THE DUAL ROLE OF EMPLOYEE NON-COMPETE AGREEMENTS: KNOWLEDGE-PROTECTION AND MOBILITY LIMITATION

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ABSTRACT OF THE DISSERTATION

The Dual Role of Employee Non-Compete Agreements: Knowledge Protection and Mobility Limitation

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Human capital, or the knowledge, skills, and abilities of employees, can be a powerful driver of firm performance, yet the mobility of human capital raises questions over how to protect it. Employee non-compete agreements, which limit an employee's ability to start or join a rival firm, have received recent attention, but prior research has focused on the role of non-competes as individual mobility restrictions and questioned the ethics of such agreements.

This three-paper dissertation considers whether employee non-compete agreements can be ethically or economically good for firms by exploring three distinct contexts: (1) regardless of state policy, when, how and for whom should firms use non-competes; (2) when a state chooses not to enforce out-of-state employee non-competes; and (3) when a state strengthens enforcement of employee non-competes.

In "*The Case for Ethical Non-Compete Agreements: Executives versus Sandwich-makers,*" I assert that the espoused ethical tension of non-competes over questions of property rights is due to concerns over power, autonomy, and fairness. I suggest an ethical employee non-compete agreement exists when appropriate consideration to these attributes has been made during the negotiations between the firm and employee.

I then apply the resource-based view of the firm to conceptualize employee non-compete agreements as isolating mechanisms that insulate firm human capital from rivals. In "*Opening the Labor Market Doors: Firm Performance Following California's Refusal to Enforce Out-of-State Employee Non-Compete Agreements*," I exploit a quasi-natural experiment of a California Supreme Court decision, and find that this decision dramatically increased the performance of in-state firms. Moreover, this relationship was influenced by both local labor market and firm-specific resource factors. Finally, in "*Don't Mess with My Texans: Firm Performance in the Wake of Texas' Increased Enforcement of Employee Non-Competes*," I find that firm performance can also be increased by strengthened enforcement of employee non-competes. While I find no support for labor market factors in altering this relationship, the effect of firm-specific resource factors persists.

This dissertation therefore bridges both strategic management and business ethics literature. Read together, the essays demonstrate the ability of employee non-competes to enable firms to ethically create and sustain human capital-based competitive advantages.

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DEDICATION

To my daughter, Zeynep Elizabeth, my reason for waking each morning, and my husband, Tolga, without whom I would never have started on, nor survived, this journey.

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CHAPTER 1

INTRODUCTION

> *"Our assets walk out of the door each evening. We have to make sure that they come back the next morning." - N.R. Narayana Murthy, Chairman and CEO of Infosys (The Economic Times, 2013)*

Firms recognize the value that resides in their human capital assets – the knowledge, skills, and abilities of their employees (Coff & Kryscynski, 2011) – but also face a very real threat that these assets can walk out the door and cause immeasurable harm. In light of such departures, firms lose access to both the knowledge residing in a departing employee's mind and to any investments made to develop the employee's human capital. Additionally, firms incur direct costs related to employee turnover, such as recruiting and training costs for new hires, and risk having valuable firm information being taken to a firm's competitors (Coff, 1997), potentially eroding the firm's competitive advantages (Campbell, Coff, & Kryscynski, 2012). Because of this risk, many organizations consider human capital to be a critical, if not their most important, asset (Garmaise, 2011; Gilson, 1999). The value of a firm's human capital comes, in large part, from the tacit knowledge residing within the minds of a firm's employees, or the "know-how" such as hands-on experience and on-the-job learning that occurs during the course of the employment relationship (Gilson, 1999). Moreover, human capital is costly to develop as firms frequently invest in their human capital by offering training or other benefits such as educational opportunities, career development, or networking opportunities, and often seek to develop employee human capital to best serve the particular needs of the particular organization (Garmaise, 2011; Samila & Sorenson, 2011). However, human capital is not eligible for standard intellectual property

protections, such as copyright and patent, because the knowledge, skills, and abilities of a firm's employees are intangible, making them both not fully codifiable and not capable of being owned by a firm.

To prevent or mitigate the effects of such a departure, a firm has several potential alternatives: first, the firm may induce employees to stay with the firm, by means of increased compensation or other benefits; second, the firm may want to protect its access to the human capital investments, such as training or education, that employees having developed while working for the firm; or finally, the firm may seek to restrict the ability of its employees to leave to join, or start, a competitive enterprise. In a "one stone kills two birds" manner, employee non-compete agreements serve both the second and third options. Such an agreement is signed in association with an employment relationship and expressly limits an employee's ability to work for or start a competitive entity should the employee leave the focal firm.

The consensus in the extant literature is that non-compete agreements are effective at limiting employee mobility. More formally, non-compete agreements have been empirically shown to have a negative effect on employee mobility (Marx, Strumsky, & Fleming, 2009; Garmaise, 2011). However, despite the many potential firm-level implications of non-compete agreements on employee mobility and the ability of firms to "learn by hiring" away a competitor's employees (Singh & Agrawal, 2011), the relationship between non-compete agreements and firm performance remains largely unexplored. This is surprising, as surveys indicate that hiring away employees from competitive firms ranks second only to use of cross-functional teams as a means of encouraging product innovation (Rule & Irwin, 1988). Additionally, while past research

considers the effectiveness of non-competes in limiting employee mobility, few have consider if non-competes *should* be used. This dissertation therefore addresses two significant gaps in the literature regarding research on the ethics of non-compete agreements themselves and research on how employee non-competes affect firm performance by exploring whether employee non-compete agreements can be ethically or economically good for firms.

While scholars have explored operating mechanisms that may promote knowledge transfer, including between firms such as in alliances (*e.g.*, Becerra, Lunnan, & Huemer, 2008), within individual firms (*e.g.,* Tsai, 2001), and the strategic deployment of human resources (*e.g.*, Huselid, Jackson, & Schuler, 1997), the role of human resource-based protection mechanisms in facilitating the management and protection of firm knowledge remains relatively unexplored, with the exception of employee mobility-focused research on non-competition agreements (*e.g.*, Marx, et al., 2009). The ability of non-competes to prevent the valuable firm knowledge contained within the mind of a departing employee from being acquired by competitive firms (Franco & Mitchell, 2008) has been largely ignored in favor of research focused on employee mobility. This dissertation therefore seeks to re-emphasize a theoretical basis of *knowledge protection* for the effects of non-compete agreements.

Similarly, prior research on non-competes has focused predominantly on the impact on inventors or individual employee mobility. However, the implications of non-competes as a knowledge protection mechanism, as well the explorations on the relationship between such mechanisms and firm performance, remains underexplored. To address these gap, in this dissertation I explore whether employee non-competes are a

mechanism through which firms can ethically obtain human capital-based competitive advantages. With a theoretical basis grounded in the resource-based view of the firm (RBV), this dissertation advances research on employee non-compete agreements by moving beyond questions of individual employee mobility to address macro-level issues regarding societal and firm outcomes.

This dissertation therefore contributes to the growing literature on research on employee non-competes by exploring three different contexts: (1) when a state chooses not to enforce out-of-state employee non-competes; (2) when a state strengthens in-state enforcement of employee non-competes; and (3) regardless of state policy, when, how and for whom should firms use employee non-competes. The remainder of this dissertation proceeds as follows. In Chapter 2, background information is provided, including specific legal background on non-competes and a literature review of existing management research on non-competes. Chapters 3, 4, and 5 then build on this background in three related projects:

1. In Chapter 3, "The Case for Ethical Non-Compete Agreements: Executives versus Sandwich-makers," I question whether non-competes are unethical, as has been espoused in the extant literature, and propose that the major ethical issues with non-competes are due not to the agreements themselves, but rather center on three primary principles that arise during the contracting process between a firm and a new hire: power, autonomy, and fairness. When concerns related to these three constructs are resolved, as in the described case of an executive hired away from Amazon to work at Target, I assert there are no ethical issues with employee non-compete agreements.

2. In Chapter 4, "Opening the Labor Market Doors: Firm Performance Following California's Refusal to Enforce Out-of-State Employee Non-Compete Agreements," I use a quasi-natural experiment of a 2008 California Supreme Court decision eliminating enforcement of out-of-state employee non-compete agreements in California to explore the impact of employee non-compete enforcement on firm performance. Applying the RBV, whereby firm-level resources provide sustainable competitive advantage if they are valuable, rare, inimitable, and non-substitutable (Barney, 1991), I conceptualize employee non-compete agreements as isolating mechanisms that insulates firm's human capital from acquisition or imitation by rivals (Rumelt, 1984). I find significant support that non-competes do operate as an isolating mechanism, and that the sudden ability of a group of firms to avoid the barrier of non-compete enforcement significantly increases the financial performance of such firms. Moreover, this relationship is highly affected by both labor market and firm-specific factors.
3. In my final paper, "*Don't Mess with My Texans: Firm Performance in the Wake of Texas' Increased Enforcement of Employee Non-Competes*," I exploit a quasi-natural experiment of a Texas Supreme Court decision in 2008 that dramatically increased enforcement of employee non-competes in that state. I find that firm performance is increased by strengthened enforcement of employee non-competes, but that such a relationship may be affected by considerations of firm size. While I find no support for labor market factors in altering this relationship, the effect of firm-specific resource factors persists.

Chapter 6 then closes with a discussion of the findings of these projects. Read together, these three projects demonstrate the ability of employee non-competes to be used as tools by which firms can ethically create and sustain human capital-based competitive advantages. The empirical projects find that state-level enforcement of non-compete agreements has important impacts on firm performance because of the dual uses of employee non-compete agreements for *both* firm knowledge protection and a limitation on employee mobility. Moreover, such increase in firm performance is not at the expense of other firms, suggesting that human capital-based competitive advantage need not be considered a zero-sum game among firms.

CHAPTER 2

BACKGROUND & LITERATURE REVIEW

The intent of an employee non-compete agreement is to, at least temporarily, limit both employee mobility and the diffusion of the employee's tacit knowledge within the competitive industry. After providing background information on employee non-compete agreements, including specific legal background on non-competes, I proceed with a literature review of existing management research on non-competes organized around these four theoretical perspectives.

BACKGROUND ON NON-COMPETE AGREEMENTS

Employee non-compete agreements, also known as covenants not to compete or "CNCs," prohibit employees from starting competitive businesses or working for a competitor of the firm during the course of employment and for a specified duration of time after termination of the employment relationship. Such agreements are frequently included in either offer letters or other, more formal employment contracts.

From a legal perspective, employee non-competes are one of five distinct methods that firms may use to protect their interests when it comes to their employees and, sometimes, independent contractors; this group of restrictions is commonly referred to as "restrictive covenants," and those that apply after the termination of employment are generally referred to as "postemployment restrictive covenants. Specifically, the five types are: (1) non-compete/non-competition agreements; (2) non-solicitation agreements[1]; (3) confidentiality agreements (also known as non-disclosure agreements or

[1] Non-solicitation generally prohibit an ex-employee from contacting the former employer's customers, and sometimes also prevent the ex-employee from hiring away (or even attempting to hire away) the former employer's current employees (Graves & DiBoise, 2006). Such restrictions generally carry a time limit of one to two years and, not surprisingly, are the subject of frequent litigation; however, such cases run in to

"NDAs")[2]; (4) trade secrets protection[3], and (5) assignments of inventions[4] (Greco, 2013). Due to this dissertation's focus on non-compete agreements, a full discussion of all these methods is outside the scope; however, it is interesting to note that each of the other legal methods could have potential implications similar to those of non-compete agreements, and are thus potential areas of future research.

Types of non-compete agreements

There are three distinct types of non-competes. The first, and the one most commonly associated with the term, are the agreements that employees must sign as a condition of employment or as a condition on advancement or promotion within a firm; these are also known as "post-employment" non-competes. The second type is the non-compete that relates to the sale of a business; in this version, the seller of a business agrees to not compete with the buyer of the business, generally by agreeing to not open up a competing business within the original business' region or sometimes by agreeing to not work as an employee for any of the of the business' competitors for some defined

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logistical difficulties regarding proof that the ex-employee affirmatively solicited the firm's customers or current employees.

[2] Confidentiality agreements, where an ex-employee agrees to not disclose confidential information about the employer, run into a similar problem as non-solicitation agreements that it can be extremely difficult to prove whether an ex-employee is complying (Marx & Fleming, 2012).

[3] Trade secrets protection in the United States is generally governed by state-by-state enactments of the Uniform Trade Secrets Act ("UTSA"); notably, each state can enact its own version of the UTSA (Gilson, 1999). Of particular relevance is the trend of courts to apply the doctrine of "inevitable disclosure" whereby a firm argues that an ex-employee should not be allowed to work for a competitor on the grounds that the ex-employee cannot help by use the employer's trade secrets (Graves & DiBoise, 2006). In effect, the inevitable disclosure doctrine becomes a court-created non-competition agreement (Graves & DiBoise, 2006).

[4] Assignment agreements are much more applicable to patents or other intellectual property than non-competes and generally require that an employee offer to assign the employer the ownership rights to any invention created during the course of employment; similarly, independent contracts hired to deliver a particular item are often asked to assign the rights to such an item (Greco 2013; for a more on inventions, see Gilson, 1999).

amount of time. The third and final type of non-compete is the fiduciary duty requirement not to compete, which is also known as a "preparing to compete" restriction (Graves & DiBoise, 2006). Certain parties (such as attorneys, accountants, CEOs, board members, and sometimes employees) are considered "fiduciaries" of a company and therefore have an obligation to either not compete with the company, to offer the company a "right of first refusal" on potential competitive business ventures, or to be subject to certain limitations about the information about the company the fiduciary may use when preparing to leave the business to found a competitive entity (Graves & DiBoise, 2006). While this dissertation focuses solely on post-employment covenant not-to-compete since that is what the bulk of prior management literature has also considered, it is worth noting that there are likely potential implications on firms from both other types of non-competes as well.

Thus, non-compete agreements, as discussed here, refer only to agreements signed in association with an employment relationship that limit an employee's ability to work for a competitor or start a competing business should the employee leave the firm. Such agreements are frequently included in either offer letters or other, more formal employment contracts. In the United States, enforcement of non-compete agreements is governed by state law and some states, most notably California[5], have banned the use of post-employment non-competes, while others place restrictions on the enforcement of non-competes, such as Oregon. As a generalization, enforcement of a non-compete must generally be considered "reasonable" based on (i) industry limitations (that is, what or who is a competitor and what activities would be considered competitive?), (ii)

[5]Although it prohibits post-employment non-competes, California expressly allows for non-competes in the context of a sale of a business.

geographic/regional limitations, and (iii) the duration of the restriction (Graves & DiBoise, 2006).

How common are non-competes?

Although most attention to non-compete agreements is focused on the United States, it is important to note that the U.S. is not unique in its use of post-employment non-competes and that many other countries utilize non-competition agreements (for a full exploration of non-compete laws by country, see Ius Laboris, 2010). Use of employee non-compete agreements is widespread in the United States, although use may vary across industry or status within a company. Studies have indicated the following:

- 18% or 30 million Americans were covered by non-competes as of 2014, while 37% report having signed one at some point during their career (Prescott, Bishara, & Starr, 2016);
- Almost 50% of technical professionals in several industries were asked to sign non-competes (Marx, 2011);
- 70% of entrepreneurs receiving venture capital funding were required to sign non-competition agreements as a condition of investment (Kaplan & Stromberg, 2003);
- 70.2% of executives at publicly-traded firms signed non-competes in another study (Garmaise, 2011); and
- 80% of IT professionals were asked to sign a non-compete (Holley, 1998).

In fact, use of non-competes may be increasing according to recent news reports (Marte, 2013; White House, 2016). A recent White House report under the Obama administration additionally noted an increase in litigation of non-competes, stating, "[t]he law firm Beck

Reed Riden LLP found a 61 percent rise from 2002 to 2013 in the number of employees getting sued by former companies for breach of non-compete agreements" (2016, p. 3).

One major criticism of non-compete law in the United States is that there remains an inherent disconnect between non-compete law and modern, increasingly interstate, national, or even global corporate operations. It is difficult for states to enforce judgments of any kind outside of their boundaries (Cheskin & Lerner, 2003) due to concerns over jurisdiction and as a result of the widely differing laws across the states, any discussion of non-compete enforcement in the United States is necessarily limited to the state-level.

Of note, however, the lack of enforceability of non-competes at the state level does not mean that employees in such states do not sign them: Garmaise (2011) found that 58% of California-headquartered publicly-traded firms reported using non-competition agreements for their executives while Kaplan & Stromberg (2003) found similar results for California entrepreneurs asked to sign non-competes by venture capital firms. One possible explanation for this that such a non-compete could still provide protection outside of a particular state; that is to use Garmaise (2011) example, a California-based executive could potentially sign a non-compete that is enforceable in a state outside of California, although this would only apply should the employee relocate to such a state. Most recently, Prescott, Bishara, and Starr (2016) conducted a large, nationwide employee-level survey on non-competes and found that the frequency of employee non-competition agreements in an employment contract had little relationship to the level of non-compete enforcement in that state: "In other words, an employee in California (where noncompetes are prohibited) appears to be just as likely to labor under

a noncompete as an employee in Florida (where noncompetes are much more likely to be enforced)" (p. 370).

MANAGEMENT RESEARCH ON NON-COMPETES

Management research clearly acknowledges that protection of the firm's knowledge base is a predominant concern for firms. Firms must implement structures, policies, and processes that will allow knowledge to transfer freely within the firm, while at the same time protecting this knowledge from leaking out to competitors (Kogut & Zander, 1992). Non-competes can be such a firm policy. As mentioned in Chapter 1, human capital is a critical asset, with its value to firms coming, in large part, from the intellectual property contained within the "tacit knowledge" of the employees of a business, and takes the form of general "know-how" such as hands-on experience and similar on-the-job learning (Gilson, 1999). Additionally, an organization can invest in its human capital by offering training or other benefits (educational opportunities, career development, networking opportunities, etc.), and often seeks to develop its human capital to best serve the particular needs of the organization (Garmaise 2011; Samila & Sorenson 2011). However, organizations, particularly business, face the problem of how to protect this intangible asset from other organizations: since it is not physical and can't be written down, it isn't eligible for standard intellectual property protections such as copyright and patent, and if the employee leaves the organization, such tacit knowledge departs with the employee. Thus, the firm faces two options: it can utilize a non-compete agreement to prevent the employee from leaving to join or start a competitor, or it can encourage the employee to stay with the firm. In an ideal world, the firm would do both, but for the purposes of this dissertation, the focus will be on the first: preventing the

employee from leaving to start a competitive business or preventing the employee from working for a competitor by utilizing a non-compete agreement. As is clear, the intent of a post-employment non-compete agreement is to, at least temporarily, limit both employee mobility and the diffusion of the employee's tacit knowledge within the competitive industry reducing knowledge spillovers (Cooper, 2001).

Management research on employee non-competes is generally attributed as arising from the pioneering work of Ronald Gilson (1999). Gilson, a legal scholar, provided a thoughtful extension of Saxenian's (1994) comparison of the rise of two well-known technology clusters: Silicon Valley in California, and Route 128 in Massachusetts (1999). Silicon Valley was ultimately more successful than Route 128, and Saxenian had attributed this success to the unique cultural elements at play in California. Gilson, however, ascribed the regional success of Silicon Valley over Route 128 to the different state policies on the enforcement of non-competes – that is, California does not enforce employment non-competes while Massachusetts does. This groundbreaking theoretical piece planted the seeds for future researchers exploring the impacts of employee non-compete agreements.

The impact of non-compete agreements has been examined by business and economic scholars at multiple – and nested – levels of analysis. This is because such agreements are contained in the *individual* employment contracts of employees, who work at *firms*, which operate in competitive industries, and the enforceability of such agreements is dependent upon *state* law. Employee non-compete agreements are therefore a multi-level – and nested – phenomenon, as show in Figure 2-1.

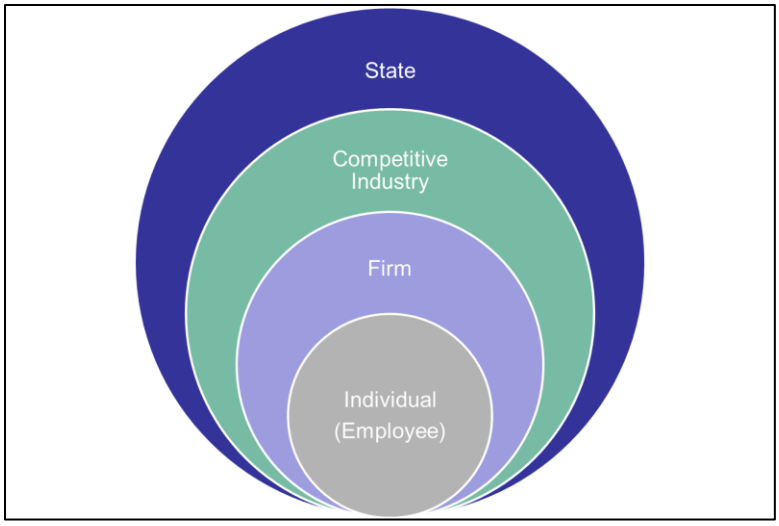

Figure 2-1: The multi-level aspects of employee non-compete agreements.

Most research has crossed such levels by focusing on the effects of *state*-level enforcement of such agreements on *individuals*, exploring the effect of non-compete agreements on employee mobility (*e.g.*, Fallick, Fleischman, & Rebitzer, 2006; Marx, et al. 2009; Marx 2011), human capital investment (*e.g.*, Cooper, 2001; Garmaise, 2011; Starr, 2018), and entrepreneurship (*e.g.*, Stuart & Sorenson, 2003; Marx & Fleming, 2012; Starr, Balasubramanian, & Sakakibara, 2017). Legal scholars have also theorized on what an ideal enforcement regime should be (*e.g.*, Bishara, 2006), expressed concern about lack of negotiation over such contracts (Arnow-Richman, 2006), and opined that such agreements may be unethical (Bishara & Westermann-Behaylo, 2012). However, there has been scant research (notable exceptions include Younge & Marx (2015) and Lavetti, Simon, & White (2014)) on how non-competes at the firm level, although there has been some limited research on how non-competes affect firm innovation (*e.g.,* Samila & Sorenson (2011); Conti (2014)). In the following sections, I briefly summarize the existing literature on employee non-compete on these topics and identify open avenues for future research. I then delineate four specific challenges facing those researching

employee non-competes, followed by a discussion of how this dissertation addresses some of these challenges and contributes to the existing literature on employee non-compete agreements. I close with a discussion of my application of the resource-based view of the firm (RBV) (Barney, 1991) to the issue of employee non-competes, and describe how this dissertation also extends our understanding of the RBV.

Existing literature on employee non-competes

Employee mobility

Fallick, Fleischman, and Rebitzer (2006) is an early attempt at empirical validation of Gilson's (1999) work which proposed non-competes as the cause behind the differences between Silicon Valley in California and Route 128 in Massachusetts. These scholars found a correlation they deemed the "California effect" only within the computer industry; that is, there was a correlation between a higher amount of mobility for computer industry employees within California, where non-competes are not enforced, than Massachusetts, where non-competes are enforced. Interestingly, they found no such results for other industries, even within California, nor were they able to attribute this to phenomenon specifically to California's non-compete enforcement status.

Marx, Strumsky, and Fleming (2009) advanced research on employee mobility by looking at inventor mobility following the (accidental) reversal of Michigan's position on non-compete enforcement. They find that inventor mobility decreased following a dramatic increase in Michigan's enforcement of non-compete agreements. Additionally, they showed that high value (that is, high patenting) inventors left Michigan after the legal change and frequently moved to non-enforcing states. The primary value of this paper is to demonstrate that enforcement of non-competition agreements "works" to keep

employees in place. However, this result may be confounded by other statutory changes occurring during the same time period, including an antitakeover law (see Atanassov, 2013), and a branch banking deregulation (see Kerr & Nanda, 2009).

Similarly, Garmaise (2011) found that executive tenure at publicly traded companies increased with increases in non-compete enforcement. A one–standard deviation increase in non-compete enforcement when interacted with in-state competition increased executive job tenure by 16% of the mean.

