance will be recorded, and an appropriate compensation will be determined. The computer will then select one of the participants at random to receive the payment for their work.

Important: You will be contacted roughly two weeks later to participate in the 2nd stage of this simulation and perform more tasks.

Note, some of the tasks you will be asked to complete bear consequences on your participation in subsequent tasks. For example, participation in some tasks pose restrictions about participating in a similar task in the future, or impose financial penalties for performing a similar task in the future. Such restrictions will be clearly stated ahead of time.

Your first task today will be the Free Associates task.

In this task you will be presented with sets of three words. Your job is to find a fourth word that is most closely associated with the trio of words presented.

For each correctly solved set, you can earn \$.50. Moreover, if you finish the task quickly you can gain a bonus. The bonus is structured such that you are better off solving correctly than guessing, but if your overall speed in the task is fast you can gain a larger reward.

OR

Your first task today will be the Math Matrices task.

In this task you will be presented with a series of matrices filled with numbers. Your goal is to find and check 2 numbers in each matrix that sum up to exactly 10. When you find the pair of numbers check both of them, and move to the next matrix. The goal of the task is to solve the matrices as fast as possible.

For each correctly solved set, you can earn \$.50. Moreover, if you finish the task quickly you can gain a bonus. The bonus is structured such that you are better off solving correctly than guessing, but if your overall speed in the task is fast you can gain a larger reward.

Conditions:

\*\*\*\* IMPORTANT: IN THIS TASK THERE ARE NO RESTRICTIONS ON FUTURE TASKS

\*\*\*\*

\*\*\*\* IMPORTANT: In this particular task, you are allowed to perform the same task in the future for a different company, BUT you contractually commit to PAY A FEE to your original company. This means that your future payment in the next stage of the experiment will be taxed \$2, resulting in a smaller payoff, if you chose to undertake such future task \*\*\*\*

\*\*\*\*\* IMPORTANT: In this particular company, you contractually commit to NOT PERFORM the same type of task in the future. You agree here to sign a NON-COMPETE stating that you will not to perform this type of task as your next job, i.e., in any future stages of the experiment.  
\*\*\*\*\*

Additional DVs:

**How much did you enjoy this task? (Not at all enjoyed <-> Very much enjoyed)**

Gender

Age

Education

Employment experience (years)

Areas of work experience

## The Math Search Matrices

In this task you will be presented with a series of matrices filled with numbers. Your goal is to find and circle 2 numbers in each matrix that sum up to exactly 10. When you find the pair of numbers circle both of them, mark that you solved it, and move to the next matrix. The goal of the task is to solve as many matrices as possible.

For example:

3.91	0.82	3.75
1.11	1.69	7.94
3.28	2.52	6.25
9.81	6.09	2.46

Got it

1.69	1.82	2.91
4.67	2.81	3.15
5.82	5.06	4.28
6.36	7.19	4.57

Got it

1.17	4.83	7.76
5.66	1.86	5.17
6.83	5.95	4.25
7.01	6.28	3.82

Got it

0.49	0.74	1.13
3.72	2.66	1.22
3.75	5.22	5.67
8.87	8.23	7.71

Got it

0.47	4.61	2.57
3.17	3.82	4.38
4.94	5.39	5.98
2.15	4.86	7.54

Got it

2.92	4.98	4.34
1.39	0.72	5.53
8.61	3.57	3.36
6.8	0.53	7.58

Got it

0.81	1.31	2.09
4.55	3.75	3.12
5.62	9.41	6.88
7.02	8.48	8.51

Got it

0.17	3.46	2.44
6.02	2.46	2.63
6.05	6.21	6.61
8.22	8.19	7.54

Got it

4.74	4.78	0.83
1.61	5.97	4.09
5.96	3.29	9.09
0.87	9.13	2.71

Got it

6.21	2.47	9.57
2.68	9.52	4.52
8.72	7.69	1.47
6.41	4.44	7.32

Got it

3.08	9.42	5.87
3.94	5.41	3.42
4.02	5.06	4.12
4.13	4.65	2.86

Got it

3.15	0.95	1.31
4.98	2.9	2.88
6.66	6.73	7.67
9.75	6.85	8.17

Got it

0.63	0.65	1.02
2.64	2.34	2.12
2.89	5.98	8.89
9.49	9.37	9.33

Got it

2.22	4.51	7.13
9.33	9.77	5.86

0.74	4.55	3.19
8.51	7.91	8.68

5.97	9.62	9.41
3.61	7.39	7.01

4.73	2.12	8.99
0.63	8.89	9.33

7.04	4.14	5.22
2.28	1.72	8.16

Got it

5.62	0.81	2.11
3.75	3.72	2.09

Got it

5.49	0.59	2.62
7.51	5.71	0.49

Got it

1.02	2.34	4.98
1.11	0.65	2.91

Got it

0.12	0.71	0.74
4.27	3.07	2.27
5.09	5.73	5.82
9.27	7.03	6.79

Got it

0.74	1.93	2.76
7.24	5.03	3.14
7.71	6.38	3.19
8.28	9.18	9.48

Got it

0.14	2.67	2.22
5.96	5.58	5.22
7.04	7.78	9.33
9.77	9.5	8.52

Got it

4.16	4.51	1.66
8.29	8.05	9.03
4.73	5.84	9.86
5.21	3.94	7.18

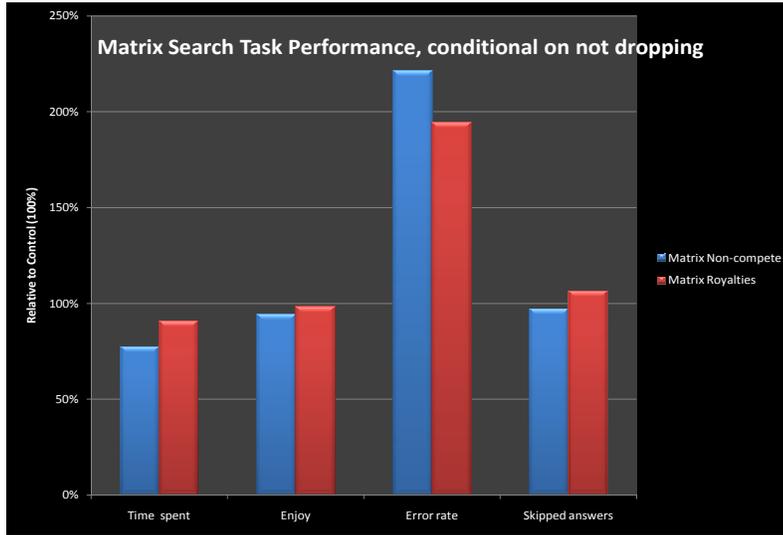
Got it

## Free Associates

This task presents you with three words in each line. Your task is to find a fourth word for each set that is most closely associated with the trio of words presented. The goal of the task is to solve as many word groups as possible.

cottage/swiss/cake  
cream/skate/water  
loser/throat/spot  
show/life/row  
night/wrist/stop  
duck/fold/dollar  
rocking/wheel/high  
dew/comb/bee  
fountain/baking/pop  
preserve/ranger/tropical  
aid/rubber/wagon  
flake/mobile/cone  
cracker/fly/fighter  
safety/cushion/point  
cane/daddy/plum  
dream/break/light  
fish/mine/rush  
political/surprise/line  
measure/worm/video  
high/district/house  
sense/courtesy/place  
worm/shelf/end  
piece/mind/dating  
flower/friend/scout  
river/note/account  
print/berry/bird  
pie/luck/belly  
date/alley/fold  
opera/hand/dish  
cadet/capsule/ship  
fur/rack/tail  
stick/maker/point  
hound/pressure/shot

--- Figure 3 ---



--- Figure 4 ---