From a mobility perspective, non-competes may not only reduce employee mobility between firms but also limit the available labor pool of potential new hires (Marx, et al., 2009). That is, non-competes could lessen the availability of relevant skilled labor *if* potential new hires are subject to non-compete agreements. Non-competes may, therefore, dampen the velocity of active labor markets, although there is additional research needed on this point. For example, consider the rise of the two well-known technology clusters: Silicon Valley in California, and Route 128 in Massachusetts. Silicon Valley was ultimately more successful than Route 128, and this had been attributed the unique cultural elements at play in Silicon Valley and/or California (Saxenian, 1994). Differing institutional regimes regarding the enforceability of non-competes may be a particular cause of this success, as noted by Gilson (1999) – that is, California does *not* enforce employment non-competes while Massachusetts does.

Empirically, it remains unknown whether non-competes cause labor market shortages and thus make it more difficult for firms to hire new or specialized talent (Marx, Singh, & Fleming, 2015). Starr, Frake, and Agarwal (2017) demonstrate that the job mobility of "non-signers" (those who are not subject to non-compete agreements for

any reason) is adversely impacted by non-competes due to a "vacancy chain" effect as a result of "signers" staying with their firms and thus a lack of available positions for non-signers, so there is some significant evidence that non-competes have important labor market effects.

Employee mobility has significant implications on knowledge spillovers. Economists such as Arrow (1962) long ago identified worker mobility as a key source for potential knowledge spillovers, and increases in competition often provide opportunities for high-value workers to job-hop (Cooper, 2001), further transmitting knowledge. It remains an open question, however, how the reduced mobility of employee non-competes impacts knowledge diffusion as, to my knowledge, there has been no research on this point.

Human capital investment

Due to the threat of employee mobility, theorists such as Becker (1964) have argued that firms will be reluctant to invest in human capital via training or other methods due to a lack of property rights; that is, since, once a firm provides an investment in human capital via such training or other methods, it loses the right to that investment once the knowledge is conveyed, since it now resides in the mind of the firm's employee. Since permanent control by a company over the human capital stored in the minds of its employees is simply not realistic, firms may turn to non-compete agreements as a way to gain property rights to their investments in human capital; that is, "[n]on-compete agreements enable companies to convert general training into firm-specific human capital by denying workers the opportunity to apply those skills outside the firm" (Marx, 2011). However, this creates a "double edged sword" from a broader

perspective, whereby such clauses allow a firm to protect its own investments, but may also create negative effects by preventing the movement of workers and thereby the exchange of such knowledge even when such movement would be both individually beneficial for the worker, the firm, and the industry (Cooper, 2001). Gilson (1999, p. 595) notes that, from an industry-wide perspective, the "collectively rational" strategy is to allow unrestricted movement between firms because the industry as a whole benefits from the exchange of information and each individual firm's share of such firm benefit exceeds the negative costs the firm incurs by losing its individual investment (what Gilson calls "intellectual property dilution"). But this creates a classic prisoner's dilemma for any individual firm: each firm individually is better off protecting its own investments in human capital by limiting its employees' mobility, yet desires to take advantage of any other knowledge spillovers from other workers moving around in the industry (Gilson, 1999). Thus, it is therefore individually beneficial for each firm to implement non-compete agreements but this has the potential to lead to a suboptimal social outcome (Samila & Sorenson, 2011). Further work in this vein should clarify whether such effects are actually experienced in the aggregate.

Empirically, the effect of non-compete agreements enforcement on employee human capital investment was researched by Garmaise (2011), who found that in states that strongly enforce non-compete agreements, employees invest less in their own human capital development than in lesser enforcing states. Similarly, Starr (2018) found that firms in higher enforceability states provide more training to employees, or, said differently, invest more in firms-sponsored employee human capital development.

However, in contrast to Garmaise (2011), Starr (2018) found no evidence of reduced self-investment in training.

Entrepreneurship

Entrepreneurs, or those hoping to be entrepreneurs, may encounter non-competes in at least five different ways: (1) they may be subject to one from employment at a prior firm that may (or may not) limit the opportunities available to them for founding a new firm; (2) they may have access to a limited labor pool because their desired employees are subject to non-competes at their current jobs; (3) they may be asked to sign a non-compete should they want to sell their company; (4) they and even their employees may be asked to sign non-competes as a condition of receiving external funding from, say, venture capitalists; or (5) they may actually decide to have their employees sign a non-compete.

It may be especially important for entrepreneurs to utilize non-compete agreements for their own employees in order to protect the entrepreneurs' limited – and mobile - assets. Cooper (1985) theorized that small firms actually have higher rates of employees leaving to start competitive firms (so called "spin-offs") because a smaller firm, such as a start-up, provides more opportunities for learning among employees and thus "trains" them to start their own firm. Empirical evidence on this point is, however, mixed (Klepper, 2001). And while learning theories generally suggest that employees may leave firms to start competitive businesses (Klepper, 2001), Garvin (1983) suggests that spin-offs will be greatest in young, lesser-developed markets, such as those frequently inhabited by entrepreneurs. Additionally, entrepreneurs may believe they have a protectable interest in preventing their employees from leaving, even when they don't,

since entrepreneurs are generally overconfident (Forbes, 2005) and may be particularly overly optimistic about the uniqueness and market value of their technology (Giuri, Mariani, Brusoni, ... & Verspagenj, 2007). However, to date, no research has looked at the use of employee non-compete agreements by entrepreneurs.

However, Stuart and Sorenson (2003) found that non-compete enforcement limited entrepreneurship; more specifically, they found that the enforcement of non-competes discouraged the founding of new firms within the biotechnology industry after liquidity events (such as acquisitions or initial public offerings). Starr and colleagues similarly found that higher enforceability of non-competes results in fewer and smaller new firms overall, but found that within-industry spinouts were larger and more successful in regions with greater enforcement of non-competes (2017).

Samila and Sorenson (2011) investigated the moderating effects of non-compete enforcement on venture capital investment relationships. They found that enforcement of non-competes "moderates the effects that venture capital has on both innovation and the overall regional economy" (Samila & Sorenson, 2011, p. 436). More specifically, they found that the relationship between venture capital investment and (1) number of patents, (2) number of firm creations, (3) employment , and (4) total wages, was negatively moderated by enforcement of non-competes. Notably, the conclusions remained significant even when California, and thereby Silicon Valley, were excluded from the analysis.

Firm innovation

From a theoretical perspective, the effect of non-competes on firm innovation is ambiguous since, on the one hand, non-competes reduce knowledge spillovers and the

diffusion of new ideas, but on the other hand, non-competes allow firms to not fear that their employees are going to leave to a competitor, thus encouraging firm investments in human capital or research and development, which can increase firm innovation. Likely for these reasons, few scholars have demonstrated a direct relationship between non-compete enforcement and firm innovation strategy. Besides the work of Samila and Sorenson (2011) mentioned above, a notable exception is Conti (2014), who found a positive relationship between non-compete enforcement at the state level and the risk level of research and development (R&D) projects by focusing specifically on the chance of breakthroughs and failures that companies were willing to pursue, as well as an increased likelihood to patent in new areas under increasing non-compete enforcement. This paper was unique in establishing that the legal environment surrounding a firm could directly affect the R&D strategy of the firm and, additionally, noting that "corporate entrepreneurship" could be stimulated by increased enforcement of non-competes. The net impact of non-compete enforcement on innovation is thus an open question; for instance, do the positive effects of non-competes on corporate entrepreneurship found by Conti (2014) exceed the decreases in patenting observed by smaller firms receiving venture capital funding in non-compete enforcing areas, as found by Samila and Sorenson (2011)?

Firm performance

The impact of non-compete agreements on firm performance is theoretically ambiguous because management theories allow both positive and negative predictions. On one hand, the intent of an employee non-compete agreement is to, at least temporarily, limit both employee mobility and the diffusion of the employee's tacit

knowledge within the competitive industry, which should increase firm performance. However, reduced employee mobility and therefore reduced knowledge diffusion may cause state or industry-level impacts that endanger firm performance. There is some evidence that firms benefit the most from incoming employees that are not "poached" from close competitors, and thus concerns about non-compete enforceability negatively impacting firm performance may be exaggerated. Specifically, Rosenkopf and Almeida (2003) find that firms may intentionally broaden their knowledge bases by hiring from non-related firms, that is, they find that in the semiconductor industry, hiring inventors with greater technological distance produces the most firm-level benefits. Investigating so-called "learning by hiring," Song, Almeida, and Wu (2003) also conclude that firms experience greater patenting activity when patenting engineers originate from technologically less-related firms.

Moreover, there is empirical evidence that the effect of non-competes on firm performance is positive: Lavetti, Simon, and White (2014) found that physicians with non-competes earn 11% more because they are allocated more clients, while Younge and Marx (2015) find that *Tobin's q* increased by 9.75% for Michigan-based firms after non-competes became enforceable in Michigan. Specifically, Lavetti, Simon, and White (2014) found that physician-employees with non-competes see over 12% more patients per week and generate 41.5% more in weekly revenue than those without non-competes; they note that such revenue generation is due both to the number of patients seen as well as the mix of patients (physicians with non-competes saw more patients with better reimbursement rates through private insurance or Medicaid than those without). Notably, they found no evidence of any difference in quality between employee-physicians with

and without non-compete agreements, so these results cannot be explained by physician quality.[6] But such results are not fully generalizable to non-service industries. Younge and Marx (2015) find that *Tobin's q* (a measure of firm performance) increased by 9.75% for Michigan-based firms after non-competes became enforceable in Michigan due to a legislative change in 1985. However, as with the Marx, Strumsky, and Fleming (2009) paper, these results may be confounded by other statutory changes occurring during the same time period, including an antitakeover law (see Atanassov, 2013), and a branch banking deregulation (see Kerr & Nanda, 2009).

Challenges to employee non-compete research

Research on employee non-compete agreements must grapple with the following issues: (1) the challenges of disentangling implications across levels of analysis; (2) questions of state-level enforceability versus firm use; (3) measurement issues, including selection of control groups and problems of cross-state comparisons of non-compete enforceability; and (4) lack of clarity about the net effect of how multiple provisions in employee contracts (for instance, non-disclosure agreements *and* non-compete agreements) operate together. I discuss each of these briefly in turn.

Difficulties disentangling effects across levels of analysis

As should be clear from the above, there are many open questions about how reduced individual mobility due to non-competes will impact firm performance. By way of an example, consider March's (1991) categorization of exploratory versus exploitive organizational learning and search for new information. Exploration is commonly

[6] They note, "Collectively, this evidence suggests that any systematic difference in quality among physicians with NCAs would have to be a characteristic that is neither valued by consumers nor insurance companies, is unrelated to clinical knowledge, diagnosis patterns, and treatment recommendations, and is unrelated to experience" (Lavetti, et al. 2014, p. 28).

equated in employee mobility literature with new employees coming into an organization, as well as radical innovation, while exploitation is equated with increased employee tenure and more incremental innovation. Per March (1991), the balance of a firm's exploitive versus exploratory activity will be affected both by the tenure and new entry of employees. As employees join a firm, regardless of their role, they bring with them their prior stock of experiences and knowledge, while also seeking to learn about the new organization and how to best leverage their prior knowledge and experiences within the new organization. New entry of employees thus "shakes things up" and encourages a firm to consider new routines and approaches. Thus, reduced job mobility or reduced availability within the labor pool due to enforcement of non-compete agreements could reduce the entry of new employees into firms, and therefore negatively impact firm ability to engage in exploratory activities, a potential damper on firm performance. On the other hand, enforcement of non-compete agreements (or even simply having employees sign a non-compete, as found by Starr, Prescott, and Bishara (2018a) increases employee tenure (Garmaise, 2011; Starr, 2018). As tenure increases, employees accumulate firm-specific human capital, and develop common sets of experiences, attitudes, and problem-solving behaviors, or what March (1991) refers to as mutual adaptation to the organization's code. Thus, by reducing new entry and increasing employee tenure, employee non-compete agreements could facilitate exploitation and drive out exploration, potentially improving firm incremental performance. Alternatively, the increased employee tenure that comes with the use of non-compete agreements could result in employees feeling more secure in their job positions and willing to be more creative or risk taking, which may result in an increase in exploratory activities and lead

to more radical innovation – an antecedent of firm performance. This would be consistent with Conti (2014)'s findings of increased risk-taking behavior under strong non-compete enforcement regimes. Because diverse groups of employees may lack the social integration (Ancona & Caldwell, 1992) or the absorptive capacity (Cohen & Levinthal, 1990) needed to adequately make use of new, incoming information, they may fail in performance when compared with groups who are more homogenous in terms of tenure or their adherence to an organization's code. Such long-term, homogenous teams could be more creative or innovative than heterogeneous teams, thereby enhancing firm performance. There is some evidence this may be the case, as O'Reilly and Flatt (1989) found that top management teams with homogeneous patterns of organizational tenure were more creative than teams with more diverse tenure. This increased creativity could result in higher levels of firm performance.

It is also possible, or perhaps even likely, that the reduced employee mobility caused by non-compete agreements has an inverted U-shaped relationship with firm performance. Per March (1991), there is an ideal amount of turnover in relation to organizational learning, and he asserts that a certain amount of mobility is actually *good* for firms. That is, turnover introduces less socialized employees into the organization, which increases exploration and improves aggregate knowledge among all employees. Thus, the knowledge reflected by the organizational code increases, as does the average individual knowledge of employees who stayed with the firm. Thus, non-competes would reduce firm performance, and even reduce the individual knowledge of workers within the firm, *if* such agreements suppress mobility below this optimal level. Empirically, there is an inverse-U-shaped relationship between organizational learning and

productivity with inflow of new personnel (Argote, Epple, Rao, & Murphy, 1997); specifically, there is a positive effect when there is a moderate amount of personnel inflow and negative effects with either low or high amounts of personnel inflow. An open question is therefore whether non-competes reduce employee mobility too much and thus lead to stagnation or lack of improvement in the organizational code.

A related open area of research is whether there is an optimal level of usage, or enforcement, of non-competes. One example of could be firm use of non-competes for only select employees. In the State of Oregon, for example, only employees making at least the median income for a household of four may have non-compete agreements enforced against them. Another optimal level of non-competes could be use of non-competes only under certain conditions, such as in response to high turnover among employees, only for executives, or in response to industry disturbances. Consider March's (1991) discussion about employee turnover when there is significant turbulence in the marketplace. In such a situation, there exists "considerable individual advantage to having tenure in an organization that has turnover…. So [some] individuals [may try] to secure tenure for themselves while restricting it for others" (March, 1991, p. 81). Higher-level employees within a firm could think it to not only be a sign of prestige but could consider it to be a source of individual advantage should they, as opposed to others, be asked to sign non-compete agreements, and they may act accordingly to secure the best interests of the firm.

Non-compete enforceability versus use

The vast majority of literature on employee non-compete agreements has focused on the role of state policies on non-compete enforceability, with an assumption that firms

will use such agreements if they are legally enforceable. Therefore, firm-level research on non-competes has proxied firm usage by state-level enforceability. However, just because non-competes are enforceable at the state level does not necessarily mean that firms will use them. Moreover, recent statistics indicate that firms may include non-competes in employment contracts without consideration towards state level enforceability (Prescott, et al. 2016).

Methodological issues

Methodological issues may be among the most vexing for those researching employee non-competes. With the exception of the 2014 Noncompete Survey Project (Prescott, et al. 2016) and other papers with much smaller samples, such as Marx (2011), there is little data on what or how many employees actually have non-competes in their employment contracts. As such, several projects have attempted to use a control group of employees that are not subject to non-compete agreements: lawyers. Non-competition agreements for lawyers are generally prohibited by the American Bar Association's Model Rule 5.6, enacted in almost every state (American Bar Association, unknown year). This prohibition is based on the argument that it is in the public interest to preserve an attorney's professional autonomy and protect a client's freedom to choose his or her attorney (Wilcox, 2000). However, an under-recognized point is that lawyer's face strict conflict of interest provisions that have the ability to create almost *de facto* non-competes, particularly if we consider the employer (or principal, to use agency language) to be the lawyer's client, instead of a particular law firm (Wilcox, 2000). Usage of such group as a control therefore is only appropriate with considering alternative groups of

professional service firms (*i.e.*, those that are structurally similar to law firms), but even then may not make sense at all given the *de facto* non-compete issue.

Another concern is the use of enforcement "ratings" comparing the enforceability of employee non-competes across multiple states. There are at least five methodologies presented in the extant literature for doing so – a dummy variable indicator for 10 states used by Stuart and Sorenson (2003); a binary scale used by Marx and colleagues (2009); a 12-factor additive scale use by Garmaise (2011) based on Malsberger (2004); a weighted version of that scale used by Bishara (2011); and a reweighted using factor analysis version developed by Starr (2018), but there is limited consistency among these scales. One explanation may be a lack of equal emphasis in these rankings to states that rely solely or predominantly on case law for non-compete enforcement (such as Washington or New York), and therefore such rankings are instead are more influenced by states that utilize a statute as the basis for enforcing covenants not to compete;[7] it is certainly easier to clarify a state's policy on employee non-competes if it is in statutory form and, as Bishara notes, "the availability of a statute was considered a strong indication the state had considered and weighed the policy options and effects related to crafting a noncompete policy" (2011, p. 774). However, case law and legislation are at least equally important when determining non-compete enforcement; some might assert that case law is actually superior since any questions of interpretation of statutory language will be decided by a court.

[7] For instance, under the Bishara (2011) rankings, a state with a statute would score up to 5 points greater than a state without such a statute, even if both states effectively operate under otherwise similar case law or judicial conditions of enforceability.

Additionally, the Garmaise (2011), Bishara (2011) and Starr (2017) frameworks are all based on specific factors identified by Malsberger (2004), but there are, I assert, factors missing from this list. For instance, the Practical Law Company considered the following additional dimensions in its 2011 state-by-state survey of non-competes in the United States:

- Statutes for non-competes applicable only to certain professions, such as lawyers, financial industry employees, etc.
- Major case law regarding enforcement of non-competes
- Choice of law provisions
- Separate consideration of time and geographic provisions
- Whether restrictions can be based on specific items (such as customer lists or listed competitors)
- Whether geographic considerations can be contingent, such as "any area the employee services"
- The availability of injunctive relief
- Other related limitations on employee behavior, such as non-solicitation covenants or the doctrine of inevitable disclosure.

Other criteria also important to the enforcement of non-compete agreements are difference at the state level regarding judicial modifications, known as "blue pencil" versus "red pencil," and whether the time limitation of an employee non-compete can be extended due to employee violations of the non-compete agreement. Therefore, there is a clear need within the literature to create an updated framework to adequately measure enforcement of non-compete agreements across the United States. Such a framework

would be useful beyond cross-sectional analysis due to changes in state-level enforcement occurring at different time periods. Alternatively, as discussed below, such concerns about a cross-state comparisons of enforceability can be entirely eliminated if research were to focus only one changes occurring in a single state.

A final methodological concern is the use of patents to measure mobility or innovation related to non-competes or non-compete enforcement. There are strong suggestions in the literature that patents and non-competes may operate as substitutes (Kim & Marschke, 2005). Specifically, Kim and Marschke (2005) find that firms use patents to protect against a risk of employee departure, with important implications for knowledge codification and reduction of knowledge spillovers. Despite this, research on employee non-competes has frequently relied on patents as an indicator of inventory mobility (*e.g.*, Marx et al., 2009; Younge & Marx 2015), a potential problem if patents and employee non-competes effectively operate as substitutes. Younge and Marx (2015) find that the effect of non-competes on firm profitability may be partially attenuated by patent activity. Additional empirical research is needed to explore the conditions under which patents and employee non-competes may operate as either substitutes or complements.

Legal concerns

From a legal perspective, most management research on non-competes does not reflect a clear differentiation of the separate but overlapping use and implications of trade secrets protection (*i.e.*, the Uniform Trade Secrets Act), non-compete agreements, non-solicitation covenants, non-disclosure agreements, or invention assignment agreements. Additionally, much research relies on the assumption that an increase in non-compete

enforcement equates, quickly, with an increase in the number of employers requiring employees to sign such agreements. For example, consider Marx and colleagues' seminal paper (2009), where the complete reversal of Michigan's policy means that there probably were *not* non-competes contained in pre-MARA employment agreements, and thus the enforceability of such agreements wasn't changed, but rather the agreements would have had to been introduced separately, and employers would face the challenge of having to ask their existing workforce to sign non-compete agreements.

I also caution that there may be a disconnect between the legal and management understandings of the role of consideration, or bargained for exchange (normally meaning financial gain in excess of standard compensation), in association with employee non-compete agreements. For example, Starr (2018) implies that requiring consideration at reduces state-level enforceability, but I believe this is only part of the picture. Requiring consideration may reduce enforceability for employers who do not follow such requirements, and likely increases the cost to employers of using non-competes when they do follow the requirements. However, by providing such additional rules, the law essentially provides a "checklist" to firms for how to make their employee non-competes enforceable. Thus, for employers that "follow the rules" and provide consideration, non-competes actually become *more* enforceable following the implementation of consideration requirements for non-compete enforceability.

Contributions of this dissertation

The intent of this dissertation is to advance research on employee non-compete agreements beyond questions at the individual level to address whether such agreements can be used to ethically create and sustain firm-level human capital-based competitive

advantages. On the question of ethics, the extant literature has generally either directly stated that non-competes are unethical (Bishara & Westermann-Behaylo, 2012) or made normative judgments on the implications of employee non-competes, without full consideration of the potential firm-level effects of such agreements. On this point, the relationship between enforcement of non-compete agreements and firm financial performance remains largely unexplored. This lack of prior research is likely because such agreements represent theoretical and methodological challenges occurring at multiple levels since employee non-competes both "prevent the loss of human capital to a competitor *and* block the firm's ability to poach from a competitor" (Younge & Marx, 2015, p. 652, emphasis added; see also Belenzon & Schankerman, 2013).

This dissertation seeks to resolve these challenges with two theoretical contributions and one methodological contribution. First, on the theory side, while scholars have explored operating mechanisms that may promote knowledge transfer between firms, as in the case of alliances (*e.g.*, Becerra, et al. 2008), or within individual firms (*e.g.*, Tsai, 2001), or the strategic deployment of human resources (*e.g.*, Huselid, et al. 1997), the role of human resource-based protection mechanisms such as non-competes in facilitating the management of firm knowledge remains relatively unexplored, with the exception of the aforementioned employee mobility-focused research on non-compete agreements (*e.g.*, Marx et al., 2009). This dissertation therefore seeks to reinforce a theoretical basis of knowledge protection for the effects of non-compete agreements on firm performance (Franco & Mitchell, 2008). Second, existing management research has not extensively utilized the potential of the resource-based view of the firm (RBV) and its relationship with employee non-compete agreements. To address this gap, this empirical

projects in this dissertation formally conceptualize employee non-competes as an isolating mechanism that can affect firm ability to obtain sustainable human capital-based competitive advantage.

Third, and on the methodological side, much research on employee non-competes has utilized methodological models that ultimately compare enforcement of employee non-competes across two (or more) U.S. states, using an enforceability "score" for each such state. However, at least five distinct methods of generating these "scores" exist within the literature,[8] and such methods are not consistent among each other.[9] Moreover, states receiving the same "score" under such a method may have very different requirements for enforcement, but such systems (falsely) imply that enforceability would be identical in the two states. Thus, the extant literature on non-competes has not given adequate methodological considerations to the real differences in content of different state laws.

To mitigate such methodological challenges, the two empirical projects of this dissertation are the first, to my knowledge, to utilize event study methodology to explore the impact of changing state-level enforcement of employee non-competes on the performance of such firms headquartered in a single state, avoiding any issues of cross-

[8] The five recent systems of categorizing non-compete enforceability across states mentioned here are the dummy variable indicator used by Stuart and Sorenson (2003); the binary scale used by Marx and colleagues (2009); the 12-factor additive scale use by Garmaise (2011); a reweighted version of that scale used by Bishara (2011); and a reweighted version of the Bishara (2011) using weights derived from factor analysis developed by Starr (2017).

[9] There is, for example, a clear mismatch between the Garmaise (2011) graduated ranking and the Marx, Strumsky, and Fleming (2009) binary scale. Specifically, comparing the list of ten "non-enforcing" states identified by Marx and colleagues (2009) with the scoring system from Garmaise (2011) leads to a mismatch of all states except California; that is, all states except California receive a non-zero score in Garmaise's framework and several states that are excluded from Marx and colleagues' (2009) "non-enforcing" list actually score lower in Garmaise's (2011) ranking than states that were included (Starr, 2017).

state comparison. For an event study to be appropriate, there must be an unanticipated shock to which the market has not previously had time to respond (Fama, 1970; McWilliams & Siegel, 1997). For these projects, I selected two quasi-natural experiments of changing state-level enforcement of employee non-competes, as discussed in detail in Appendix A and more thoroughly in Chapters 4 and 5. The primary empirical questions of the two empirical studies is the same: whether state-level non-compete enforcement affects firm performance.

CHAPTER 3

THE CASE FOR ETHICAL NON-COMPETE AGREEMENTS: EXECUTIVES VERSUS SANDWICH-MAKERS

INTRODUCTION

"The ability to use the talents of other persons depend[s] not on coercion but rather on consent—including consent that [is] purchased in voluntary transactions."
(Epstein, 1992, p. 21)

An employee gives his employer "but a temporary power over him, and no greater, than what is contained in the contract between 'em." (John Locke, 1690, emphasis omitted)

Human capital is a key strategic asset for many businesses whose value comes largely from the intellectual property contained within the "tacit knowledge" of the employees and takes the form of general "know-how" such as hands-on experience and similar on-the-job learning (Garmaise, 2011; Gilson, 1999). But employees are inherently mobile, and firms wishing to reduce their risks of employees departing to join or start a competitor often turn to written employee non-compete agreements to reduce this risk of valuable human capital departing the focal firm. Thus, the classic legal theory and justification for employee non-compete agreements derives from the idea that firm knowledge belongs to the firm and is therefore a type of employer intellectual property (Fisk, 2009; Hyde, 2012). This perspective views employees as vehicles by which firm knowledge can be taken away from the firm, and the protection afforded by non-competes is due to the ability to keep employees from departing the focal firm for a competitor or to start their own competitive entity. This creates a tension between the employer's interests in protecting its intellectual property and the interest of employees in being fully – and unrestrictedly – mobile in their choice of careers.

From this perspective, employee non-competes are a tool that firms utilize to protect firm knowledge, particularly firm investments made in developing employee human capital or in developing firm intellectual property. Some scholars (*e.g.*, Marx, et al. 2009), however, regard non-competes as a simple limitation on employee mobility. To date, the majority of business and management research has focused almost exclusively on the conceptualization of employee non-competes as the latter, while mostly ignoring, or only mentioning in passing, the former. As a result, non-competes have been almost unfailingly maligned within business literature and the popular press, perhaps because most empirical research has shown that non-competes fulfill the intent of keeping employees at firms. Because such agreements limit worker mobility (Marx, et al., 2009; Garmaise, 2011), studies have claimed a host of negative normative implications for non-competes, such as reduced investment human capital (Garmaise 2011), loss of valuable inventors to non-enforcing states (Marx, et al., 2009), reduced venture capital funding (Samila & Sorenson, 2011), and reduced instances of entrepreneurship (Stuart & Sorenson, 2003; Marx & Fleming, 2012; Starr, Prescott, & Bishara, 2018 – hereinafter Starr, et al. 2018a). Moreover, employee non-competes have even been found to adversely affect those who do not sign them by creating vacancy chain effects (Starr, Frake, & Agarwal 2018 – hereinafter Starr, et al. 2018b).

In this project, I do not seek to challenge the empirical findings of this literature. Rather, I seek to catalyze a conversation about how this growing stream of literature makes normative judgments about the ethics of employee non-compete agreements that may not fully be justified. I propose an alternative framework that, at this stage, looks at only one small part of the picture, in order to clarify open issues and avenues for further

research. In particular, I assert that the espoused core ethical tension of non-competes over questions of *property rights* (such as, "who owns or has rights to the knowledge contained within a departing employee's mind?") is in fact due to underlying concerns over power, autonomy, and fairness. I suggest that an ethical employee non-compete agreement exists when there has been appropriate consideration during the negotiating process between the firm and employee to these three central attributes. Non-compete agreements are therefore an example of what Edwin Epstein cautioned when he notes that "sometimes conflicting, values as success, freedom, justice, equity, efficiency, contractualism, communitarianism, utilitarianism, and individualism, together with deeply ingrained notions of personal and property rights, influence our concepts of ethical and responsible behavior" (Epstein, 1987, p. 361).

This paper proceeds as follows. First, I examine the existing literature on the ethics of employee non-compete agreements, which has not differentiated the ethics of non-compete *enforcement* from the ethics of the *negotiation* of such agreements, and which has not considered the perspective of the firm or different types of employees. Moreover, while prior non-compete research has focused on issues related to property rights, I propose that this has been a misconception, and is better framed as underlying concerns over power, autonomy, and fairness. Due to the inadequacy of the direct literature, I then examine employee non-competes in relation to similar agreements and provisions, specifically confidentiality/trade secrets provisions and the doctrine of employment-at-will in order to compare and contrast the ethics of employee non-compete agreements from related theories and phenomena. I next describe two real-life illustrative examples where the "ethics" of an employee non-compete differ: an executive at Amazon

and a sandwich-maker at Jimmy John's. By identifying a set of attributes on which these two examples differ, I isolate three core ethical issues of employee non-compete agreements facing employers and employees at the negotiation stage: power, autonomy, and fairness. By focusing on the negotiation stage, I am able to provide a three-pronged framework for when an employee non-compete agreement can be considered ethical. Finally, I call for future research and outline potential avenues for such research. "To be clear, I do not advocate for unfettered and indiscriminate use of non-competes" (Gomulkiewicz, 2015, p. 258), but rather, I propose that there exists (at least) one way in which employee non-competes can be used ethically.

EXISTING LITERATURE AND CLARIFICATIONS

Most existing literature on employee non-competes has answered the question of "are employee non-compete agreements good or bad?" with an ardent "bad." For instance, Marx, Singh, and Fleming state in the abstract of their 2015 paper in *Research Policy* that "non-compete agreements are responsible for a 'brain drain' of knowledge workers out of states that enforce such contracts to states where they are not enforceable." Yet this literature oftentimes only considers one part of the puzzle, or posits ambiguous relationships due to the dual nature of employee non-competes as *both* an employee mobility limitation and a firm knowledge protection mechanism. Consider investments in human capital by firms and employees, where the relationship between non-compete enforcement and net human capital investment remains unclear. This is because non-competes are posited to reduce employee-sponsored investments in human capital while at the same time increasing firm-sponsored investments in that same human capital (Garmaise, 2011; Ghosh & Shankar, 2016). Adding to this is uncertainty are

questions about the impacts non-competes have beyond just the parties involved. For instance, Starr, Frake, and Agarwal (2018) (Starr, et al. 2018b) demonstrate that the job mobility of "non-signers" (those who are not subject to non-compete agreements for any reason) is adversely impacted by non-competes due to a "vacancy chain" effect as a result of "signers" staying with their firms and thus a lack of available positions for non-signers. Additionally, in the human capital research stream, it is well acknowledged that such agreements "at once prevent the loss of human capital to a competitor" and "block the firm's ability to poach from a competitor" (Younge & Marx, 2015, p. 652; see also Belenzon & Schankerman, 2013).

Thus, the question of "are non-competes good or bad?" must be decomposed into two separate questions: (1) *why* is a non-compete is good or bad, and (2) *who* is the non-compete good or bad for? The first question can be broken down even further by asking what is meant by "good or bad" – economically or ethically? Empirical literature on the *economic* impact of non-competes has coalesced around the notion that employee non-competes may be good for firms (Lavetti, et al. 2014; Younge, et al. 2015) but bad for employees (Starr, 2018; Marx, 2011). Scholarship on the *ethics* of non-competes has been much more limited, with two notable exceptions, and will therefore be the focus of this paper. The most recent work by Bishara and Westermann-Behaylo (2012) critiques non-competes, garden leave, and the inevitable disclosure doctrine from the rights, utilitarian, and fairness perspectives, finding them unethical under all three. The older work by Kafker (1993) considers the ethics of using non-competes in partnership agreements for professionals, such as lawyers, doctors, or accountants, and concludes that

absolute non-competes should not be permitted, but agreements with fiduciary obligations that form similar requirements are acceptable.

A central concern with prior research on the ethics of non-competes is a lack of specificity over exactly what is being discussed. First, as noted above, it is important to clarify *from whose perspective* we are discussing the ethics of non-competes. It is also critical to recognize a question of *when*. This is because as the ethical issues and conclusions may be very different at different points in times or from different perspectives. While the multiple points in time issue is recognized by Bishara and Westermann-Behaylo (2012) in their discussion of employee non-competes, their ethical analysis loses this distinction. Their focus is on the ethics of the actual *enforcement* of non-compete agreements, but their analysis is mixed with temporal questions such as when an employee signed an agreement and the duration of the employment relationship. This is an important conversation to have because analysis over "what is ethical?" should be explicit on considerations of perspective (ethical for whom?) and sensitive to the temporal issues (ethical when?). This is well reflected in the large body of research on the ethical decision-making process, but prior research on the ethics of employee non-competes has largely ignored the fact that the non-compete process is actually a complex set of decisions involving multiple stakeholders, including the firm and the (prospective, current, or terminated) employee, but also the state and the applicable judicial decision-maker, that occur in a temporal sequence. This process is illustrated in Figure 3-1 as a decision process, and is not meant to be a step-by-step diagram for determining when a non-compete is ethical. In this paper, I focus on the negotiating stage, or what is identified as a "black box" in Figure 1. This answers the two primary questions I raised

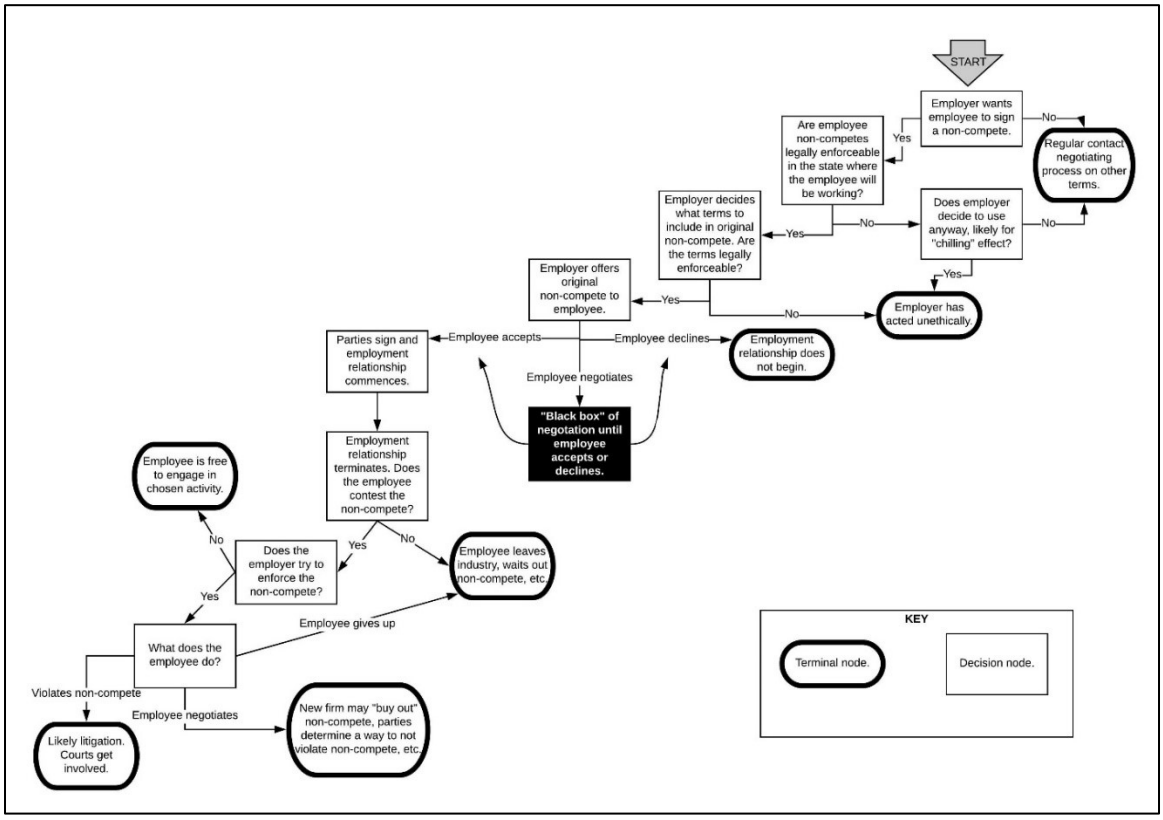

Figure 3-1: The employee non-compete process.

earlier: I am focusing on the ethics of non-competes from the perspective of those involved in the negotiation over the terms of the non-compete, meaning the employee and the employer, to address the *who* question, and I am looking at one particular temporal moment in a complex process in order to address the *when* question. Future work should address other pieces of the process, such as the employer's decision to use a non-compete (the original node of Figure 1) in the first place. The question of "should a firm use non-compete agreements?" is therefore left to future research. This focus on the negotiation of the employee non-compete has the benefit of also limiting analysis of the stakeholders involved to the employee and the employer, removing questions of state policy/enforcement or judicial involvement. Moreover, there is a rich literature on

negotiation which I connect to the strategic human capital literature on employee non-compete agreements.

By way of clarifying the questions of "ethical from whose perspective?" and "ethical when?", I offer the following example: begin at the initial decision node of Figure 1, the decision of the employer that it would like to have an employee sign a non-compete. We cannot evaluate the ethics of this decision without first considering whether state policy will allow the firm to have such an agreement in the first place (the second decision node). If state policy does not permit such an agreement and the firm decides to use one anyway, we are likely to encounter what is commonly referred to as the *in terrorem* effect of such clauses (Sullivan, 2009). That is, if an employer intends to utilize a non-compete agreement without consideration towards its actual enforceability, and therefore is using the agreement solely for its potential "chilling effect" on the employee's future activity (Marx & Fleming, 2012), I would propose that such an agreement is unethical. Under the majority of philosophical ethical theories (except perhaps under a utilitarian analysis)[10], such a decision motivated solely by a desire to chill employee mobility would be unethical since it violates legal requirements, and may violate the rights of employees. Moving to the end of Figure 1, a former employee's and a firm's litigation over a non-compete will involve judicial actors that will take over the decision-making process for all involved. Because there is a great deal of legal literature on what reasoning should govern a judicial determination of a non-compete, it will not be addressed in this paper.

[10] Although Bishara and Westermann-Behaylo (2012) analyze non-competes under a utilitarian analysis and find them to be unethical, they do not specifically discuss the *in terrorem* issues with non-enforceable non-compete agreements being requested of employees.

Returning to the central question of "are non-competes good or bad?", the core tension underlying research on both the economic and ethical impact of employee non-compete agreements has long been focused on questions of property rights: Who owns human capital? Who owns the knowledge that is contained in a (likely eventually departing) employee's mind? The employee or the firm? If the firm owns the knowledge, does it have the right to limit the employee's mobility in order to prevent that knowledge from being used at a competitive firm? Does it matter if the firm paid to develop the employee's human capital, through training or educational benefits?

Management research is clear that worker mobility is a key source for potential knowledge transfer among firms, but, since knowledge is a quasi-public good (Arrow, 1962), possession by one party does not exclude possession by another party. But due to the risk of proprietary firm knowledge being taken by employees to competitive firms, a firm may be reluctant to invest in or develop human capital of its employees via training or other methods if the firm's property rights in such human capital are not secured. Employee non-competes are method by which a firm can secure its property rights in its human capital development of employees (Marx, et al. 2009), and non-compete enforceability at the state level has been found to be positively related to firm-sponsored investments in human capital (Cooper, 2001; Garmaise, 2011; Starr, 2018). Simply, non-competes allow firms to not worry that their employees are going to take *their* valuable firm knowledge to competitors.

Other scholars claim that non-compete agreements give firms greater property rights than which they should be entitled, noting , "[n]on-compete agreements enable companies to convert general training into firm-specific human capital by denying

workers the opportunity to apply those skills outside the firm" (Marx, 2011, p. 698). However, if employees realize that their external employment opportunities may be limited due to such agreements, they may invest less in their own human capital development. Empirical results on this point are mixed, with some scholars (Garmaise, 2011) finding a negative relationship between non-compete enforceability and employee-sponsored training while others (Starr, 2018) find no relationship. Moreover, an intuitive economic perspective on employee non-competes would conclude that such agreements increase employee wages (or welfare) because the employee has the ability to negotiate the non-compete and should, in theory, receive compensation for the exchange of property rights (Callahan, 1985; Rubin and Shedd, 1981). However, most recent scholarship agrees that employee non-competes result in reduced employee wages (Garmaise, 2011; Starr, 2018), likely due to suppressed elasticity in the labor market. More educated employees are able to offset this reduction in wages, possibly due to increased bargaining power, and also gain more firm-sponsored training (Starr, 2018).

I suggest, however, that this focus on property rights as the key underlying ethical issue with non-competes has been misplaced. For instance, Bishara and Westermann-Behaylo conclude their analysis of non-competes under property rights theory stating:

> [T]he weaknesses of noncompetes from the rights-based perspective include (1) a failure to resolve the issues of employee consent versus coercion to protect against employer overreaching, (2) questions about the employee's ability to develop herself and make a living from her property rights in her own productive capability, and (3) a failure to gain certainty about protection of the employer's property rights to competitive information such as trade secrets. (2012, p. 39)

Similar, Haws notes that, "it is unjust for the employer to assert indefinite ownership over this 'competence' of their employees, or to assert rights to the general training or education that an employee already had when the employment relationship commenced"

(2004, p. 5). Unpacking these concerns, however, indicates ethical issues not with property rights per se, but rather with other ethical constructs. For instance, issues of consent versus coercion or the (in)ability to make a living raise concerns over employee autonomy and power, while those dealing with concerns indefinite ownwership indicate concerns with fairness. Such unpacking is akin to Werhane's conceptualization of property rights as secondary to other fundamental moral rights, such as freedom (Werhane, 1985; see also Werhane, Radin, & Bowie, 2008). Due to the inadequacy of the existing literature on the ethics of employee non-compete agreements, I turned to literature on the ethics of similar agreements and practices in order to analyze the ethical issues with employee non-compete agreements. As will be discussed more thoroughly below, this paper proposes the underlying ethical concerns with employee non-compete agreements are due primarily to questions of power, autonomy, and fairness.

ETHICS OF SIMILAR AGREEMENTS & PRACTICES

While there is a lack of direct scholarship on the ethics of employee non-compete agreements, there has been further research on similar agreements and policies, specifically the ethics of non-disclosure and trade secrets agreements, and on the doctrine of employment-at-will. In this section, I discuss each of these in turn and compare these agreements and doctrines with employee non-competes.

Confidentiality/Trade Secrets

Confidentiality agreements, also called non-disclosure agreements (or "NDAs"), are assumed to be one of the most widely used terms in employment contracts in the United States (Bishara, Martin, & Randall, 2015; Dworkin & Callahan, 1998). Such agreements do not restrict employee mobility like a non-compete, but rather are a written

confirmation that proprietary firm information remains the exclusive property of the employer should the employee leave the firm – even if the knowledge is contained in the employee's mind (Bishara, et al. 2015). Thus, from a normative ethical theory standpoint, non-disclosure agreements are a prime illustration of property rights theory.

Because of the nature of non-disclosures versus non-competes, "[c]oncerns regarding restraint of trade are much less directly implicated [for non-disclosure agreements]; restrictions on access to information, rather than employee movement, are involved" (Dworkin & Callahan, 1998, p. 156-57, citations omitted).

Scholarship exploring the ethics of non-disclosure agreements in the context of the employment relationship has centered on issues relating to the duty of loyalty (Dworkin & Callahan, 1998; Gomulkiewicz, 2015; Schaller, 2001), sometimes expressed as a duty of confidentiality (Bishara, Martin, & Randall, 2015). Thus, there is a strong connection with literature on the ethics of "whistleblowing" or the disclosure of confidential information to an outside party.

Whistleblowing itself is a stand-alone topic in business ethics literature, with most scholarship focusing on what circumstances justify an employee violating his or her duty of loyalty to the employer and exposing confidential information to a third party, which is, in most cases, the government. However, there is some contention here about what exactly is meant by the duty of loyalty, with some scholars, such as Duska (2007), defining loyalty as a direct person-to-person relationship and stating that there is no loyalty owed from the employee to a firm. However, this appears to a minority viewpoint, with most scholars (*e.g.*, Jubb, 1999; Corvino, 2002) agreeing that such a duty of loyalty does normally exist, and that whistleblowing is ethically permissible in

situations in which real harm is avoided for which the employee might have otherwise been responsible.

Analogizing this to non-compete agreements, consider whether there is a duty of loyalty that is created or affected by an employee non-compete agreement. Even Duska may agree that, at least in the negotiation context, there is a direct relationship created between the person negotiating the non-compete on behalf of the firm, frequently a manager, and the employee. As Haws (2004, p. 4) notes, "We may work for companies, but the employee/employer (worker/manager, if you'd prefer) relationship is between individuals." The employment relationship, when viewed through an agency theory lens, also supports the notion of the reciprocal obligations that engender duties on both the part of the firm and the part of the employee. From a legal perspective, there is also agreement, with the Restatement (Third) of Agency defining the duties that employees, as agents of the employer, owe to employees, including, most importantly, a duty of loyalty, a duty of care, and a duty not to mislead, among other fiduciary duties (American Law Institute, 2006). Only the duty of loyalty is considered to apply broadly to all employees regardless of status within an organization; in some cases, courts "have concluded that the duty of loyalty applies to all employees, regardless of status as an officer, director or manager of the firm" (Lee, 2006, p. 7). Is it therefore surprising that Bishara and Westermann-Behaylo (2012) state that there are not deontological ethical issues of employee non-competes, as I propose that an employee's duty of loyalty would certainly be breached should the employee choose to violate an existing non-compete, provided such a non-compete was negotiated properly, as will be discussed in detail below.

Other research on confidentiality and trade secrets has reached similar conclusions about the obligations created between firms and employees. Empirical research has found that the action of gaining agreement from employees about access protocols required in exchange for the employees' access to confidential information creates a personal obligation for employees to protect the firm's information (Hannah, 2005). The notable phrase here, however, is *agreement* which implies voluntary and informed consent. As will be discussed below, this directly points to the important role of autonomy in the negotiating process of such contracts

I propose this obligation from such a voluntary agreement extends to employee non-competes, such that by being given access to firm proprietary information, the employee gives up the right to intentionally take such information to a competitor. At issue, however, is whether non-disclosure agreements are a better tool than non-competes for such limitations. Proponents of such a view, such as Dworkin & Callahan, (1998) or Bishara, Martin, and Randall (2015), note that non-disclosure agreements are "an unambiguous declaration that the employer views firm matters as confidential" (Dworkin & Callahan, 1998, p. 57) and do not make limitations on employee mobility. Moreover, they assert that it is easier to enforce a non-disclosure agreement than a non-compete agreement (Bishara, et al. 2015). In contrast, other scholars would assert that non-disclosure agreements are much more difficult to enforce than non-compete agreements, since proving "ownership" or source of knowledge is complex (Gomulkiewicz, 2015), and litigation over such issues is therefore costly and unpredictable (Pooley, 2008). Moreover, violations of a non-disclosure agreement can be difficult for a firm to even become aware of (Hyde, 2012) and may therefore not be able to be resolved before harm

has occurred to the firm. The benefits of a non-compete agreement is therefore that it is significantly more unambiguous than a non-disclosure, and may even bolster the intended of non-disclosure agreements when the two are used in conjunction (Whaley, 1999).

Non-competes can therefore engender similar loyalties as non-disclosure agreements. This is because beyond a written contract there is also a psychological contract created between a firm and its employees that begins with the negotiation of the employment contract. Under psychological contract theory, there are implicit, reciprocal rights and obligations that individuals perceive within exchange relations such as the relationship between a firm and an employee (Rousseau, 1998; Hannah, 2005). In such an exchange relationship, when an employee believes he/she has a high-trust relationship with his/her employer, the employee will feel more personal obligations towards the employer (Hannah, 2005; Fox, 1974). Thus, employees who believe themselves to be in a high-trust relationship, as demonstrated through access to confidential information, are more likely to feel a personal obligation to protect their employer's confidential information (Hannah, 2005). In fact, this research indicates that the very existence of privacy or access-restrictive language in employment contracts "signals to employees that their employers trust them sufficiently to provide them with access to trade secrets" (Hannah, 2005, p. 74). Thus, instead of indicating that the employers does not trust or otherwise want to harm employees, a non-compete agreement could actually be seen as a tool to develop trust – and a lack of ambiguity – between a firm and an employee.

Employment at will

Turning from similar agreements to similar employment doctrines, the closest established field in business ethics research appears to be research on employment-at-will

(EAW). Employment-at-will is the presumption in 49 out of 50 states (with the exception of Montana, which only allows at-will employment during a probationary period) (National Conference of State Legislatures, n.d., hereinafter "NCSL"; Montana Department of Labor & Industry, n.d.). The default of EAW means that, subject to the exceptions noted below, an employer can terminate an employee at any time, for any reason or no reason at all, with no notice, as long as the firm does not violate state or federal employment laws, such as those against discrimination (NCSL, n.d.). The only exception to this default available in all states is modification via written contract, while other exceptions are available on a state-by-state basis, such as concerns over a violation of public policy, an implied contract, or a covenant of good faith and fair dealing (NCSL, n.d.). The EAW literature has been the subject of much discourse and debate in business ethics, with similar concerns to those of non-compete agreements.

In particular, both EAW and employee non-competes center on issues relating to rights. EAW protects the right of firms, as employers, to choose who works for them, or to hire and fire whomever, whenever (Radin & Werhane, 2003). Moreover, because it gives the employer the ability to terminate the employee if there are any issues, EAW discourages theft, encourages productivity, reduces labor costs, allows for reduced monitoring of the employee by the firm, and relieves the employer of concerns associated with imperfect information, a core issue with any agency relationship (Epstein, 1984). The employee receives similar protection from imperfect information, such as whether the job is a good fit, and employee mobility, or flexibility, is maximized (Epstein, 1984). Moreover, the risk of reputational losses discourages both sides from abusing the EAW doctrine (Epstein, 1984; Maitland, 1989).

The parallels with non-compete agreements are similar, particularly regarding the risks of imperfect information and of protection from abuse. Employee non-competes give the firm property rights in firm knowledge contained within employees, and thus let the firm choose how – and with whom – its information may be shared. A firm will not know at the outset of the employment relationship what an employee's intent is, and thus a non-compete agreement protects the firm from an employee with malicious intent (or later hard feelings after termination). And much like EAW, the risk of reputational losses will keep the parties in check, in addition to the threat of litigation costs which operate as a selective enforcement mechanism that can be highly efficient (Gomulkiewicz, 2015).

However, one major contrast to non-competes is that the temporal concern with non-compete enforcement is not present with EAW. That is, for employee non-competes that are enforced, the firm's property rights in the firm knowledge contained in the mind of former employees extends beyond the duration of the employment relationship (Bishara & Westermann-Behaylo, 2012). Such concerns can only be mitigated when it is ensured during the negotiating process that the employee fully understands the implications of the contract and is providing voluntary and informed consent. As discussed in detail in the next section, this involves the core ethical tenant of *autonomy*.

Since EAW is the default in the most jurisdictions within the United States, an employee provides similar consent when accepting an at-will job, particularly if the offer letter or employment contract expressly states that such employment is "at will." However, "consent comes very close to coercion when one agrees to go along with an action due to lack of information or simply because no other feasible option is available," a comment Bishara and Westermann-Behaylo (2012, p. 33) make about employee non-

competes but is equally applicable to EAW (Radin & Werhane, 2003). However, the core ethical issue here is not actually consent, but rather with whether such consent is informed and voluntary. Thus, the question is raised how we can determine whether consent, whether to EAW or to an employee non-compete, is informed and voluntary? I propose in the case of non-competes (and suggest that the case may also be made for EAW) that we can focus on the negotiating process, or the "black box" identified in Figure 1. As discussed in the next section, the primary concern in such a process are those related to bargaining power.

Returning to EAW, under such a doctrine, both the employee and employer possess equal abilities to terminate the employment relationship. Such equal ability to initiate the termination of the employment relationship is still provided by employee non-competes to the firm and the employee, except in a few jurisdictions, such as New York, that do not allow non-competes when an employee has been fired for no cause. The difference between non-competes and EAW is, however, that the duration of the employment relationship is extended by the duration of the non-compete. Building on the proposal above, I suggest the ethical concerns with a non-compete at this stage can be resolved by verifying that there has been adequate consideration of the *autonomy* of both parties, including voluntary and informed consent by both the employee and the firm.

In defense of EAW, both Epstein (1984) and Maitland (1989) put primacy on the freedom of employees and employers to contract freely with employers. Under this argument, the autonomy of the parties is violated if there is interference with the free ability to create contracts among consenting parties. If the terms of a contract are unacceptable to a party, (s)he bears any responsibility, provided that such a contract was

freely entered into. Moreover, as noted above, under EAW, either party may terminate the contract at any time. This same "freedom to contract" argument has been applied to non-competes and specifically, has been contrasted against an employee's "freedom to trade." The prior argument is virtually identical to that espoused for EAW, and supported by empirical evidence that, under certain conditions, employee non-competes can result in positive net gains for both parties (Starr, 2018). The latter argument views non-competes as parallel to servitude, and prioritizes the right of employees to have free choice of whom they work for – that is, with whom they will trade their labor in exchange for wages (Blake, 1960). Scholars in this vein have concerns focused almost entirely on disparities of bargaining power between the firm and the employee, particularly those who might be "forced" to sign such agreements or to whom such agreements are presented after they have already accepted a job offer (Marx, 2011; Starr, et al. 2018a).

However, EAW does face objections which can also be paralleled to employee non-competes. Firing employees without cause has been said to treat employees like instruments, or pieces of machinery, and therefore violates their autonomy by not treating them with the respect they are due as persons (Radin & Werhane, 2003). Applied to non-compete agreements, viewing employees simply as vehicles of firm knowledge may similarly violate their autonomy. Thus, there must be a balance –with respect to power, autonomy, and fairness – in order for employee non-competes to be considered ethical.

Many concerns with EAW deal with fundamental issues of power; that is, EAW does not treat employers and employees equally (Radin & Werhane, 2003). Specifically, the firm or employer is regarded as having more power than the employee (Blades,

1967). In one sense, such power concerns stem from the fact that employees rely upon employers for their livelihood. Employees possess a vested interest, or right, in their current employment, and being fired from such a job causes them harm and deprives them of obtaining their livelihood (Werhane, et al. 2008). But "employers suffer when employees simply walk off jobs without notice" (Radin & Werhane, 2003, p. 115). Thus, it has been argued that the employment relationship entails reciprocal obligations for both the employee and the firm regarding the intent to hire or fire, or to join or to leave (Werhane, et al. 2008). Analogizing this to non-compete agreements, a non-compete also creates reciprocal obligations between the firm and the employee, but there may be, perhaps significant, concerns over the fairness of such an agreement to both parties. Such question over fairness should become evident in the illustrative examples discussed in the next section.

ILLUSTRATIVE EXAMPLES

Based on the above analysis, I propose that ethical concerns related to employee non-competes at the negotiation stage can be avoided when there is proper attention paid to three core ethical issues: power, autonomy, and fairness. In this section, I provide two illustrative examples where the "ethics" of employee non-competes differs. The first is the case of an executive at Amazon, Arthur Valdez, who, in February, 2016, left Amazon to seek employment with Target. This case is provided as an example of an ethical non-compete agreement. The second is the case of sandwich-making employees at the national retail chain Jimmy John's. This case, to the contrary, is an example of an unethical non-compete agreement.

Illustrative Example #1: The Executive

Arthur Valdez worked for Amazon for over 16 years (*Amazon v. Valdez* Complaint, 2016). At the time of his hire in 1999, he signed his first non-compete agreement, and in 2009, he was promoted to Vice President in a series of roles related to supply chain and logistics management. In 2012, Valdez reaffirmed his non-compete agreement. The two non-compete agreements contained identical terms, and required an 18-month "time out" after leaving Amazon before Valdez could work in a comparable positions for a competitive company (*Amazon v. Valdez* Complaint, 2016, 2).

In February 2016, Valdez was working as an Amazon Vice President at a salary of over a million dollars a year (*Amazon v. Valdez* Complaint, 2016), and was tasked with managing "the Seattle-based company's supply chain, fulfillment centers and transportation operations, in addition to expansion in developing countries" (Bishop, 2016). Later that month, Valdez's attorney informed Amazon that Valdez would be leaving the e-commerce firm and taking a position with Target. Valdez told Amazon that the new position with Target was not competitive to his work with Amazon because he would only be "working on delivering products from warehouses to stores" (*Amazon v. Valdez* Complaint, 2016, 17); that is, that his work with Target would not be competitive because it would deal only with physical stores instead of online retailing. However, it is public knowledge and reported in news outlets that Target is attempting "to step up its e-commerce game to better compete with Amazon and take advantage of the growth in the online retail sector. Target's hiring of Valdez was viewed as another key step in that effort" (Bishop, 2016). In the press release announcing Valdez's hire, "stated that Mr. Valdez would be Target's Executive Vice President, Chief Supply Chain and Logistics

Officer leading 'Target's supply chain transformation including planning, distribution and transportation" (*Amazon v. Valdez* Complaint, 2016, 3). Not surprisingly, Amazon filed a lawsuit against Valdez, seeking to enforce his non-compete agreement.

Illustrative example #2: The Sandwich-Maker

In early October 2014, the sandwich chain Jimmy John's made headlines when it was revealed that most of its employee sandwich-makers had signed non-compete agreements as a condition of employment (Jamieson, 2014). This non-compete, stated:

> Employee covenants and agrees that, during his or her employment with the Employer and for a period of two (2) years after … he or she will not have any direct or indirect interest in or perform services for … any business which derives more than ten percent (10%) of its revenue from selling submarine, hero-type, deli-style, pita and/or wrapped or rolled sandwiches and which is located with three (3) miles of either [the Jimmy John's location in question] or any such other Jimmy John's Sandwich Shop.
>
> (Jamieson, 2014)

In some areas of the country, this covenant may not have such an issue for employees, as there were not a significant number of Jimmy John's locations in the area. For instance, Figure 1-2 demonstrates the radius of prohibited activity in the New York City area, while Figure 1-3 demonstrates the areas of prohibited activity in the greater Chicago area – almost the entire Chicago metropolitan area is covered.

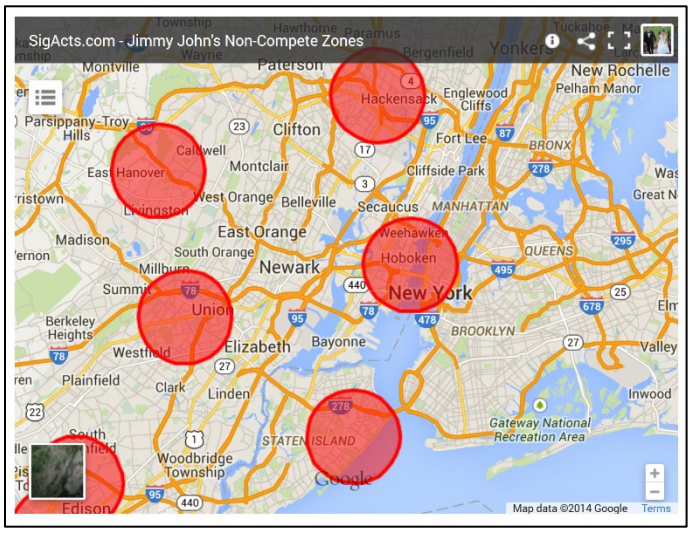

Figure 3-2: Jimmy John's non-compete zones around New York City (SigActs, 2014).

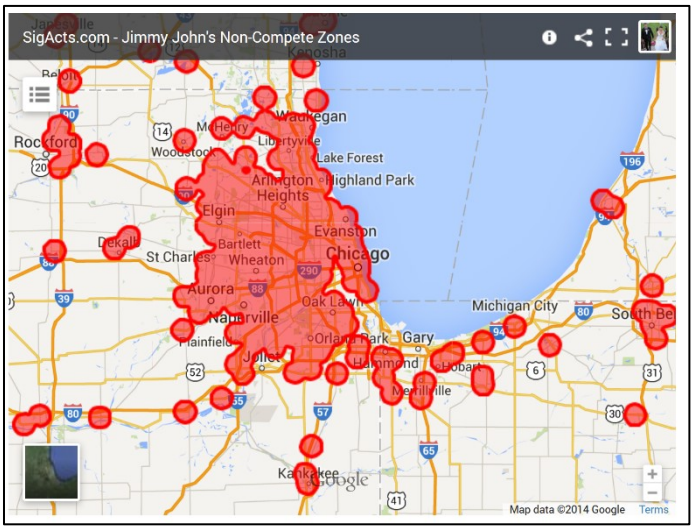

Figure 3-3: Jimmy John's non-compete zones around Chicago, IL (SigActs, 2014).

The chain was lambasted on the Internet for having its workers sign such an agreement, and the company faced investigations in multiple states (Whitten, 2016). From a rationale perspective, the non-compete would prevent the sandwich makers from working not only at direct sandwich-making competitors, such as Subway or Quizno's, but possibly even a Greek restaurant serving gyros or a grocery store with an active deli. It was later revealed that the non-compete clauses had been included in an employment contract template

provided by the firm to its franchisees, a practice that was stopped in late 2016 (Whitten, 2016).

Comparing the examples

These examples raise a basic question: do firms treat executives and sandwich- differently, particularly regarding usage of non-compete agreements? The answer is an emphatic yes. "Approximately 15 percent of workers without a college degree are currently subject to non-compete agreements, and 14 percent of individuals earning less than $40,000 are subject to them" (White House, 2016) In contrast, Schwab and Thomas (2006, p. 234) find that approximately "two-thirds of the CEO employment contracts contain explicit do-not-compete clauses," while at least 70.2% of executives at publicly-traded firms signed non-competes in another study (Garmaise, 2011). Moreover, despite the default in the United States towards at-will employment, overwhelming CEOs are not employed at-will (Schwab & Thomas, 2006).

Comparing these specific examples, I delineate what I believe are a set of key differences between the executive and the sandwich-maker in Table 3-1, which I have divided into phases of pre-contract, contract negotiation, employment, and post-employment. Although the focus of the normative ethical analysis is the negotiating phase, I believe it is important to include the last two phases in order to fully explore the differences between such types of employees.

Pre-contract: Before engaging with a potential employer, the executive and the sandwich-maker start from unique positions. The executive is likely to possess significant resources, and already be employed. In addition, the executive likely has many more years of work experience and thus a larger stock of human capital. In contrast, the

sandwich-maker is more likely to be an entry-level employee, perhaps a high school or college student, working at his/her first job.

Contract negotiation: An important distinction to make is that employees generally do not negotiate their non-competes. The most recent statistics from the 2014 Noncompete Survey demonstrated that while 40% of employees indicated having signed a non-compete in the past, only 10% reported that they negotiated their non-compete (Starr, et al.. 2018a). Employees with bachelor's degrees or higher were twice as likely to negotiate their non-compete, and only 17% of employees actually consulted a friend, family, or lawyer about their non-compete. These results would seem to suggest that executives are much more likely to negotiate over a non-compete than a sandwich-makers.

Why might this be the case? First, an executive is likely to already be employed, so there may be a significant opportunity for a tripartite, three-party bargaining scenario (Starr, et al., 2018b), increasing the executive's bargaining power. An executive is therefore likely to negotiate his/her offer letter and terms and conditions of employment, and is a "rare find" for which a firm would be willing to make concessions. By contrast, a sandwich-maker would be unlikely to negotiate his or her offer letter, and any terms and conditions are likely to be presented as-is, in a take-it-or-leave-it fashion. This relates strongly to the notions regarding human capital in the prior phase: the executive possesses a higher level of human capital than the sandwich-maker, and this gives the executive greater bargaining power. Moreover, the "freedom to contract" viewpoint

Table 3-1. A comparison of the executive versus the sandwich-maker

Phase	*Dimension*	*Executive*	*Sandwich-maker*
Pre-contract	Resources/information	Can afford legal review of agreement; likely familiar with the process of employment negotiation; superior to the sandwich-maker.	Limited resources; probably can't afford an attorney or wouldn't even think to hire an attorney to review
	Current employment status	Likely already employed	May not currently be employed; current employer low prestige
	Available job opportunities	Few, specialized	Many, generic
	Pre-existing human capital	Significant (experience, education, etc.)	None or minimal; entry-level skills
Contract negotiation	Contracting/hiring process	Negotiation is standard; firm willing to negotiate terms; potential for third party negotiating	Limited or no negotiation; take-it-or-leave-it
	Bargaining power	High	Low
	Likely firm intention/motivation	Protect firm's confidential information or investments the firm makes in the executive (firm-focused)	Restrict mobility in order to damage competitors ability to hire (competitor-focused)
	Anticipated length of employment	Long; turnover unusual	Short or time-limited; turnover is routine for the firm
During employment	Compensation/Consideration	Significant annual salary, up to millions of dollars	Low wage, hourly, likely near minimum wage
	Likelihood of being "poached" by competitor	High; non-compete may even be a signal of value	Low
	Access to confidential information during employment	Extensive	Limited, if at all
	Duties of employee to firm	Fiduciary duties associated with role above what is expected of all employees	None beyond those normal to all employees
	Cost to firm should employee leave	Significant recruitment costs to replace/train, potential impact with investors or the public	Minimal costs for new hire (not substantial; training is routine)
Post-employment	All else equal, likelihood of enforceability as written	High	Low – likely overreaching
	Skill transferability across industries	Management skills highly transferable across industries	Skills unlikely to transfer across industries
	Resources	Can afford to initiate a lawsuit to challenge non-compete; can afford to "wait out" agreement	Limited, can't afford to file suit or pay costs should employer file; can't afford to "wait out" agreement

stresses the autonomy of individuals to voluntarily agree to restrictive terms. Consistent with this viewpoint are empirical studies demonstrating increased compensation or increased firm investments in human capital when using non-competes (Starr, et al., 2018a).

Additionally, the executive and the sandwich-maker differ regarding their anticipated length of employment. I believe that an executive is generally hired by a firm with the intention that the executive will remain with the company for a series of years. By contrast, is a sandwich-maker is much more likely to be hired for a limited period of time, as, for instance, a summer job. At the least it seems reasonable to state, that a line-level Jimmy John's employee is unlikely to spend his entire career at Jimmy John's.

Finally, and perhaps most importantly, is the question of firm intent. While academic literature has indicated dual intents of a post-employment non-compete agreement to, at least temporarily, limit both employee mobility and the diffusion of the employee's tacit knowledge within the competitive industry, I believe firm intent is a primary distinction between non-competes for executives and sandwich-makers. In the case of sandwich-makers, I believe such agreements are predominantly a restraint on employee mobility, which is arguably the dominant viewpoint in management literature (see, *e.g.*, Marx, et al., 2009). In contrast, the case of executives seems that employee non-competes can viewed as measures a firm may take to protect its intellectual property, or "employment intellectual property" (Rachum-Twaig, 2014, p. 481). This distinction over intent is born about by the access each type of employee has to confidential information during the employment relationship.

During employment: Once the employment relationship has commenced, and the non-compete is signed, the executive has extensive access to a firm's confidential information, while a sandwich-maker has limited, if any, access to the sandwich chain's confidential information. As well, the two differ also in terms of their compensation, with the executive making considerably more, and differ over the duties and loyalties they owe to the firm. The Restatement (Third) of Agency define the duties that executives, as agents of the employer, owe to employees, including, most importantly, a duty of loyalty, a duty of care, a duty not to mislead, and, especially in the case of executives, other fiduciary duties. Only the duty of loyalty is considered to apply broadly beyond executives; in some cases, courts "have concluded that the duty of loyalty applies to all employees, regardless of status as an officer, director or manager of the firm" (Lee, 2006, p. 7). Thus, the executives owes more duties to the employer.

Executives also have higher transferability of skills to external industries, since skills such as managing others, reading balance sheets, or running a business, are transferable to other industries, and are particularly more transferable than the skills a sandwich-maker develops during the course of the employment relationship. Moreover, while there are costs to replace any employee to the firm (Tziner & Birati, 1996), such search costs will be much higher to replace the executive as opposed to the sandwich-maker. An executive would also have resources upon which he or she could rely in needing to "wait out" a non-compete agreement after termination of employment, or to even challenge the validity of a non-compete in court, a so-called declaratory judgement. A sandwich-maker is unlikely to have such resources.

During the course of the employment relationship, firms should encourage the human capital development and make investments in developing the skills of their employees, but at the same time, employees need to respect the investments the employer makes in anticipation of a continued employment relationship (Haws, 2004), particularly once that relationship has ended.

A NORMATIVE SCHEMA FOR ETHICAL NON-COMPETES

I propose that the ethical status of these two illustrative examples differs due to differences in the negotiating process to issues of power, autonomy, and fairness. While these three constructs are closely related, I differentiate them by focusing on bargaining power derived from resource and information asymmetries, an understanding of autonomy as the ability act as one's own self, and a notion of fairness driven by concerns over distributive justice. In this section, I explain each of these ethical constructs in detail and apply them to the context of employee non-compete agreements.

Power

Power is defined broadly in business literature, at both micro- and macro-levels. At a micro-level, power can be viewed under either exchange (Blau, 1964) or dependency theory (Emerson, 1962), while at a macro-level, power has political, economic, and social aspects (Bierstedt, 1950). The context of a negotiation of an employee non-compete is that of an exchange, and thus I adopt exchange theory, as represented by Emerson (1972) as my understanding of "power." Under this theory, power originates from resource value (does each party have something the other wants?) and resource availability (can one party can get the same resource from alternative sources?) (Emerson, 1972). The more dependent a party is on the other in terms of

resource value and resource availability, the greater power the other possess. While employment is ultimately about creating a relationship, the negotiation of the terms of such a relationship between a firm and the employee is influenced by the power of the parties involved. The negotiations between the firm and the prospective employee at the time of contracting set the stage not just for the written employment contract, but also the psychological contract created between a firm and its employees. Under psychological contract theory, there are implicit, reciprocal rights and obligations that individuals perceive within exchange relations such as the relationship between a firm and an employee (Rousseau, 1998; Hannah, 2005). The terms of an employee non-compete are particularly interesting as there is not pure freedom to contract on the part of either the firm or the employee due to legal requirements or even industry norms that will govern the terms of such a contract.

It is clear from the extant literature that power affects ethical behavior in negotiation. Crott, Kayser, and Lamm (1980) found that parties with more power than the other "bluffed" more frequently, and communicated less than those with less power. This is likely because parties with more power consider themselves as more deserving a higher portion of the benefits of negotiation (Kabanoff, 1991), or to use strategy language, a those with more power appropriate more rent. The risk of this greater power is that, as Melé (2012, p. 154) notes, ''Power can foster opportunism.''

Power is a central concern in non-competes. "Lori A. Ehrlich, a Massachusetts representative who has sought to curb non-compete agreements" stated, "'We're trying to balance a situation where workers have so much less power than the corporations that employ them'" (Lohr, 2016, n.p.). However, at issue is what causes these power

differences among parties negotiating employee non-compete agreements? In this context, I suggest that power differences arise due to inequalities or asymmetries in the negotiation process, not just between the firm and the employee, but also between different types of employees. In employment negotiations, most literature indicates the employer has more power than the employee, but this overlooks the fact that different types of employees may have very different types of power. As noted above, the "freedom to trade" argument would assert that non-competes are an unethical restraint on an employee's ability to switch employers; in this view, non-competes are not very different from indentured servitude (Blake, 1960). However, scholars asserting this view (*e.g.*, Marx, 2011) focus on the workers lack of bargaining power, but with particular emphasis on low-skilled workers, such as our sandwich-maker. In contrast, it is widely recognized that executives possess extensive bargaining power (Schwab & Thomas, 2006). Thus, the power imbalance that appears between firms and employees is actually more complex. Specifically, there are distinct resource asymmetries between a firm and an executive, and a firm and a sandwich-maker. These asymmetries result in the executive having greater bargaining power than the firm, while the sandwich-maker has less power. Thus, an executive is likely to have the bargaining power necessary to require the firm to negotiate his/her offer letter and terms and conditions of employment, and is a "rare find" for which a firm would be willing to make concessions, including on the terms of a non-compete agreement. By contrast, a sandwich-maker would be unlikely to negotiate his or her offer letter, and any terms and conditions are likely to be presented as-is, in a take-it-or-leave-it fashion.

Resource asymmetries in the negotiating process will influence power in a negotiation. The resource of information is a particularly vital element in negotiations (Kelley & Thibaut, 1969), and the ability to control or manipulate information operates as a significant source of bargaining power (Lewicki & Litterer, 1985; Valley, White, Neale, & Bazerman, 1992). There are risks to both disclosing and failing to disclose information: by being fully honest, a party risks exploitation and may end up in a less desirable final position (Aquino, 1998), but keeping material information secret may make the negotiation more contentious or could risk later litigation (Shell, 1991). But selective disclosure gives the party greater control over the negotiation process and outcome (Bazerman, Neale, Valley, Zajac, & Kim, 1992). Thus, information is as a tradeable resource in negotiations (Blau, 1964), and having access to information allows parties to obtain more favorable outcomes in negotiations (Lewicki & Litterer, 1985). Aquino (1998) finds that willingness to withhold critical information, rather than the availability of alternatives, gives negotiators a competitive advantage, and thus strategic disclosure (or even non-disclosure) of information is an important source of power.

One particular critical piece of information available only to a party in a negotiation is that party's awareness of available alternatives, generally referred to as a party's "Best Alternative to Negotiated Agreement" or "BATNA" (Fisher & Ury, 1981). The better the alternatives available to a party if (s)he fails to reach an agreement with the other, the better the relative power of that party (Lewicki & Litterer, 1985), thus, the better the party's BATNA, the greater his/her bargaining power (Komorita & Leung, 1985). Parties may also have no alternatives (or no BATNA). Having a poor quality, or nonexistent, BATNA results in a party experiencing less desirable negotiating processes

and outcomes compared to having a good BATNA, while parties with good quality BATNAs have higher reservation prices and expectations of how the process will go (Pinkley, Neale, & Bennett,1994). Thus, a party's information of his or her BATNA is a critical piece of information to be used in the negotiating process to bring about desired outcomes (Fisher & Ury, 1981).

Resource asymmetries arise in the non-compete negotiating process because the executive and the sandwich-maker start from unique positions, with stark differences in their education, resources, and experience. Under human capital theory, "[i]t is believed that individuals choose an occupation or employment that maximizes the present value of economic and psychic benefits over their lifetimes" (Gimeno, Folta, Cooper, & Woo, 1997, p. 754). The executive possesses years of experience and thus a large stock of human capital, and likely has sufficient financial resources, and will be able to afford legal review of the contract, as discussed below. The executive is more likely than the sandwich-maker to be currently employed, there may be a significant opportunity for a tripartite, three-party bargaining scenario (Starr, et al. 2018b) between the executive, his/her current employer, and his/her prospective new employer. In contrast, the sandwich-maker is likely to be an entry-level employee, perhaps a high school or college student, working at his/her first job, with limited human capital or work experience. An executive also likely has higher transferability of skills to external industries, since skills such as managing others, reading balance sheets, running a business, etc., are transferable to other industries, and are particularly more transferable than the skills a sandwich-maker develops during the course of the employment relationship. Moreover, while there are recruitment costs to the firm to hire any type employee (Tziner & Birati, 1996), such

search costs will be much higher to identify a prospective executive as opposed to a sandwich-maker.

The asymmetries between the executive and the sandwich-maker therefore suggest that the executive's BATNA certainly exceeds that of the sandwich-maker. Moreover, due to the relative scarcity of qualified executives, I propose that the executive's BATNA is at least as good as, if not superior to, the firm's BATNA. Building on Pinkley and colleagues (1994) finding that a better BATNA heightens a party's aspirations, since the potential negotiated agreement must be more profitable than the party's BATNA to be accepted, the executive thus will be in a better position to demand compensation or other concessions in exchange for agreeing to a non-compete agreement. This gets directly at the heart of a major ethical concern with employee non-competes: they appear unjust when an employee has limited bargaining power and receives no separate compensation for the agreement (Arnow-Richman, 2006). Moreover, this conclusion is consistent with Starr's (2018) empirical findings that more educated employees, such as executives, receive wage premium, while lesser-educated employees experience wage losses, when signing non-compete agreements. Linking directly to the illustrative examples, Arthur Valdez reaffirmed his non-compete agreement on multiple occasion and negotiated a salary of over a million dollars, indicating significant bargaining power. Such was not the case with the low-wage Jimmy John's workers. The non-competes for such workers also raise potential concerns with autonomy, or the

Autonomy

In this paper, I focus on a definition of autonomy as the ability act as one's own self. In addition to concerns over power, the illustrative examples raise concerns that the

two types of workers were treated differently by the firm during the negotiating process in regards to this definition of autonomy. Kantian ethics require autonomy as the foundation for both rationality and morality (Budd & Scoville, 2005). To operate as an autonomous agents, parties must possess sufficient knowledge such that they may rationally make suitable decisions (Boatright, 2010). In a negotiation it is therefore important that the parties share sufficient information so that they can bargain to a fair outcome. Moreover, the parties must treat each other as autonomous, responsible human beings, during the negotiating process, and not as means-to-an-end. One clarification is that I am not talking about *freedom*, although there is substantial overlap in the two constructs (Berlin, 1969). The primary distinction here is that I want to separate out the concerns with "freedom" over resources that provide to the *ability* to act, which I assert are best categorized under "power" in my normative schema, from the respectful treatment that serves as precursor to the ability to act, which I define as "autonomy." Thus, the type of autonomy discussed here is that of autonomous personhood – specifically, the capacity of the employee to operate as an unrestricted party in the negotiating process over an employee non-compete.

In the context of employee non-competes, it was already mentioned above that a central ethical concern is whether employees are providing voluntary and informed consent (Bishara & Westermann-Behaylo, 2012). In fact, Starr, Bishara, and Prescott (2018a) find that almost 30% of employees do not even know whether they have ever signed a non-compete agreement, and that this number changes dramatically based on the employee's education level: approximately 20% of employees with bachelor's degrees or higher reported being unaware of whether they had ever signed non-compete, while this

number rose to 45% of workers with less than a bachelor's degree. This means that there are significant concerns with the autonomous treatment of lesser-educated workers as there cannot be informed consent if employees do not even know what they have signed. Moreover, even if employees are aware of signing such agreements, Starr and colleagues (2018a) find that nearly one-third of workers are asked to sign non-competes *after* they have accepted a job offer. This raises additional concerns over autotomy because if a job has already been accepted and the terms are then changed, there has not been adequate respect for the employee as an autonomous agent (that is, there is no bargaining). Moreover, employee feelings of coercion are common, with 20% of employees asked to sign non-competes but who did not choose to negotiate indicating fear of creating tension with the employer or fear of the job offer being revoked as a reason for *not* negotiating over the terms of their non-compete (Starr, et al. 2018a). A surprising 41% of these employees assumed that they could not negotiate the terms of their non-compete.
I therefore suggest that we can have autonomous treatment of employees when firms have obtained the voluntary and informed consent of employees to the terms of a non-compete.

Yet I also believe it is necessary to respect the autonomy of firms to choose who can have access to proprietary firm information. However, I would require the firm to explain to the employee *why* a non-compete has been requested. In Table 3-1, there were distinct differences between why a firm would want employee to sign a non-compete: in the case of executive, it was protection of proprietary firm knowledge, while for the sandwich-maker, it was to keep the employee from moving to a competitor. This raises an important link between employee autonomy and the question of why a firm chose to

use a non-compete in the first place. If a non-compete is used as a knowledge protection mechanism, that is, to prevent firm knowledge from being taken to a competitor, and this purpose is communicated to an employee, I do not believe there are concerns with the autonomy of either the firm or the employee. In the illustrative examples, however, such a situation is likely only to arise with an executive, who has sufficient resources to obtain legal review of the contract and for whom such legal review would be the expectation or norm. Thus, the executive has provided fully voluntary and informed consent. In contrast, the sandwich-maker was likely asked to sign a non-compete purely out of an intention to limit the employee's mobility, and is highly unlikely to provide full and informed consent.

Fairness

Finally, employee non-competes raise inherent issues of fairness with, in business ethics literature, equates with "organizational justice" (Cropanzano & Stein, 2009). Research on organizational justice focuses on perceptions of and reactions to business decisions, and has categorized the fairness of outcomes, processes, interpersonal reactions, and information (Cugueró-Escofet & Fortin, 2014). These first two are perhaps the most well-known, and are referred to as distributive justice (fair outcomes) and procedural justice (fair process). For the reasons explained below, my categorization of fairness in the context of employee non-competes adopts the view of distributive justice. That is to say that I believe a key step in determine whether a non-compete is ethical is whether the result of the negotiations between the firm and the employee (a process that has also required the employee to possess bargaining power and the parties to treat each

other as autonomous beings) lead to a fair outcome, or, said differently, is in accordance with principles of distributive justice.

The primary reason for the focus on distributive instead of procedural justice is my goal to create clear boundaries among the constructs in my tripartite schema. I suggest that notions of procedural justice, particularly in regards to negotiations over employee non-competes, are inherently intertwined with concerns over power and autonomy. For example, the information asymmetries discussed above in relation to power also raise issues over the fairness of a negotiation, with parties facing tensions "over the desire to use information strategically while also [ideally] trying to treat the other party fairly and ethically" (Aquino, 1998, p. 210). This is akin to the notion of procedural justice in the negotiation process, and it is well recognized by scholars that fairness is an important consideration in the negotiation *process* (Tripp, Sondak, & Bies, 1995). Moreover, concerns over a fair process, particularly in the context of negotiation, are entangled with notions of autonomy, or how people are treated in the negotiation process. Thus in my categorization, it became difficult to hypothesize a non-compete negotiation that would meet the requirements of procedural justice but violate requirements of autonomy. Scholars have only recently recognized this overlap, with procedural justice seen as functional to regulating an individual's need for autonomy (van Prooijen, 2009).

The most famous of these justice scholars is likely John Rawls, who claims that what is just would be an action selected by those unware of the details of their social conditions and individual psyches (Rawls, 1971). The Rawlsian "thought experiment" therefore requires each party to place himself behind a "veil of ignorance" and decide

what (s)he would want to do without knowing his or her role in a given situation (Donaldson & Werhane, 2002). Thus, a Rawlsian thought experiment for an employee non-compete negotiation requires determination from behind a veil of ignorance for what a reasonable agreement would be that both lets "employers to protect valuable firm assets, such as strategic knowledge and information from unfair competition" and which also "protect[s] an employee's ability to sell her labor services in an open market where they would be utilized at their highest value" (Bishara & Westermann-Behaylo, 2012, p. 51). In the case of the illustrative examples, the fact that the duration of the sandwich-makers non-compete exceeds that of the executive raises questions of the fairness of these outcomes. From an egalitarian justice standpoint, this imbalance indicates either that the executive has too short of a non-compete or the sandwich-maker has too long of a non-compete. Moreover, Rawls' difference principle, requires such inequalities be to benefit of the least advantaged members of society (1971). Between the illustrative examples, it is clear that the sandwich-makers are less advantaged compared to the executive, and yet they do not receive the benefit of the shorter non-compete agreement. Therefore, the fact that the duration of the sandwich-makers non-compete exceeds that of the executive is indicative of an unfair outcome in the case of the sandwich-makers.

An additional requirement for a fair outcome for an employee non-compete must be that a firm to recognize – and therefore relinquish – any "rights to the general training or education that an employee already had" prior to the negotiation of the employment relationship (Haws, 2004, p. 5). This is something that may be missing even in the employment contract of an executive, since the executive comes with a supply of general

human capital that (s)he should be free to use outside of the firm. In the case of the sandwich-maker, there has likely not even been a negotiating process over the terms of a non-compete, much less a fair one.

This raises realistic questions over how a non-compete can be judged to be fair. One guideline may be the reasonableness criteria frequently used by courts for enforcement of employee non-competes. Under such regimes, non-competes will only be enforced if they are "reasonable" based on (i) industry limitations (that is, what or who is a competitor and what activities would be considered competitive?), (ii) geographic/regional limitations, and (iii) the duration of the restriction (Graves & DiBoise, 2006). Thus, a non-compete that is overbroad on its face, vague in terms, or would otherwise be clearly unenforceable should it be taken to court is a non-compete that would not meet this requirement for distributive justice.

CONCLUSION

Employee non-competes are a particularly ethically charged topic within management literature, due predominantly to espoused issues over property rights. I suggest in this paper that these issues over property rights are actually due to underlying concerns of power, autonomy, and fairness, and that an employee non-compete can be ethical when there has been adequate consideration during the negotiating process to these three central attributes, as represented in Figure 3-4:

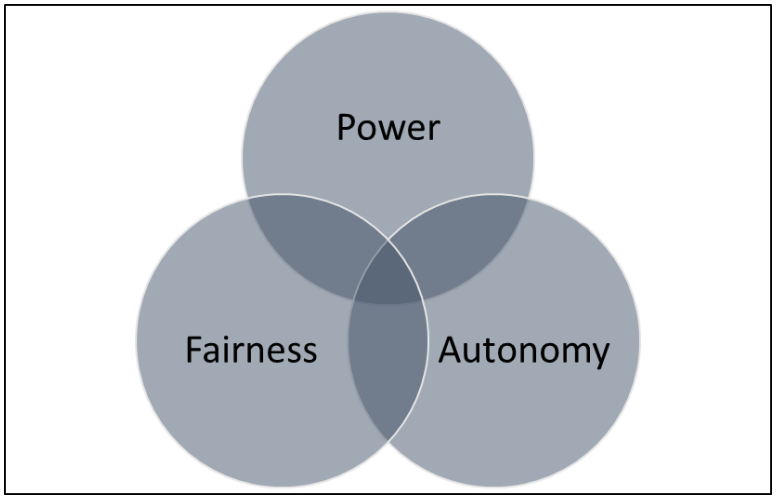

Figure 3-4: Ethical dimension of employee non-competes.

I propose that an ethical non-compete can only be found at the three-way intersection of these dimensions, or the darkest area at the center of Figure 3-4. It is therefore possible, under my categorization, to have an employee non-compete that might be objectively regarded as fair, and therefore possibly even enforceable by the courts, but that which would still be considered unethical under this framework if the negotiating process by which the non-compete was derived did not respect the autonomy of the employee, or was forced upon the employee by a firm with greater bargaining power.

Thus, an ethical non-compete can actually exist in, for instance, the case of an executive with who goes into a negotiation with bargaining power, whose autonomy is respected in the negotiating process and who therefore provides both voluntary and informed consent, and whose non-compete would be objectively deemed as fair at the end of the negotiation process.

The illustrative examples in this paper raises an important question over what types of workers are those that may be best positioned to be the subject of ethical non-competes. That is, what is the ultimate distinction driving the different ethical

conclusions between the illustrative examples of an executive and a sandwich-maker? The two real life examples provided were selected because they are dichotomous examples which are easy to analyze, and thus a more difficult question is what do these examples actually represent in terms of broad classifications of workers? This is important work to finalize as we try to determine when non-competes can be ethical.

Such a distinction certainly does not lie with the marketability of skills, as a sandwich-maker would have much higher marketability of his/her generic skills than the executive. One possibility may lie in this pre-existing skillset, or human capital, of such workers, particularly if it is combined with the firm's intent in requesting the non-compete in the first place: knowledge protection or mobility limitation? Use as a knowledge protection mechanism, which feels inherently more ethical, requires the ability of an employee possess sufficient absorptive capacity (Cohen & Levinthal, 1990) to make use of his/her own pre-existing human capital to ingest, assimilate, absorb, and make use of the firm's knowledge base once the employment relationship begins employment. Thus, one proposal for such a categorization of workers for which non-competes are more ethical could be a continuum of pre-existing, absorptive capacity-based, knowledge-intensive human capital, with the low-skilled sandwich-maker on one end and the highly-skilled executive on the other. This attribute of the worker would therefore be something independent of, although likely coincidental with, my tripartite schema of power/autonomy/fairness for ethical employee non-compete agreements.

The conclusion of this paper raise practical questions of how such three core attributes can be promoted during the negotiating process. Future empirical research should explore this question, although I propose that the state of Oregon's recently

revised requirements for employee non-competes may be an informative starting point. In the state of Oregon, non-competes will only be enforced for "white collar" employees given at least two weeks' notice in advance of the start date (Bureau of Labor & Industries, n.d.). Moreover, at termination, the employee's annual salary must be greater than the median U.S. income for a family of four, and the firm must be trying to use the non-compete for knowledge protection. More specifically, firms should take action to ensure that employees are aware of what they are being asked to sign. This means that negotiation over the terms of a non-compete must be standard protocol. Additional suggestions would be that employees be encouraged to consult their own legal counsel, and that employees are given time to consider their options before a job offer deadline (which presupposes that non-competes are included with the initial job offer and *not* presented afterwards).

Along this line, in future work I hope to empirically explore whether the assertions in this paper resonate with real-life employees. For instance, I could set up an experimental environment with managers tasked with negotiating an employee non-compete with high and low power employees to determine if the non-competes negotiated by such parties are rated as more "ethical."

One limitation of this paper is that I have skipped over the first decision node Figure 1, and therefore eliminated the ability of the firm to choose to use a non-compete agreement, perhaps without regard the legal enforceability of such agreements. The question of whether or not an employer chooses to utilize non-competes for its employees may be as ethically charged than a discussion of whether non-competes themselves are

actually ethical or not. Thus, the motivations behind why a specific employer chooses to utilize non-competes should be examined in future research.

Similarly, another open area of research is to explore the actual enforceability of a firm's non-compete agreement; that is, how do firms decide to word a non-compete? Research indicates that many clauses are unenforceable as written (Sullivan, 2009), and the motivations behind such "overreaching" (Sullivan, 2009, p. 1151) may be interesting. Such drafting may be an honest mistake (Sullivan, 2009), or may be intentional.

CHAPTER 4

OPENING THE LABOR MARKET DOORS: FIRM PERFORMANCE FOLLOWING CALIFORNIA'S REFUSAL TO ENFORCE OUT-OF-STATE EMPLOYEE NON-COMPETE AGREEMENTS

INTRODUCTION

Firm human capital, the valuable knowledge, skills, and abilities of employees (Coff & Kryscynski, 2011) is regarded by strategic human capital scholars as the primary source of sustainable competitive advantage (Brymer, Molloy, & Gilbert, 2014; Nyberg, Moliterno, Hale, & Lepak, 2014). A basic assumption in labor market economics literature (*e.g.*, Roubini & Milesi-Ferretti, 1994) is the immobility of human capital. This assumption underlies the positive relationship between human capital and sustainable competitive (Snell, Youndt, & Wright 1996; see also Kogut & Zander (1992) on the "inertness" of knowledge), and may represent a, perhaps old-fashioned, expectation that employees will spend their entire career with one organization and thus are the very embodiment of firm-specific human capital (Snell, Youndt, & Wright, 1996). However, current research in strategic human capital recognizes that human capital is inherently mobile (Coff, 1997) and can depart from a focal firm to a competitive entity – hampering the focal firm's competitive advantage. Employee non-compete agreements, which limit an employee's ability to work for or start a competitive entity should an employee leave the focal firm, are a mechanism that firms may utilize to limit this mobility (Marx, et al. 2009) and prevent the valuable firm knowledge contained within the mind of a departing employee from being acquired by competitive firms (Franco & Mitchell, 2008).

Employee non-competes, therefore, are a tool that may contribute to firm performance; that is, employee non-competes can be seen as a means by which firm human capital can be exploited. However, enforcement of non-competes in the United States is governed by state law, and non-compete agreements are not legally enforceable in all states. Moreover, the legal enforceability of non-competes within any single state can change due to judicial or legislative action at the state level. An unexpected change in state-level non-compete enforcement may therefore affect firm performance.

This project exploits a quasi-natural experiment, a 2008 California Supreme Court decision prohibiting enforcement of all out-of-state employee non-compete agreements, to explore whether access to a previously unavailable labor pool (that is, all employees outside of California with valid non-compete agreements) affects the performance of California-based firms. Thus, this project explores whether California-based firms receive a state-specific competitive advantage due to unanticipated access to a previously unavailable valuable resources: a pool of labor of those employees who were subject to out-of-state employee non-compete agreements.

The human capital research stream builds on the resource-based view (RBV) of the firm (Barney, 1991; Wernerfelt, 1984), but human capital, unlike other firm resources, "depend[s] on the continued presence of people, who—unlike property, plant, and equipment—are not owned by the firm, but merely *employed*" (Younge & Marx, 2015, p. 653, emphasis in original). This dissertation therefore proposes employee non-competes as a human capital-specific isolating mechanism, as defined by the RBV, that protects a firm's human capital from acquisition or imitation by rivals (Rumelt, 1984). If non-competes operate as an isolating mechanism according to the RBV (to protect

valuable firm human capital), then the value of this human capital should be reflected in the performance of firms which are suddenly able to access this human capital due to the removal of this barrier.

The consensus in the extant literature is that non-compete agreements effectively operate to keep employees at firms (Marx, et al. 2009; Garmaise, 2011). More formally, non-compete agreements have been shown to have a negative effect on employee mobility (Marx, et al. 2009; Garmaise, 2011; Starr, et al. 2018a) and thus empirically have been shown to fulfill their intent to prevent interfirm mobility of employees. But, such clauses may limit the movement of workers, and thereby the exchange of firm knowledge, even when such mobility could be beneficial for the worker, the firm, or the industry (Cooper, 2001). That is, employee non-competes may limit *both* the firm's risk of outward-flowing human capital, as well as the firm's ability to acquire new, inward-flowing human capital by limiting the available labor pool of potential new hires (Marx, et al., 2009). Non-competes can lessen the availability of relevant skilled labor *if* potential new hires are subject to non-compete agreements. However, if a group of firms were suddenly able to avoid the mobility barrier imposed by employee non-compete agreements, such firms should experience increased performance.

I therefore predict (Hypothesis 1) that an unanticipated access to previously unvailable pools of valuable human capital, *i.e.,* employees subject to non-compete agreements, due to the ability of a group of firms to avoid enforcement of such agreements will result in increased firm performance for these firms – a competitive advantage based on access to a previously unavailable labor market. Further applying the RBV, I explore the firm-level variations in these predicted results by exploring the impact

of both attributes of the firm's labor market and the firm's specific resource base. First, under a labor market competition argument, I propose that the benefit obtained from being able to avoid enforcement of employee non-competes is reduced by the number of similar firms with which this benefit must be shared; that is, all benefiting firms within an industry compete over the same pool of newly available human capital, which reduces the value of the ability to avoid enforcement of employee non-competes (Hypothesis 2). I also predict that the unanticipated access to a new labor pool will be most valuable for firms experiencing a local labor market shortage (Hypothesis 3). Turning to firm resources, I predict that firms with a need for skilled labor, that is, firms that employ more knowledge workers, will especially benefit from access to this newly available pool of labor (Hypothesis 4). Additionally, it is important to recognize the role of complementarities, defined as firm assets or activities that work better together to increase firm performance (Teece, 1986). Such complementarities are particularly critical for knowledge-based assets, such as human capital, since knowledge assets alone may not be sufficient for competitive advantage as they must be "packaged into products or services to yield value" to a firm (Teece, 1998, p. 72). Two particular complementarities, research and development (R&D) intensity and physical capital intensity, are therefore proposed as particularly because they have been shown to be coupled with both human capital and the enforcement of employee non-competes. I predict that research and development intensity will be positively associated with the increased firm performance predicted in response to the changing enforcement of employee non-competes (Hypothesis 5), while physical capital intensity will be negatively (Hypothesis 6).

This project finds a highly statistically significant increase in firm performance for firms able to avoid the isolating mechanisms imposed by employee non-compete agreements due to California's decision to stop enforcing out-of-state employee non-compete agreements. Moreover, this advantage appears unique to firms experiencing this change in non-compete enforcement, and there is no evidence that such performance is at the expense of out-of-state firms. I also find significant influences of two labor market factors, in-state competition and local unemployment rates, on this positive firm performance in support of hypothesized relationships. Contrary to predictions, I find that firm already employing more knowledge workers experience decreased firm performance. I also find a statistically significant inverse-U-shaped relationships between both R&D intensity and physical capital intensity with financial performance.

ENFORCEMENT AND USE OF EMPLOYEE NON-COMPETES

In the United States, enforcement of non-compete agreements is governed by state law and some states, most notably California, have banned the use of employee non-competes by in-state firms, while other states place restrictions on the enforcement of non-competes, such as Oregon. As a generalization, when it is legally permitted, enforcement of a non-compete must generally be considered "reasonable" based on (i) industry limitations (that is, what or who is a competitor and what activities would be considered competitive?), (ii) geographic/regional limitations, and (iii) the duration of the restriction (Graves & DiBoise, 2006).

Use of employee non-compete agreements is widespread in the United States, although use may vary across industry or status within a company. Studies have indicated the following:

- 18% or 30 million Americans were covered by non-competes as of 2014, while 37% report having signed one at some point during their career (Prescott, Bishara, & Starr, 2016);
- Almost 50% of technical professionals in several industries were asked to sign non-competes (Marx, 2011);
- 70% of entrepreneurs receiving venture capital funding were required to sign non-compete agreements as a condition of investment (Kaplan & Stromberg, 2003);
- 70.2% of executives at publicly-traded firms signed non-competes (Garmaise, 2011); and
- 80% of IT professionals were asked to sign a non-compete (Holley, 1998).

In fact, use of non-competes may be increasing according to recent news reports (Marte, 2013; White House 2016). A recent White House report under the Obama administration noted an increase in litigation of non-competes, stating, "[t]he law firm Beck Reed Riden LLP found a 61 percent rise from 2002 to 2013 in the number of employees getting sued by former companies for breach of non-compete agreements" (2016, p. 3).

A primary criticism of non-compete law in the United States is that there remains an inherent disconnect between non-compete law and modern/increasingly interstate, national, or even global corporate operations. It is difficult for states to enforce judgments of any kind outside their boundaries (Cheskin & Lerner, 2003) due to concerns over jurisdiction, and, as a result of the widely differing laws across the states, any discussion of non-compete enforcement in the United States should be limited to the state-level.

LITERATURE REVIEW

Human capital theory is founded on the work of economists such as Arrow (1962), who identified worker mobility as a key source for potential knowledge spillovers. Increases in competition provide opportunities for high-value workers to job-hop (Cooper, 2001). Due to this job-hopping, theorists, such as Becker (1964), argue that firms will be reluctant to invest in human capital via training or other methods due to a lack of property rights; that is, since, once a firm provides an investment in human capital via training or other methods, it loses its rights in that investment since that knowledge conveyed now resides in the mind of the firm's employee. Since indentured servitude, lifetime employment contracts, or slavery are disparaged around the globe, permanent control by a company over the human capital stored in the minds of its employees is simply not realistic.

Thus, firms may turn to non-compete agreements as a way to gain property rights to their investments in human capital; that is, "[n]on-compete agreements enable companies to convert general training into firm-specific human capital by denying workers the opportunity to apply those skills outside the firm" (Marx, 2011). However, this has the potential to create a "double edged sword" at the societal level, since such clauses allow a firm to protect its human capital investments, a positive outcome at the firm level, but have the potential for negative effects at the industry level since such clauses also prevent the movement of workers, and thereby the exchange of such knowledge, even when such movement could be individually beneficial for the worker, the firm, and the industry (Cooper, 2001). Gilson theorizes, therefore, that from an industry-wide perspective, the "collectively rational" strategy is to allow unrestricted

movement between firms because the industry as a whole benefits from the exchange of information and each individual firm's share of such firm benefit exceeds the negative costs the firm incurs by losing its individual investment (what Gilson calls "intellectual property dilution") (1999, p. 595). But this creates a classic prisoner's dilemma for any individual firm: each firm individually is better off protecting investments in its human capital by limiting the mobility of its own employees and therefore using non-competes, except that each firm also desires to take advantage of any other knowledge spillovers from other workers moving around in the industry (Gilson, 1999). Thus, it is individually beneficial for each firm to implement non-compete agreements but this has the potential to lead to a suboptimal social outcome (Samila & Sorenson, 2011).

An alternative perspective to Gilson (1999) following the work of Arrow (1962) would assert that, without use of non-compete agreements, there may be underinvestment in human capital development by all firms in an industry, which would results in a pool of less-skilled available labor for all such firms. Because firms use non-compete agreements to transform general human capital into firm-specific human capital (Marx, 2011), they gain additional property rights in resources that were not initially controlled by them. However, because employees realize that their external opportunities are limited due to such an agreement, they may invest less in their own human capital development (Garmaise, 2011), which could suppress firm performance. In contrast to Garmaise's (2011) findings on this point, Starr (2018) finds that firms in states that enforcement non-competes provide more training to employees and finds no evidence of reduced self-investment by employees in their own human capital development.

There are at least 24 published empirical studies on employee non-competes (Prescott et al., 2016), where scholars have examined the impact of state-level enforcement of such agreements has on employee mobility (*e.g.*, Fallick, et al. 2006; Marx et al., 2009; Marx, 2011), human capital investment (*e.g.*, Cooper, 2001; Garmaise, 2011), and entrepreneurship (*e.g.*, Stuart & Sorenson, 2003; Marx & Fleming, 2012). Legal scholars have also theorized on what an ideal enforcement regime should be (*e.g.*, Bishara, 2006), and what the hypothetical impacts of differing enforcement regimes could be (*e.g.*, Gilson, 1999).

This literature does not address, however, the impact of non-compete agreements on firm performance. Such relationship is, at first glance, ambiguous because management theories allow both positive and negative predictions. On one hand, the intent of an employee non-compete agreements is to, at least temporarily, limit both employee mobility and the diffusion of the employee's tacit knowledge within the competitive industry, which should increase firm performance. But these mechanisms may also cause labor pool impacts that endanger firm performance, such as reduced availability of qualified labor (Marx & Fleming, 2012) or perhaps, as mentioned previously, reduced investments by employees in their own human capital (Garmaise, 2011). Empirically, there are some indications that the effect of non-competes on firm performance is positive. Lavetti, Simon, and White (2014) found that physician-employees with non-competes see over 12% more patients per week and generate 41.5% more in weekly revenue than those without non-competes; they note that such revenue generation is due both to the number of patients seen as well as the mix of patients (physicians with non-competes saw more patients with better reimbursement rates

through private insurance or Medicaid than those without). Notably, they found no evidence of any difference in quality between employee-physicians with and without non-compete agreements, so these results cannot be explained by physician quality.[11] But these results are not fully generalizable to non-service industries.

Similarly, Younge and Marx (2015) find that *Tobin's q* (a measure of firm performance) increased by 9.75% for Michigan-based firms after non-competes became enforceable in Michigan due to a legislative change in 1985. However, this result may be confounded by other statutory changes occurring during the same time period, including an antitakeover law (see Atanassov, 2013), and a branch banking deregulation (see Kerr & Nanda, 2009).

HYPOTHESIS DEVELOPMENT

Applying the RBV to employee non-compete agreements

Under the RBV, a resource is considered to provide a competitive advantage if it is valuable, rare, inimitable, and non-substitutable (VRIN) (Barney, 1991). The RBV stresses the importance of ownership or control over resources as the means to generate value from strategic actions (Amit & Schoemaker, 1993). Firms gain control over valuable resources by availing themselves of isolating mechanisms, such as causal ambiguity, firm-specification of assets, intellectual property rules such as patents or trademarks, or other mechanisms that insulate proprietary resources from competitors (Rumelt, 1984; Wernerfelt, 1984). Isolating mechanisms allow the firm to secure its rents from these resources, as well as protect the resources from imitation (Peteraf, 1993).

[11] They note, "Collectively, this evidence suggests that any systematic difference in quality among physicians with NCAs would have to be a characteristic that is neither valued by consumers nor insurance companies, is unrelated to clinical knowledge, diagnosis patterns, and treatment recommendations, and is unrelated to experience" (Lavetti et al., 2014, p. 28).

Inimitability has been recognized as the most important attribute of the RBV (Barney, 2001; Godfrey & Hill, 1995; King & Zeithaml, 2001).

Under the RBV, human capital operates as a source of sustainable competitive advantage (Coff, 1997) only if isolating mechanisms are in place to prevent employees from taking their human capital – their valuable knowledge, skills, and abilities (Coff & Kryscynski, 2011) – to a competitive firm (Barney, 1991; Rumelt, 1984). Employee non-competes can thus be seen as an isolating mechanism that strengthens the RBV's VRIN requirements for a firm's human capital by making such human capital inimitable, thereby increasing the ability of the firm using non-competes to generate value from its human capital and obtain a sustainable human capital-based competitive advantage. However, in the event study chosen here, the California court decision suddenly allowed California-based firms to remove this isolating mechanism.

Moreover, literature based on the RBV does not limit itself to the VRIN characteristics. Collis and Montgomery (1995) assert that firm competitive advantage comes not only from the valuableness, etc., of firm resources and capabilities, but also from the durability, appropriability, and superiority of these resources. In this sense, employee non-competes operate to safeguard the durability, appropriability, and superiority of firm human capital: human capital subject to non-competes is *durable* in that the firm's rights to its human capital are extended beyond the length of the employment agreement (to the extent of the law); it is *appropriable* since non-competes allow a firm to capture more value from its human capital (Garmaise, 2011; Starr, 2018); and it is *superior* in that it provides the best – or really, the only – protection available

(Samila & Sorenson, 2011) for human capital that cannot otherwise be protected from mobility via other mechanisms such as patents (Kim & Marschke, 2005[12]).

Employee non-competes thus operate as isolating mechanisms that shield a firm's human capital from its competitors, in addition to serving as strong *ex-post* limits on worker mobility (Peteraf, 1993). When such a mechanism is removed, and therefore such mobility limitations lifted, such as by the California 2008 court decision to not enforce out-of-state employee non-competes, such firms gain unanticipated access to previously unavailable pools of valuable human capital, *i.e.,* employees of out-of-state firms subject to non-compete agreements. It is well recognized in labor market economics that availability of human capital is a driving force of growth (Romer, 1990). Similarly, the extended resource-based view of the firm asserts that firms engage in alliance formation in order to access to additional resources under the control of the alliance partner, and that this access to resources enhances alliance performance (Lavie, 2006). Therefore, when firms gain access to previously unavailable human capital, because it had previously been subject to the isolating mechanisms of enforceable non-compete agreements, this should generate positive firm performance:

> *Hypothesis 1: A state-level decision to stop enforcing out-of-state employee non-competes will increase firm performance for in-state firms*.

Firm performance is affected not only by firm human capital but also by the concurrent interactions between the public policy environment, the resources of a firm's

[12] Specifically, Kim and Marschke (2005) find that firms use patents to protect against a risk of employee departure, with important implications for knowledge codification and reduction of knowledge spillovers. Moreover, research on employee non-competes has frequently relied on patents as an indicator of inventory mobility (*e.g.*, Marx et al., 2009; Younge & Marx 2015), a potential problem if patents and employee non-competes effectively operate as substitutes. In fact, Younge and Marx (2015) find that the effect of non-competes on firm profitability may be partially attenuated by patent activity.

competitors, and the firm's other existing resources (Conner, 1991). This project focuses on the role of employee non-competes as an example of the public policy environment at the state-level. Therefore, in the next sections I discuss the role of labor market factors, including competition and local labor supply, as well as firm-level resource factors including the firm's need for skilled human capital, and two types of complementary resources shown to be related to human capital: research and development and physical capital intensity.

Labor market factors

The RBV is based on the idea that there exist heterogeneous resource differences among rival firms (Barney, 1991; Wernerfelt, 1984). Thus, the RBV itself thus depends upon the existence of competitive firms, which is, of course, a central component of the Porter 5-Forces model (Porter, 1979) upon which the RBV built (Barney, 1991; Wernerfelt, 1984). The existence of alternative firms provides opportunities for high-value workers to job-hop (Cooper, 2001), and moreover, from a resource availability standpoint, access to a potential new pool of labor is more valuable if there are fewer similar firms with which the labor pool must be shared. By way of an illustrative example, consider a cake being offered to a group of children. If there are 10 children in the group, then each child receive $1/10^{th}$ of the cake. However, if there are 100 children in the group, then each child receives $1/100^{th}$ of the cake. Thus, while the offer of cake is still valuable to members of either group, it is relatively more valuable to members of the smaller group than the larger group (that is, $1/10^{th}$ of a cake is worth more than $1/100^{th}$ of a cake). Thus, because all firms within a state gain access to the same pools of previously unavailable human capital when out-of-state non-competes become non-enforceable, all

firms within an industry group will have to compete for the same set of new resources, diminishing the incremental firm-level value of this pool of labor. I therefore expect a negative effect of the local labor market competition on the predicted positive firm performance:

> *Hypothesis 2: In-state firms facing higher in-state labor market competition will experience smaller positive effects on firm performance following a state-level decision to stop enforcing out-of-state employee non-compete agreements.*

Beyond competing over resources, certain local labor market attributes should affect the value of this new labor pool. In particular, low unemployment creates a hardship on firms by creating a war for talent (Branch, 1998) by decreasing the pool of available qualified labor available to employers. Thus, firms facing low local unemployment rates should benefit the most from the positive stock price reaction

> *Hypothesis 3: In-state firms facing local labor shortages will experience greater positive effects on firm performance following a state-level decision to stop enforcing out-of-state employee non-compete agreements.*

Firm-level resource factors

Firms employing knowledge workers, or employees "with high degrees of expertise, education or experience" whose primary job purpose "involves the creation, distribution, or application of knowledge" (Davenport, 2005, p.10) face particular challenges in the labor market. Drucker (1989) similarly defines knowledge workers as employees who process existing information into new information. Beck (1992, p. 125) proposes that three types of employees qualify as " knowledge worker": (1) professionals, such as doctors, lawyers, and accountant, who are associated with educational achievements; (2) engineering, scientific, or technical workers, who are

associated with specialized skills; and (3) senior managers, who are associated with experience.

Employees meeting these definitions of "knowledge workers" therefore possess greater general human capital, which makes them more valuable in the external labor market and raises their expected income from alternative employment (Gimeno, et al. 1997). Thus, such employees are "flight risks" if other mechanisms cannot be used to limit their mobility. Such workers would also possess greater firm specific human capital due to their access to proprietary firm knowledge. Knowledge workers are thus able to take firm knowledge to a competitor or use it to start their own spin-off in competition with their former employer (Bhide, 2000). Moreover, extant literature has argued that employees utilize employee non-compete agreements specifically to protect the appropriation of firm knowledge by employees (Bishara, 2006), especially knowledge workers (Younge, et al. 2015).

Thus, employing such knowledge workers creates risks for firms, and therefore in-state firms employing larger number of knowledge workers should especially benefit from a legal change that allowed knowledge workers from *other* states to be recruited by the in-state firm without fear of non-compete litigation for two reasons: (1) access to such a labor pool allows in-state firms greater access to replacements for the knowledge workers they are at risk of losing to rivals, and (2) employing such knowledge workers in the first place indicates the firm's reliance on skilled labor.

> *Hypothesis 4: In-state firms employing more knowledge workers will experience greater positive effects on firm performance following a state-level decision to stop enforcing out-of-state employee non-compete agreements.*

However, RBV-based literature necessitates an investigation of the role of complementary assets in exploring these effects, since increased firm performance can be obtained via investments in complementary assets. Complementary assets are those "that are required to capture the benefits associated with a strategy, a technology, or an innovation" (Christmann, 2000, p. 664). Two firm activities are considered complementary when engaging in more of one activity increases, or at least does not decrease, the marginal profitability of the other (Milgrom & Roberts, 1990, 1995).

While organizational learning scholars assert that learning occurs at the individual level (Argyris & Schön, 1978), it is well recognized that firm knowledge is stored in more than just the minds of employees. In fact, the knowledge-based view (KBV), an off-shoot of the RBV, contends that firms exist in order to create, transfer, and manage knowledge (Kogut & Zander, 1992; 1993). Specifically, knowledge is regarded as a firm's most important asset, and, unlike the resource-based view of the firm (see Barney, 1991), "the firm is not a bundle of resources or capabilities, but a social organization in which individuals interact on the basis of their values, shared ideologies, and patterns of interpretation" (Lechner, 2006, p. 143). Firm knowledge is stored both in the minds of employees as well as in the patterns of social context and organizational routines (Nonaka & Takeuchi, 1995). Thus, distinct "knowledge repositories" exist within a firm and interact to comprise a firm's knowledge management system (Starbuck, 1992). In order to obtain a knowledge-based competitive advantage under the KBV, firms must implement structures, policies, and processes that allow knowledge to transfer freely within the firm, while at the same time protecting this knowledge from leaking out to competitors (Kogut & Zander, 1992). Non-competes enforcement therefore can be seen

as a tool to assist in the management of firm knowledge. But when examining the impact of non-compete enforceability on human capital-based competitive advantage, the interaction of human capital and other knowledge repositories must be considered.

Therefore, the value of firm human capital can be influenced by a multitude of complementary assets, particularly those that also function as knowledge repositories (Starbuck, 1992), such as technologies (Arthur, 1992; Snell & Dean, 1992). Firm human capital, a potentially mobile resource when not insulated from competitors by isolating mechanisms such as non-competes, can plausibly be made more valuable when it is combined with immobile firm-specific complementary assets (Hitt, Bierman, Shimizu, & Kochhar, 2001). Firm performance can be enhanced by investment in complementary assets (Helfat, 1997; Teece, 1986), and complementarities between firm human capital and other resources have demonstrated a positive effect on firm performance (Crocker & Eckardt, 2014; Mackey, Molloy, & Morris, 2014; Wright, Coff, & Moliterno, 2014; Riley, Michael, & Mahoney, 2017). In this project, I consider the effect of two types of assets complementary to human capital that may also be affected by changing enforcement of employee non-competes: R&D and physical capital.

Firm R&D is a complementary asset to firm human capital as both serve as distinct knowledge repositories with a firm. R&D is considered an indicator of the importance of knowledge and technology within a firm (Helfat, 1994) while human capital investments such as training operate as complements to the knowledge gained through firm R&D (Kor, 2006; Campbell, et al. 2012). Thus, "[e]ffective use of human capital investments that increases employees' knowledge increases the likelihood of success among multiple R&D investment options, and thus, enables the deployment of

resources to higher-margin R&D projects in which the firm is more likely to create and sustain competitive advantage" (Riley et al., 2017, p. 1899, citing Kor, 2006). Firm knowledge can conceptualized by both stocks and flows (Dierickx & Cool, 1989); unfortunately firms do not report R&D "stocks" on their balance sheets, but they can report R&D investments, indicative of knowledge flows.

Additionally, state-level enforcement of non-compete agreements can affect firm R&D strategy (Conti, 2014). As Cabral (2003) notes, development of an R&D strategy includes both decisions on the amount to invest as well as how to invest it. Conti (2014) convincingly argues, and finds empirical support, for a positive correlation between non-compete enforcement and the risk level of R&D projects (chance of breakthroughs vs. failures) that firms were willing to pursue. Firm profitability would also be impacted as there would be a high chance of high profitability should the project turn out to be a breakthrough, or a risk of profit losses should the invention be failure. Thus, state-level enforcement of non-compete directly affects firm R&D strategy. Therefore, the increased in-state firm performance generated by prohibiting enforcement of out-of-state employee non-competes, should be greater when a firm also invests in R&D:

> *Hypothesis 5: In-state firms with greater research and development intensity positively will experience greater positive effects on firm performance following a state-level decision to stop enforcing out-of-state employee non-compete agreements.*

In contrast to R&D, human capital and physical capital are much more distinct, if only because firms can assert total control and ownership over physical assets while only having limited rights, strengthened by non-compete enforcement, in their human capital which is "merely *employed*" (Younge & Marx, 2015, p. 653, emphasis in original). This reflects a common assumption of labor market economics research is that physical capital

is perfectly mobile while human capital is immobile (Roubini & Milesi-Ferretti, 1994). Physical capital is also much less able than human capital to be converted to another use. As such, it is possible to consider physical capital as a substitute for high quality human capital (Romer, 1990) since "sectors that produce human capital use educated and other skilled inputs more intensively than sectors that produce consumption goods and physical capital" (Becker, Murphy, & Tamura, 1994, p. 324).

Said differently, "[h]igh physical capital intensity could indicate that a firm has simply substituted away from labor and is now employing more automated equipment and procedures that require fewer and less-skilled employees" (Riley et al., 2017, p. 1900). This could be because a firm that invests heavily in its physical capital may not have sufficient funds available to invest in its human capital or that the human and physical may, under some circumstances, operate as substitutes if, for instance, automation drives out use of human capital or if employees with low human capital are the ones able to best take advantage of firm investments in physical capital. Empirically, Snell and Dean (1994) found that, in manufacturing, increases in physical capital investment was associated with less employee training. By this logic, a firm that invests significantly in its physical capital may be less able to obtain a human-capital based competitive advantage. Accordingly, the increased in-state firm performance caused by eliminating enforcement of out-of-state employee non-competes in California should decrease for firms with high physical capital intensity.

> *Hypothesis 6: In-state firms with high physical capital intensity will experience smaller positive effects on firm performance following a state-level decision to stop enforcing out-of-state employee non-compete agreements.*

METHODOLOGY

Research context

While California has historically not allowed the enforcement of employee non-compete agreements by California-based firms, non-California-based employers had been able successfully enforce their out-of-state agreements in California should employees decide to locate there. However, this changed in 1998, when the California Supreme Court expanded the definition of "employment in California" to include: "(1) employees living in state; (2) employees living out of state, but hired by California employers; and (3) employees living out of state but performing services in state" (Tedesco, 2011). However, there remained several open issues, and courts at the state and federal levels continued to recognize narrow exceptions to California's policy against non-competes, such as for purposes of trade secrets protection (Tedesco, 2011). These narrow exceptions were completely eliminated in 2008, in *Edwards v. Arthur Andersen LLP*, when the California Supreme Court ruled that all restrictive covenants, including out-of-state employee non-competes, were unenforceable in California. While this decision was an affirmation of the lower level court's decision in 2006, the decision was surprising even to legal scholars who had closely followed the case due to the breadth of the ruling disallowing all judicial exceptions to California's prohibition against restraints on trade, such as employee non-competes (Tedesco, 2011). Moreover, while the decision itself was expected to be handed down at some point (Pooley, 2008), the actual date of publication of the Supreme Court decision event was unknown in advance and unexpected.[13]

[13] In fact, a Factiva search for publications about the *Edwards* case prior to the Supreme Court decision on August 7, 2008, yielded only one result in 2008 that occurred nearly two months prior to the decision– a one line mention in a law firm blog posting titled "Update on Trade Secret Law" stating "expect a decision soon" (Pooley, 2008).

Furthermore, it had been ten years since the last time the California Supreme Court had addressed the enforceability of employee non-competes. After the 2008 decision, and unlike any other state, California expressly rejected any "rule of reason" or "balancing of hardships" (Tedesco, 2011). This 2008 California decision was therefore selected as a change of enforcement event for this project.

Event Study

This project uses a judicial (court) decisions rather than a legislative (statutory) decisions to examine the impact of non-compete enforceability on firm performance. This is to ensure that the event selected for the event study analysis both *applies to existing and future agreements* and is *unanticipated*. The event selected for this project was a court change that was effective on the date it was announced and affected all then-existing and future non-compete agreements. By contrast, statutory or legislative changes are frequently effective at a future date and/or may only apply to future agreements. Furthermore, for an event study, the predictability of an event, here a change in enforcement of non-compete enforcement, is an important consideration because only if the event is *unanticipated* can it be expected to generate abnormal returns. Otherwise, the new information associated with an anticipated event would already have been factored into the stock price (Fama, 1970). Moreover, McWilliams and Siegel (1997) assert that that stock prices may fully adjust as quickly as within a few minutes or hours of an event. Statutory or legislative changes can be "lobbied for" and publicized about long before they actually become effective, making them less desirable for purposes of event study analysis. In contrast, court cases are only "influenced" by the parties to the litigation, who even themselves do not know when a decision will be rendered in their case. Therefore,

court cases (judicial decisions) are better candidates than legislative (statutory) changes for event study analysis as done here. A full description of how the event study for this project was selected is described in Appendix A.

This project therefore examines firm performance following the announcement of a California Supreme Court decision relating to the enforcement of out-of-state employee non-compete agreements within California. Therefore, the methodology employed for this project follows the steps for an event study outlined by McWilliams and Siegel (1997). I first construct an event study using, as the event, the refusal of California to enforce out-of-state employee non-agreements described previously. My empirical strategy uses this event study to generate mean cumulative abnormal returns (CARs), a measure of firm performance, across all publicly traded firms in California during the stock market trading days immediately following the announcement of this court decision. This event study provides a direct test of Hypothesis 1 as well as a dependent variable (firm-level cumulative abnormal returns for California-headquartered firms) for a regression models to test Hypotheses 2 through 6.

An event will only generate abnormal returns if it is surprising and unanticipated (Fama, 1970). The event in this project – a California Supreme Court decision – was both surprising and unanticipated, as evidenced by the lack of news coverage leading up to the event date.[14] Thus, the value of firm access to *human capital*¸ a difficult to measure firm construct, "is (imperfectly) measured in absolute and competitive terms through stock

[14] Factiva was used to search for news articles relating to the event; there was limited publication regarding the forthcoming decision by the state Supreme Court and the earliest news about the actual case decisions was on the day following the court decision (+1).

market abnormal returns on or around" (Riley et al., 2017, p. 1902) the California Supreme Court decision.

Sample

To build the sample for this project, I used COMPUSTAT to identify the population of publicly traded firms (both active and inactive) headquartered in California in 2008 (n = 1,408).[15] I collected firm annual report data on all (active and inactive) firms headquartered in California that reported data to COMPUSTAT within the 2 years prior to the event date to allow for variations in firm fiscal year dates. Removal of duplicates left 1,312 firms.

I then performed an initial event study using the Event Study by Wharton Research Data Service (WRDS), which pulls stock market data from the University of Chicago Booth School of Business's Center for Research in Security Prices (CRSP). This initial event study was performed to determine which of these 1,312 firms had adequate stock market information available. For the event study in this project, I used the market model[16] where the rate of return on the share price of firm *i* on day *t,* $R_{i,t}$, is calculated as:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \qquad \text{(Eq. 4-1)}$$

where $R_{m,t}$ is the rate of return on a market portfolio of stocks (here, the CRSP value weighted index return with dividends) on day *t*, α_i represents the intercept term for firm

[15] I also pulled data only for firms listed as "active" but this reduced the total sample size to 971; removing duplicates resulted in n=897; and then the sample size in Event Study by WRDS was reduced to 576 using stock tickers as the search term and 533 using CUSIP identifiers. To maximize data availability, therefore, I requested data for all "active and inactive" firms.

[16] The market model assumes a linear relationship between the return of firm *i* and the return of a market index (MacKinlay, 1997). The market model, as well as parametric tests such as the t-statistic, are generally believed sufficiently powerful for most event study research (Brown & Warner, 1985), and the market model is the norm in most management research (*e.g.*, McWilliams & Siegel, 1997; Riley, et al. 2017).

i, β_i represents the systematic risk of firm *i*'s stock, and $\varepsilon_{i,t}$ is the error term, with $E(\varepsilon_{i,t}) = 0$.[17] From this equation, abnormal returns (*AR*) can be calculated for firm *i* on day *t* as:

$$AR_{i,t} = R_{i,t} - (a_i + b_i R_{m,t}) \qquad \text{(Eq. 4-2)}$$

where a_i and b_i are ordinary least squares (OLS) estimates obtained from regressing $R_{i,t}$ on $R_{m,t}$ over an estimation period prior to the event in question;. Firm level abnormal returns for firm *i* on day *t*, $AR_{i,t}$ represents the difference between the actual stock market return of the firm and the expected return based on the market rate. To calculate the cumulative abnormal return (CAR_i) for firm *i* over the event window (t_1, t_2), the daily abnormal returns of firm *i* are summed as follows:

$$CAR_i = \sum_{t=t_1}^{t_2} AR_{i,t} \qquad \text{(Eq. 4-3)}$$

For the event studies in this project, I used a market model to estimate the market return over the prior year (255 days), stopping 5 days before the event date; that is, the estimation window is (-255, -5); and the event window selected for the study was (+1, +3) with day 0 being the day of the California Supreme Court decision. Thus, in Equation 3, t_1 = 1 and t_2 = 3. The +1 start date of the event window was chosen because there was no indication of any information about the court decision being publicized prior to the day after the court decision (day +1). To be included in the data sample, I required firms to have at least 3 observations (trades) during the estimation window. I therefore gathered initial data for 774 California-headquartered firms; 2 duplicates appeared in the data due to historic stock ticker non-uniqueness, which led to an initial sample size of 772 when

[17] Note that any reference in an event study to "days" refers to trading days, which therefore do not include weekends or holidays.

matched with firm annual report data from COMPUSTAT. The results of this initial event study are represented graphically in Figure 4-1 and in Table 4-1; all test statistics test to see if the cumulative abnormal return is statistically significant from zero.

Table 4-1. Initial event study results for California project.

Sample Size	Event window	Mean CAR	Patell Z[1]	t-statistic[2]	Standardized cross-sectional statistic[3]
774	(+1, +3)	0.015338	7.10271***	5.68976***	5.23950***

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

[1] Patell Z refers to a statistic calculated as in the study by Patell (1976) using standardized residuals.

[2] The cross-sectional t-statistic at the end of the event window as calculated by Brown and Warner (1985).

[3] The standardized cross-sectional statistic as calculated by Boehmer, Musumeci, and Poulsen (1991).

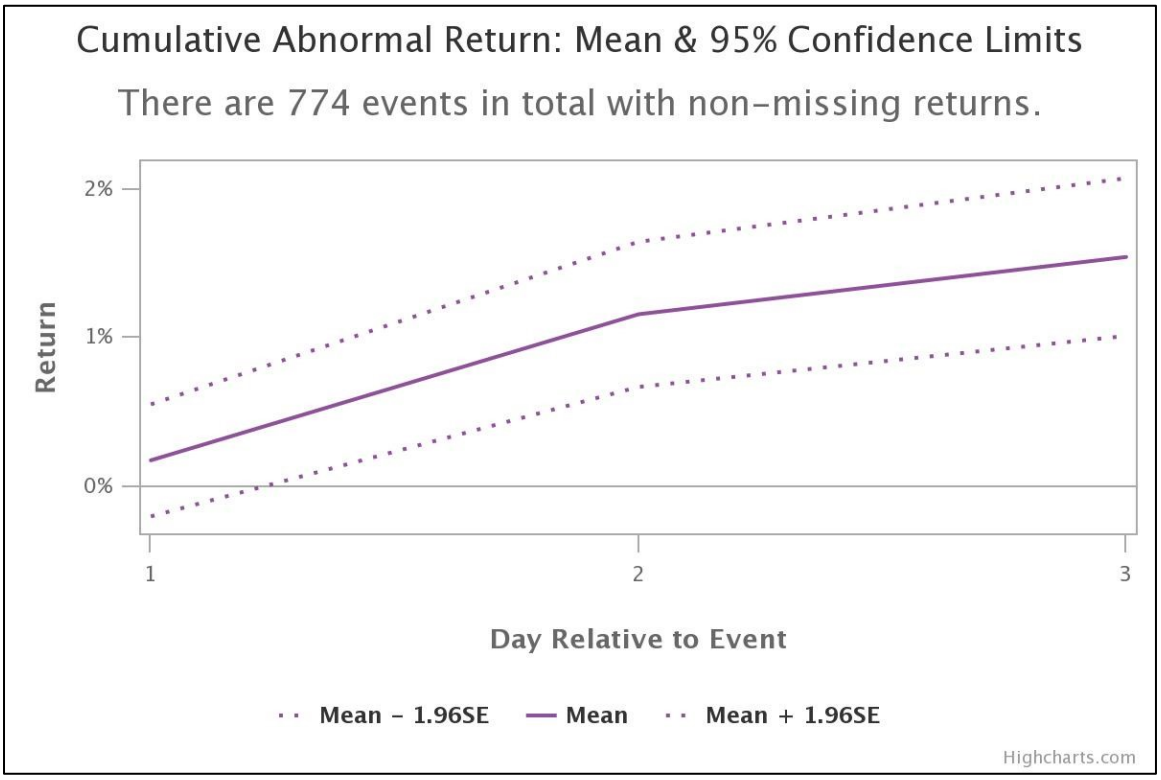

Figure 4-1: Event Study by WRDS graphical output of initial sample over event window (+1, +3); event date is day 0.

However, these initial results cannot be interpreted as indicating statistical significance without removal of potentially confounding events occurring during the event window (McWilliams & Siegel, 1997), To accomplish this, I first checked for confounding events at the state level, such as other state Supreme Court decisions

published around the event window or state-level legislation with an effective date during the event window (and found none). I then investigated all firms in the initial sample for firm-level confounding events that occurred during or around the (+1, +3) event window. To look for confounding firm-level events, I completed the following analyses, removing the noted number of firms at each step:

- First, I eliminated all firms who reported quarterly earnings data during the event window, as well as a day before and after due to potential information leakage about earnings reports that occurs frequently the day prior to such formal announcements. Since the event window was in early August (immediately after the close of the second quarter for firms following a standard calendar-year fiscal calendar), this resulted a large number of firms (110) being removed from the sample (leaving n = 662).
- I next searched for analyst recommendations as I did not want the event study results to be affected by an analyst's recommendation to buy/sell/hold/etc. the stock of the firm during the event window. I removed any firm from the sample for which an analyst made a recommendation during a (0, +3) window, resulting in the removal of 45 firms and leaving n = 617.
- I then examined the list of firms that were included and noted 138 of the stocks in the sample were iShares listed stocks (see https://www.ishares.com/), which are mutual funds, not firms. As such, these observations were removed from the sample leaving n = 479.
- I then looked for additional stock events occurring during the (0, +3) event window, including dividend announcements (none), stock splits (one), dividend

payments, and record dates[18] (eight). Removing these nine events from the sample left 470 firms.

- Further examination of the list of firms noted that there were 26 "firms" listed with SIC codes of 6722 or 6726. Like the iShares funds noted above, these represent mutual funds and not firms and were therefore removed from the sample, leaving 444 firms.
- Next, I checked for all material event filings of 8-Ks with the Securities and Exchange Commission, which includes any press releases occurring during a window of (0, +4). This analysis revealed that 47 of the firms in the sample had filed an 8-K during the applicable time period. I then personally reviewed each one of these 8-Ks and identified 23 firms that experienced material events during the event window and then excluded them from the sample (leaving 421 firms in the sample).
- Finally, I noticed that two of the stock tickers were generating duplicates in the Event Study by WRDS platform, so removed them from the sample.

The final sample included 419 California-headquartered firms from 45 different industries (using two-digit SIC codes); although over 70% of the firms come from just 6 industries – specifically, industries with large numbers of firms were SIC Code 28 (Chemicals and Allied Products, n = 49), SIC Code 36 (Electronic and other Electrical Equipment and Components, except Computer Equipment, n = 75), SIC Code 35 (Industrial and Commercial Machinery and Computer Equipment, n = 31), SIC Code 38 (Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical

[18] "Record Date" is the date on which the stockholder must be registered as holder of record on the stock transfer records of the company in order to receive a particular distribution directly from the company.

Goods; Watches and Clocks, n = 45), SIC Code 60 (Depository Institutions, n = 34), and SIC Code 73 (Business Services, n = 60). Just over half of the firms come from high-technology industries, and just over half of the firms are located in Silicon Valley, while 37.5% of the firms in the sample are both located in Silicon Valley and operate in high technology industries. As described in Tables 4-2 and 4-6, sample sizes for the regression analyses were dependent upon data availability in COMPUSTAT as some values (notably R&D expenditures, required for calculating firm R&D intensity, as described more thoroughly below) are reported on a voluntary basis.

Variables and measures

Dependent variables: For the event study exploring the impact of the change in California's enforcement of out-of-state employee non-competes (Hypothesis 1), the dependent variable is the firm performance, operationalized as the mean cumulative abnormal return (CARs), calculated as described above, of all the 419 California-headquartered publicly traded firms over an event window of (+1, +3) where day 0 is the day of the court decision. For Hypotheses 2 through 6, the dependent variable for the regressions exploring the variation in these returns at the firm-level are firm-level CARs over the same event window.

Independent variable for regression analysis – Hypothesis 2: Hypothesis 2 predicts a negative relationship between labor market competition, operationalized here as the number of in-state competitors, and the financial performance of by California-headquartered firms in response to the 2008 judicial decision. The independent variable to test this hypothesis, the number of in-state competitors (*numComp*), was calculated by counting the number of other in-state firms from the cleaned COMPUSTAT data pull (n

= 1,312) with the same industry (measured here as the primary four-digit NAICS code reported in COMPUSTAT) as the focal firm.

Independent variable for regression analysis – Hypothesis 3: Hypothesis 3 predicts a positive relationship between low local labor supply, here operationalized county-level unemployment rate for the headquarter location listed on the firm's annual report, and the firm performance occurring over the event window. The local unemployment rate (*UnemploymentRate*) was calculated as the July 2008 county-level, not seasonally adjusted, unemployment rate, and was obtained from the State of California's Employment Development Department Labor Market Information Division (LMID).

Independent variable for regression analysis – Hypothesis 4: Hypothesis 4 predicts a positive relationship between the number of knowledge workers at the firm and the firm-level CARs occurring during the event window. Initially, I used the methodology described by Younge and colleagues (2015) to first calculate an industry-based percentage (*KWratio*), as described below, and then multiply this ratio by the number of employees in the firm (from COMPUSTAT, presumably worldwide) to calculate the number of knowledge workers employed by the firm (*firmKW*). This methodology required obtaining data from the Occupational Employment Statistics (OES) survey from the Bureau of Labor Statistics (BLS) occurring closest to the event date, in this case, May of 2008. This data gives the number of employees working in each standard occupational classification (SOC) code at both the national and state levels. In the national files, the OES breaks these SOC codes at varying 2-digit sector, 3 digit sub-sector, 4 digit-industry, and, for some NAICS codes, down to 6 digit NAICS codes. At

the state level, however, May 2008 data is only broken out by SOC codes and there is no conversion from SOC to NAICS codes, so I was unable to utilize the state data.

According to Younge and colleagues (2015), any SOC code lower than 50-000 is considered to represent a knowledge worker a "knowledge worker" (KW). Thus, for each 4 digit NAICS industry code, I calculated a percentage of how many employees nationwide within that industry code are KWs by calculating the sum of all KWs (*i.e.,*, those with SOC codes lower than 50-000) in a particular 4-digit NAICS code divided by the total number of workers employed in that NAICS code. I thus calculated an industry-based percentage of KW (*KWperc*) as of May of 2008 for the 86 four-digit NAICS codes represented in my data sample of 419 firms. Data was unavailable in the May 2008 OES for NAICS 4-digit industry codes 1113 ("Fruit, Tree, and Nut Growing"), 7225 ("Restaurants and Other Eating Places"), and 9999 (Nonclassifiable Establishments). For NAICS code 1113, data was also unavailable at the 3-digit subsector level (111), so was proxied by the 2 digit sector (11), while 7225 was proxied by 7221 ("Full Service Restaurants"), and 9999 was proxied by data available for subsector 999. I then multiplied *KWperc* for each firm's four-digit industry level by the number of employees (from COMPUSTAT) to compute number of KWs employed by each firm in the sample.

Independent variable for regression analysis – Hypothesis 5: Hypothesis 5 predicts a positive relationship between R&D intensity (*RDint*), measured as R&D investment (listed in COMPUSTAT as "Research and Development Expense") divided by sales, and the firm performance experienced by in-state firms. R&D expenditures and sales data are from the most recent fiscal year prior to the event date of August 7, 2008 (for most firms, fiscal year 2007) under the rationale that investors would primarily rely

on such data and to prevent any data from the fiscal year of the event date being influenced by the court decision.

Independent variable for regression analysis – Hypothesis 6: Hypothesis 6 predicts a negative relationship between physical capital intensity (*PCint*), measured as physical capital investment ("Property, Plant, and Equipment – Total (Net)" in COMPUSTAT) divided by sales, and the firm-level performance of California-headquartered firms. Like *RDint*, data for *PCint* was data was from the most recent fiscal year prior to the event date.

Control variables for regression analyses: The regression model was formed with controls for firm size, firm location, and two controls addressing firm industry. Empirically, large firms are more capital intensive, that is, they have a greater amount of firm value tied to physical assets (Brown & Kapadia, 2007) and in the analysis in this project, I did not want to conflate the value of a firm's human capital with the sheer size of the firm's employee base. I therefore controlled for firm *size*, measured as the natural logarithm of the number of employees (plus 1, to avoid sign changes after the transformation) for all firms that reported their number of employees in COMPUSTAT (n = 412). I also wished to control for firm location, as firm location can provide its own competitive advantage due to knowledge flows and other agglomeration effects (DeCarolis & Deeds, 1999). Exploratory results using a crude measure of firm location in Northern versus Southern[19] California indicated a strong negative "SoCal" effect, so I then modified the original location variable to investigate if this "SoCal" effect was being

[19] *SoCal* was defined as any five digit zip code at or below 935XX.

driven by firms located in the "hot spot" (Pouder & St. John, 1996) of Silicon Valley[20] – which seems to be the case. As such, I replaced the original *SoCal* location variable with *SiliconValley*, a binary variable equal to 1 if a firm was located in Silicon Valley and 0 otherwise. Building on this variable, I wanted to probe the role of technological intensity, particularly whether or not the effects I was seeing were due to high technology firms as is the common association with Silicon Valley. Hecker (2005) identified 14 industries as "level-I," that is, the most technologically intensive, using the 2002 NAICS codebook. Per Mann and Nunes (2009), these 14 industries become 11 after the 2007 NAICS code update, although Mann and Nunes do not list the NAICS codes merged or eliminated. As such, I used the U.S. Census Bureau's concordance tables to cross-walk the Hecker's original 14 codes to the 2007 codes utilized in my data. The list of NAICS codes identified with *hightech* = 1 and zero otherwise is listed in Appendix D. Finally, I controlled for firm *industry* (measured as the two-digit SIC code) using industry fixed effects, as noted below.

Econometric specification of regression model: Building on this, I identified the following econometric specification to test Hypotheses 2-6:

$$CAR_{i,w} = \beta_0 + \beta_1 numComp_{i,t-1} + \beta_2 UnemployentRate_{i,m} + \beta_3 firmKW_{i,t-1} + \beta_4 RDint_{i,t-1} + \beta_5 PCint_{i,t-1} + \beta_6 size_{i,t-1} + \beta_7 SiliconValley_{i,t-1} + \beta_8 hightech_{i,t-1} + \alpha_i + u_{i,t} \quad \text{(Eq. 4-4)}$$

where *i* indexes firms, *w* denotes the event window, *m* denotes the month prior to the court decision (here, July), *t* denotes the fiscal year of the court decision (here, 2008), α_i represents industry fixed effects at the two-digit SIC code level, and $u_{i,t}$ represents the

[20] Silicon Valley was defined as to include Alameda, Contra Costa, San Francisco, San Mateo, Santa Clara, and Santa Cruz counties (Bureau of Labor Statistics, 2009).

error terms. Including industry fixed effects mitigates concerns that unobserved heterogeneity at the industry level will drive the results by controlling for the magnitude of the court decision across industries.

Variable Investigations and Transformations

Because the regression model includes fixed effects, standard regression diagnostics available for linear regressions, such as examination of leverage, studentized residuals, etc., are not available Therefore, prior to proceeding with the analysis, I investigated the range and distribution of all variables for the regression analysis. The initial summary statistics are presented in Table 4-2 and initial correlations are presented in Table 4-3. Note that the correlations in Table 4-3 only include observations for which full data was available (n = 291). Histograms of the initial independent variables and the only non-binary control variable (firm size) are in Appendix B, while scatter plots of these variables against the dependent variable are attached in Appendix C.

Table 4-2. Initial summary statistics for the (+1, +3) event window in California

Variables	**n**	**Mean**	**S.D.**	**Min.**	**Max.**
CAR (3 day window)	419	.0253532	.0577801	-.2227926	.2926987
# In-state Competitors	419	53.642	45.04592	0	133
County Unemployment Rate	419	6.567303	1.054975	5.2	10.6
# of Firm Knowledge Workers *(thousands)*	412	3.473786	13.59829	.005789	167.2742
R&D Intensity	303	6.009676	70.68701	0	1177.5
Physical Capital Intensity	400	1.102075	7.82238	0	86.23985
Firm Size	412	.8203681	.9889415	.0089597	5.61057
Silicon Valley	419	.5202864	.5001855	0	1
High Tech	419	.5202864	.5001855	0	1

Table 4-3. Initial pairwise correlations for the (+1, +3) event window in California, n = 291

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) CAR (3 day window)	1								
(2) # In-state Competitors	0.0505	1							
(3) County Unemployment Rate	-0.0340	-0.215***	1						
(4) # Firm Knowledge Workers	-0.0642	-0.0995	-0.0422	1					
(5) R&D Intensity	-0.0316	0.130*	-0.0870	-0.0279	1				
(6) Physical Capital Intensity	0.0548	0.173**	-0.0582	-0.0328	0.346***	1			
(7) Firm Size	-0.0295	-0.195***	0.0585	0.779***	-0.0699	-0.0750	1		
(8) Silicon Valley	0.112+	0.204***	-0.381***	0.0132	0.0508	0.00781	-0.0340	1	
(9) High Tech	0.0643	0.730***	-0.213***	-0.0479	0.0561	0.0728	-0.126*	0.285***	1

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Reviewing these tables and graphs identified several potential issues that required resolution before I could proceed with regression analysis. Notably, the scatter plots indicate potential outliers in almost every plot, with significant overlap of firms (for example, tickers OXGN and STEM). However, I first tried to deal with outliers via the methods described below before proceeding with examination of overly influential observations. I detail these issues and how I resolved them, to the best of my ability, in the following subsections.

Issues with R&D intensity (RDint)

There are several potential concerns with *RDint*, notably the range. First, I explored zero values, which imply that a firm with this value did not engage in any R&D. Of the 303 firms (allegedly) reporting R&D expenditures in COMPUSTAT, 41 firms had

$0 in R&D expenditures listed in COMPUSTAT, resulting in a value of *RDint* of 0. Upon investigation of a sample of 5 of these $0-expenditure firms, each firm did not, in fact, report R&D expenditures of $0 in its annual report filed with the SEC; rather it simply did not report R&D expenditures at all. Thus, it is impossible to tell from COMPUSAT whether the 41 $0-expenditure firms *did not engage in R&D* (that is, truly had $0 in R&D expenditures) or whether *they did not report R&D* expenditures, since such reporting is optional. This makes these the $0-expenditure firms indistinguishable from the firms that had missing values for R&D expenditures in COMPUSTAT, and therefore makes sense to exclude them from calculations of *RDint*. This reduces the number of observations for *RDint* to 262.

I next explored extreme values of R&D intensity. Firms with *RDint* greater than 1 raise potential concerns – this means that R&D expenditures exceeded sales revenue and, for some firms in the sample, exceeded them to an extraordinary extent. There are 32 firms in the sample with values of *RDint* greater than 1. I examined annual reports of a sample of these firms reporting extreme values of *RDint* and found that these firms actually reported $0 in sales revenue (or did not report sales revenue at all), and the reported value in COMPUSTAT of sales is in fact akin to total revenue from other sources, such as licensing or partnership collaborations. Since this should mean that *RDint* should have been a missing value (due to the divide by 0), these firms were excluded from regressions with the *RDint* variable.[21]

[21] I also tried capping the maximize value of *RDint* at 1, which is a similar idea to winsorizing. I also attempted to winsorize the *RDint* variable but unless cuts were at lower than the 88th percentile (which would be methodologically unusual as my research showed most winsorizing occuring at the 95th or 99th percentile) still resulted in values of *RDint* over 1. In both cases, model fit was not improved and for the theoretical reasons given above, I did not continue with this analysis. I also tried taking the natural log of the *RDint* variable but ran in to issues with potential multicollinearity in the regression analysis and model fit was not improved.

I then plotted *RDint* versus the dependent variable for values of *RDint* between 0 and 1, as shown in Figure 4-2, where I noticed via visual inspection the suggestion of an inverse U-shaped relationship, meaning that at higher values of R&D intensity, after around *RDint* = 0.25,[22] cumulative abnormal returns start to decrease. This prompted me to introduce a new variable of *RDintSq* in the model, representing the square of *RDint* to explore this nonlinearity.

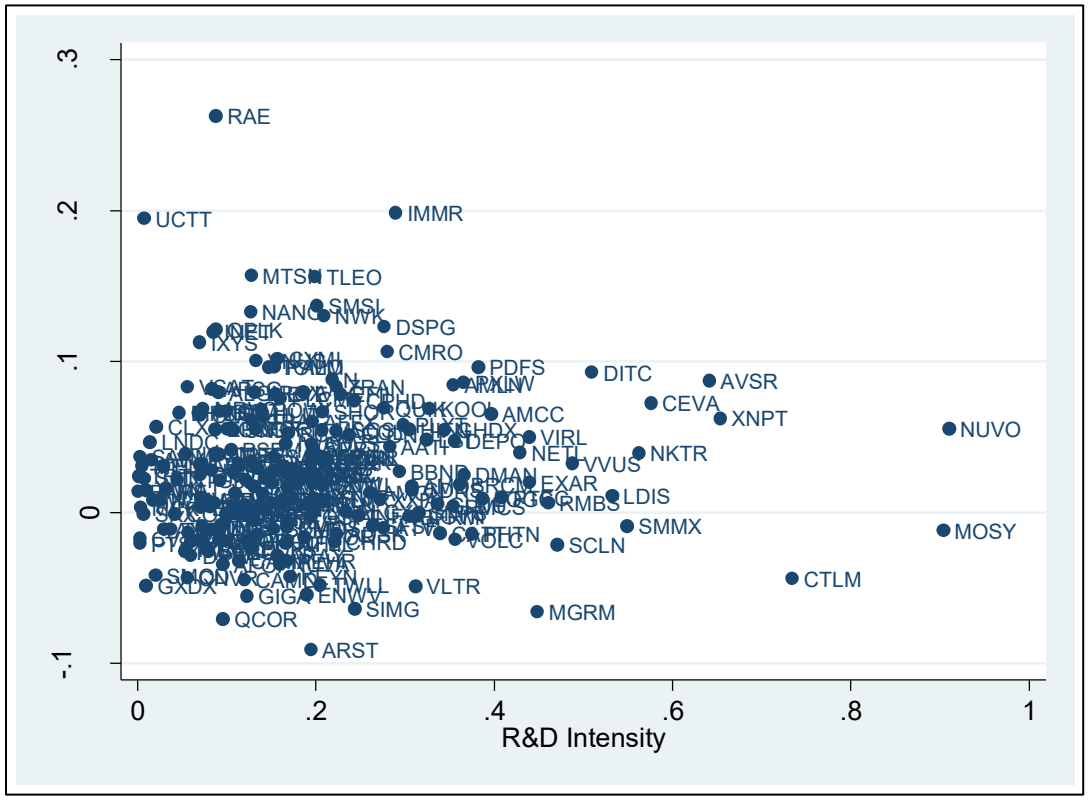

Figure 4-2: *RDint* versus *CAR* for 0 < *RDint* < 1, n = 230.

[22]Validating this, I calculated correlations for *RDint* and *CAR* by group. When *RDint* was greater than 0 but less than 0.25, the correlation with the dependent variable was 0.0717, while when *RDint* was greater than 0.4 but less than 1, the correlation was -0.0903. In future work on this project, I will also explore additional regression models taking this grouping into account.

One final issue with the *RDint* variable is the issue of reduced sample size due to non-reporting of R&D expenditures. I conducted a series of t-tests[23] to determine if the firms that had missing or zero values (as explained above) of R&D expenditures in COMPUSTAT were statistically different from firms that reported non-zero values of R&D. There was no statistically significant difference between the two groups for the dependent variable (cumulative abnormal returns), number of firm knowledge workers (using the *correctedFirmKW* measure discussed below), physical capital intensity,[24] or firm size. However, firms that reported non-zero values of R&D expenditures have more in-state competitors, are more likely to be located in Silicon Valley, are located in counties with lower unemployment rates, and are more likely to operate in high technology industries.

Issues with physical capital intensity (PCint)

Much like the analysis for *RDint*, I explored both zero and extreme values of *PCint*. There were only two firms reporting 0 values of *PCint* and review of these firm's filings with the SEC did not actually indicate $0 in property, plant, and equipment expenditures but rather indicated non-reporting of such expenditures. As such, these observations should be excluded. Extreme values of *PCint* were considered to be above 1, with 20 firms in the sample meeting that threshold (and all also had values of *RDint* greater than 1). Thus, firms with values of *PCint* greater than 1 were excluded from regressions with the *PCint* variable. I then plotted *PCint* versus the dependent variable for

[23] All reported t-tests were run allowing the two groups to have unequal variance. Requiring equal variance resulted in statistically identical results.

[24] Using both the full set of observations with non-missing values of *PCint* as well as limiting the range of acceptable values of *PCint* between 0 and 1, as noted below.

values of *PCint* between 0 and 1, as shown in Figure 3, where I noticed a slight inverse U-shaped relationship, meaning that at higher values of physical intensity, around *PCint* = 0.3,[25] cumulative abnormal returns start to decrease. This prompted me to include a new variable of *PCintSq* in the model, representing the square of *PCint* to explore this nonlinearity.[26]

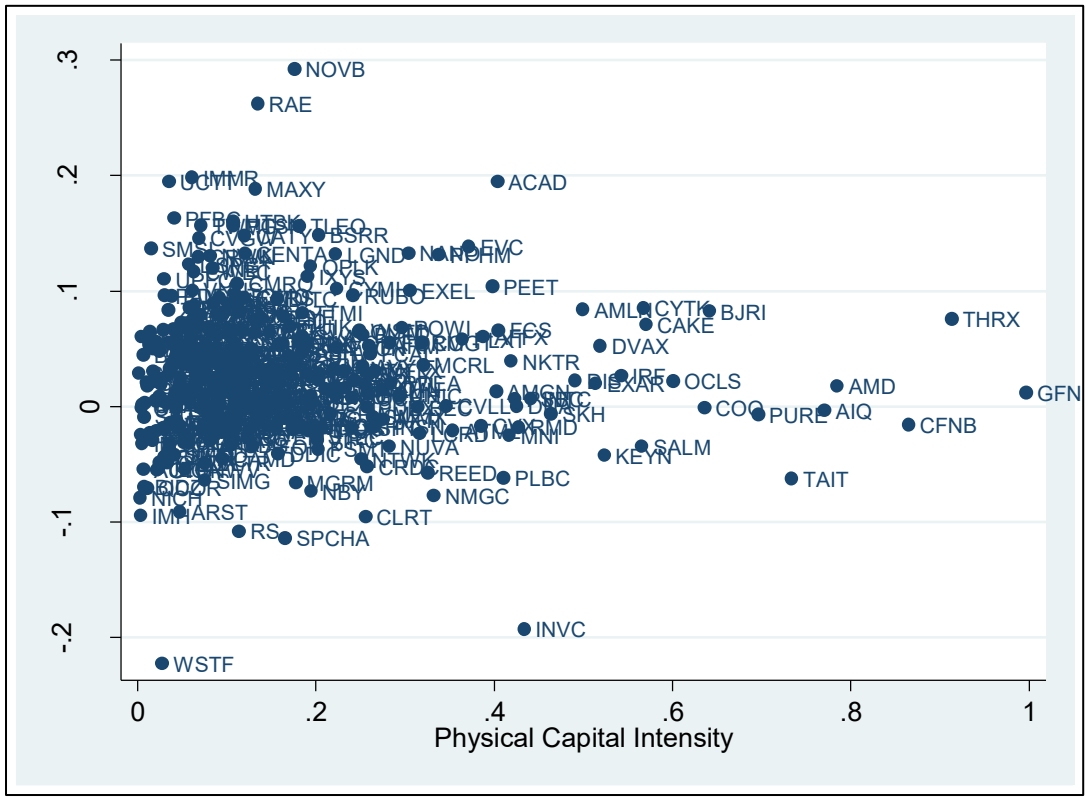

Figure 4-3: *PCint* versus *CAR* for 0 < *PCint* < 1, n = 378.

[25] Validating this, I ran correlations for *PCint* and *CAR* by group. When *PCint* was greater than 0 but less than 0.3, the correlation with the dependent variable was 0. 0439, while when *PCint* was greater than 0.3 but less than 1, the correlation was - 0. 0916. In future work on this project, I will explore additional regression models taking this grouping into account.

[26] I also tried capping the maximize value of *PCint* at 1, which is a similar idea to winsorizing. I also attempted to winsorize the *PCint* variable but unless cuts were at lower than the 95th percentile (which would be methodologically unusual) still obtained values of *PCint* over 1. In both cases, model fit was not improved and for the theoretical reasons given above, I did not continue with this analysis. I also tried taking the natural log of the *PCint* variable but ran in to issues with potential multicollinearity in the regression analysis and model fit was not improved.

Issues with the number of firm knowledge workers (firmKW)

When *KWperc* (the percentage of knowledge workers the industry level) was incorporated into the full data, odd correlations became apparent (recall that *firmKW* = *KWperc* x (# of firm employees)). For instance, *KWperc* (not reported in Table 4-3) had a negative correlation of -0.1396 with *hightech*. Intuitively, this should have been a positive correlation. Upon examination, this negative correlation was found to be the result of nearly a quarter of all firms in the sample having relatively low values of *KWPerc* while being labeled as *hightech* (specifically, NAICS industry codes 3344 and 3254), as noted in Table 4-4.

Table 4-4. Comparison of *hightech* and *KWperc* variables. There are 419 firms in the full sample.

NAICS Industry Code	*hightech*	*KWperc*	NAICS Description	Number of firms in sample (n)
5415	1	0.99	Computer systems design	5
5112	1	0.99	Software publishers	34
5413	1	0.96	Architectural, engineering	1
5417	1	0.97	Scientific R&D	1
3341	1	0.86	Computer manufacturing	13
3345	1	0.71	Navigation, measuring, electromedical component manufacturing	33
5182	1	0.98	Data processing	2
3364	1	0.65	Aerospace product and parts manufacturing	2
3342	1	0.73	Communications and equipment manufacturing	21
3344	1	0.55	Semiconductor and other electronic component manufacturing	60
3254	1	0.68	Pharmaceutical and medicine manufacturing	46

Moreover, additional examination revealed industries that are not high technology (with *hightech* = 0) with higher values of *KWPerc* than some identified as *hightech*, another intuitive mis-match. For instance, NAICS industry code 2361 (“Residential Building Construction”) has a value of *KWPerc* of 0.984721713, due primarily to the large number of workers engaged in “construction and extraction occupations;” removing this SOC

category alone reduced *KWPerc* to 0.3468. At a common sense level, it did not make sense to say that the residential building construction industry employed a higher percentage of knowledge workers than either the pharmaceutical or semiconductor manufacturing industries, and apart from the intuitive concerns, this is concerning as "knowledge worker" and "high tech" are used synonymously, both in common vernacular and in academic literature (*e.g.*, Hilton, 2008; Brophy, 2006).

Due to these discrepancies, I first reviewed the citations (Coff, 1999, 2002; Farjoun, 1994) listed by Younge, Tong, and Fleming in their 2015 article in *Strategic Management Journal* in their methodology section regarding how they calculated *KWperc*. However, neither of these citations actually used the knowledge worker categorization, instead they merely used the OES data. I then pulled the SOC classification system as of 2000 (Bureau of Labor Statistics, 2000) as this was in the system in effect for my 2008 data; a full list of the 2000 Standard Occupational Classification major categories, their classification under the Younge, Tong, and Fleming (2015) system of knowledge worker occupations, and the proposed classification of this dissertation is represented in Table 4-5. Reviewing Table 4-5, there is a clear divide in training or education occurring after code 31-000. Occupations listed below this code include managers, scientists, engineers, etc., while codes from 33-000 through 50-000 are more support and services related. For instance, 37-000 occupations include building and grounds cleaning. Most of these over 32-000 categories are not what would generally be considered to be knowledge intensive.[27]

[27] However, this categorization of KW does miss some potentially knowledge intensive, such as sales, which may require extensive on the job training and experience. However, this would imply that any percentage found using my revised classification would be an underestimate of the role of knowledge workers, meaning that statistical results would be even higher with more fine grained analysis. Thus, it is

Table 4-5: Major SOC Codes from the 2000 SOC Codelist and "Knowledge Worker" Classifications

SOC Major Code & Description	Younge, Tong, & Fleming (2015) SMJ "knowledge worker" occupations	Proposed classification of "knowledge worker" occupations
11-0000 Management Occupations		
13-0000 Business and Financial Operations		
15-0000 Computer and Mathematical Occupations		
17-0000 Architecture and Engineering Occupations		
19-0000 Life, Physical, and Social Science Occupations		
21-0000 Community and Social Services Occupations		
23-0000 Legal Occupations		
25-0000 Education, Training, and Library Occupations		
27-0000 Arts, Design, Entertainment, Sports, and Media Occupations		
29-0000 Healthcare Practitioners and Technical Occupations		
31-0000 Healthcare Support Occupations		
33-0000 Protective Service Occupations		
35-0000 Food Preparation and Serving Related		
37-0000 Building and Grounds Cleaning/Maintenance Occupations		
39-0000 Personal Care and Service Occupations		
41-0000 Sales and Related Occupations		
43-0000 Office and Administrative Support Occupations		
45-0000 Farming, Fishing, and Forestry Occupations		
47-0000 Construction and Extraction Occupations		
49-0000 Installation, Maintenance, and Repair Occupations		
51-0000 Production Occupations		
53-0000 Transportation and Material Moving Occupations		
55-0000 Military Specific		

In addition, my research specifically on this topic revealed one other paper, Cader (2008), that uses the OES to calculate a "knowledge ratio" at the industry level. Cader, building on Beck (1992), identifies the following ten SOC codes as representing

my opinion that a conservative estimate of the percentage of KW in an industry is preferable to an inflated one. Moreover, this definition of knowledge worker consistent with the prior literature on knowledge workers, as discussed below.

knowledge-based workers: (1) Management Occupations; (2) Business and Financial Operations Occupations; (3) Computer and Mathematical Occupations; (4) Architecture and Engineering Occupations; (5) Legal Occupations; (6) Arts, Design, Entertainment, Sports, and Media Occupations; (7) Healthcare Practitioners and Technical Occupations; (8) Life, Physical, and Social Science Occupations; (9) Education, Training, and Library Occupations; and (10) Healthcare Support Occupations. This list of SOC codes is the same as my classification with the addition of "community and social service occupations," which includes occupations such as counselors, social workers, and religious officials which are, I acknowledge, quite rare at the firm-level. Thus, I recalculated *KWratio* for occupations with OES codes below 32-000, with the rationale that most of these workers are required to obtain some type of higher education (such as a Master's degree or other certification) or have extensive experience (such as managers). This better meets the definition of knowledge worker given originally by Beck (1992). A comparison of the original *KWperc* (based on Younge, et al. 2015) and the revised *KWratio* is presented in Appendix D. I then multiplied *KWratio* for each firm's four-digit industry level by the number of employees (from COMPUSTAT) to compute the final number of KWs employed by each firm in the sample (*correctedFirmKW*).

Issues with hightech

Initially, the variable *hightech*, based on Hecker (2005) was included in the regression model as a control. However, upon further reflection, it was decided that the industry fixed effects that were included would pick up most of this variation, and thus inclusion of the *hightech* variable would be redundant. Also, he two-digit SIC controls would also represent a more fine grained analysis than the *hightech* dummy. Moreover,

when the full data was assembled, *hightech* had a 0.730 correlation (see Table 4-3) with number of in-state competitors. Validating concerns over this correlation, regression models run that included both *hightech* and number of in-state competitors resulted in moderate variance inflation factors (VIF) above 5. I therefore removed *hightech* as a control variable from the final regression model.

Clustered errors

Errors for the regression analysis were clustered[28] since a modified Wald test for group-wise heteroscedasticity in fixed effect regression models indicated the presence of heteroscedasticity in several of the models. To address this heteroscedasticity, building on Stock and Watson (2008) and Cameron and Miller (2015), errors were clustered at the same level used for fixed effects (here, industry level via two-digit SIC codes). From a model design perspective, clustering at the industry level is correct in order to eliminate any remaining within-industry correlation remaining after the fixed effects have been applied (Nichols & Schaffer, 2007).

Revised econometric specification

In light of the above issues, the econometric specification for the model to test Hypotheses 2-6 was changed to:

$$\begin{aligned} CAR_{i,w} = {} & \beta_0 + \beta_1 numComp_{i,t-1} + \beta_2 UnemployentRate_{i,m} \\ & + \beta_3 correctedFirmKW_{i,t-1} + \beta_4 RDint_{i,t-1} \\ & + \beta_5 RDintSq_{i,t-1} + \beta_6 PCint_{i,t-1} + \beta_7 PCintSq_{i,t-1} \\ & + \beta_8 size_{i,t-1} + \beta_9 SiliconValley_{i,t-1} + \alpha_i + u_{i,t} \end{aligned} \qquad \text{(Eq. 4-5)}$$

[28] Using Eicker-Huber-White-robust treatment of errors in order to make as few assumptions at possible (Nichols & Schaffer, 2007). This selection of error treatment is also correct given that the conclusions being drawn from this project are meant to be applied only to the firms in the sample (Abadie, Athey, Imbens, & Wooldridge, 2017).

where *i* indexes firms, *w* denotes the event window, *m* denotes the month prior to the court decision (here, July), *t* denotes the fiscal year of the court decision (here, 2008), α_i represents industry fixed effects at the two-digit SIC code level, and $u_{i,t}$ represents the error terms which are clustered at the industry (two-digit SIC code) level. Only values of *RDint* and *PCint* between 0 and 1 are included in the full model.

Revised summary statistics and correlations

Because of the reductions in sample size and change in variables described above, I have included revised summary statistics and pairwise correlations in Tables 4-6 and 4-7 below based on the revised econometric specification described in Equation 4-5. Due to the changes described in the measurement of firm knowledge workers, the mean changed from 3.473786 (with a standard deviation of 13.59829; see Table 4-2) to a mean for *correctedFirmKW* to 1.850312 (with a standard deviation of 7.951316). Due to the exclusion of observations of *RDint* and *PCint* equal to 0 or greater than 1, there have also been changes in the mean and standard deviation of those variables. Tables 4-6 and 4-7 also includes statistics and correlations for the squared values of *RDint* and *PCint*.

Table 4-6. Revised summary statistics for the (+1, +3) event window in California.

Variables	**n**	**Mean**	**S.D.**	**Min.**	**Max.**
CAR (3 day window)	419	.0253532	.0577801	-.2227926	.2926987
# In-state Competitors	419	53.642	45.04592	0	133
County Unemployment Rate	419	6.567303	1.054975	5.2	10.6
Corrected # of Firm Knowledge Workers *(thousands)*	412	1.850312	7.951316	.0010305	96.76324
R&D Intensity	230	.1866455	.1494711	.0008434	.9102238
R&D Intensity Squared	230	.057081	.1051831	7.11e-07	.8285074
Physical Capital Intensity	378	.1549829	.1551777	.0012801	.9965996
Physical Capital Intensity Squared	378	.0480361	.1112975	1.64e-06	.9932107
Firm Size	412	.8203681	.9889415	.0089597	5.61057
Silicon Valley	419	.5202864	.5001855	0	1

Table 4-7. Revised pairwise correlations for the (+1, +3) event window in California, n = 228

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) CAR (3 day window)	1									
(2) # In-state Competitors	-.0572	1								
(3) County Unemployment Rate	0.0656	-0.137 *	1							
(4) Corrected # Firm Knowledge Workers	-0.109	0.0275	-0.103	1						
(5) R&D Intensity	0.0581	0.334 ***	-0.234 ***	-0.121 +	1					
(6) R&D Intensity Squared	0.0240	0.218 ***	-0.164 *	-.0961	0.919 ***	1				
(7) Physical Capital Intensity	-.0131	0.113	0.0438	0.132 *	0.0112	0.00650	1			
(8) Physical Capital Intensity Squared	-0.0385	0.138 *	0.0375	0.119	0.0231	0.00961	0.924 ***	1		
(9) Firm Size	-.0784	-.0411	0.0323	0.717 ***	-0.293 ***	-0.227 ***	0.326 ***	0.296 ***	1	
(10) Silicon Valley	0.123	0.145 *	-0.362 ***	0.0244	0.276 ***	0.204 **	-.0426	-0.0165	-.0393	1

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Reviewing the correlations in Table 4-7, all correlations with the dependent variable are in line with the expected directions except for the (corrected) number of firm knowledge workers. The only concerning correlation is between firm size and the (corrected) number of firm knowledge workers. However, this was to be expected given how these variables were calculated and, moreover, alternative measures of firm size, such as those using sales or total assets, resulted in VIFs over 10 in regression analyses, a sign of likely multicollinearity, while regressions involving firm size as presently measured (using natural log of the number of employees plus 1, for firms reporting the number of

employees) did not result in VIFs over 5. As such, I continued to use this measure of firm size, despite this high correlation. The negative correlation between firm size and R&D intensity indicates that larger firms are less R&D intensive than smaller firms, which could be explained by smaller firms engaging in R&D in order to remain competitive with larger firms.

Because of the reduction in sample size associated with data availability from COMPUSTAT and the restrictions noted above on *RDint* and *PCint*, I also report summary statistics for the sample (n = 228) used in testing the full regression model in Table 4-8.

Table 4-8. Summary statistics for the (+1, +3) event window for observations included in the full regression model in California

Variables	**n**	**Mean**	**S.D.**	**Min.**	**Max.**
CAR (3 day window)	228	.0263187	.0489802	-.0912933	.2626963
# In-state Competitors	228	63.53947	40.14416	0	133
County Unemployment Rate	228	6.328947	.6903646	5.2	8.2
Corrected # of Firm Knowledge Workers *(thousands)*	228	1.876142	6.339713	.0081812	66.72431
R&D Intensity	228	.1854891	.149559	.0008434	.9102238
R&D Intensity Squared	228	.056676	.1055249	7.11e-07	.8285074
Physical Capital Intensity	228	.1346583	.1203111	.0070636	.7849659
Physical Capital Intensity Squared	228	.0325441	.0674345	.0000499	.6161715
Firm Size	228	.8506423	.9279395	.0207825	4.46935
Silicon Valley	228	.7280702	.4459329	0	1

RESULTS

Event study

To test the effect of the California's decision to not enforce out-of-state employee non-compete agreements, as framed in Hypothesis 1, I conducted an event study following the methodology outlined in McWilliams and Siegel (1997) using the Event Study by WRDS program. Event studies allow researchers to calculate the market reaction to the release of new information – in this case, the unanticipated court decisions relating to the enforcement of out-of-state employee non-compete agreements. As described in detail previously, the estimation model uses all trading data from the year prior to and ending 5 days before the event itself (that is, between 255 and 5 trading days prior to the court decision). The event window of (+1, +3), where day 0 is the actual day of the court decision, was selected for the study since there was no indication of any news leakage regarding the California Supreme Court decision prior to or on the event date, and the earliest news announcing the court decision was not until the next day (+1).

I then generated a predictive model estimating the expected market returns for each firm had the court decision not occurred utilizing a market model, CRSP value-weighted index (with dividends) to estimate cumulative abnormal returns (CARs) for each firm in the sample. Cumulative abnormal returns (CARs) were then generated by subtracting these expected returns from the actual market return, and summing them over the three-day event window.

Table 4-9 presents the results of the event study. There is statistically significant preliminary support for the human capital theory in Hypothesis 1, which predicted that increase in access to previously unavailable human capital when California stopped enforcing of out-of-state employee non-competes would cause a positive stock price

reaction. Using the chosen event window of (+1, +3) and the CRSP value-weighted market index, the mean cumulative abnormal returns (CARs) for the firms is 0.025353, or 2.5%, with significance at $p < .001$ for all three test statistics, which is represented graphically in Figure 4-4 and reported in the first line of Table 4-9.

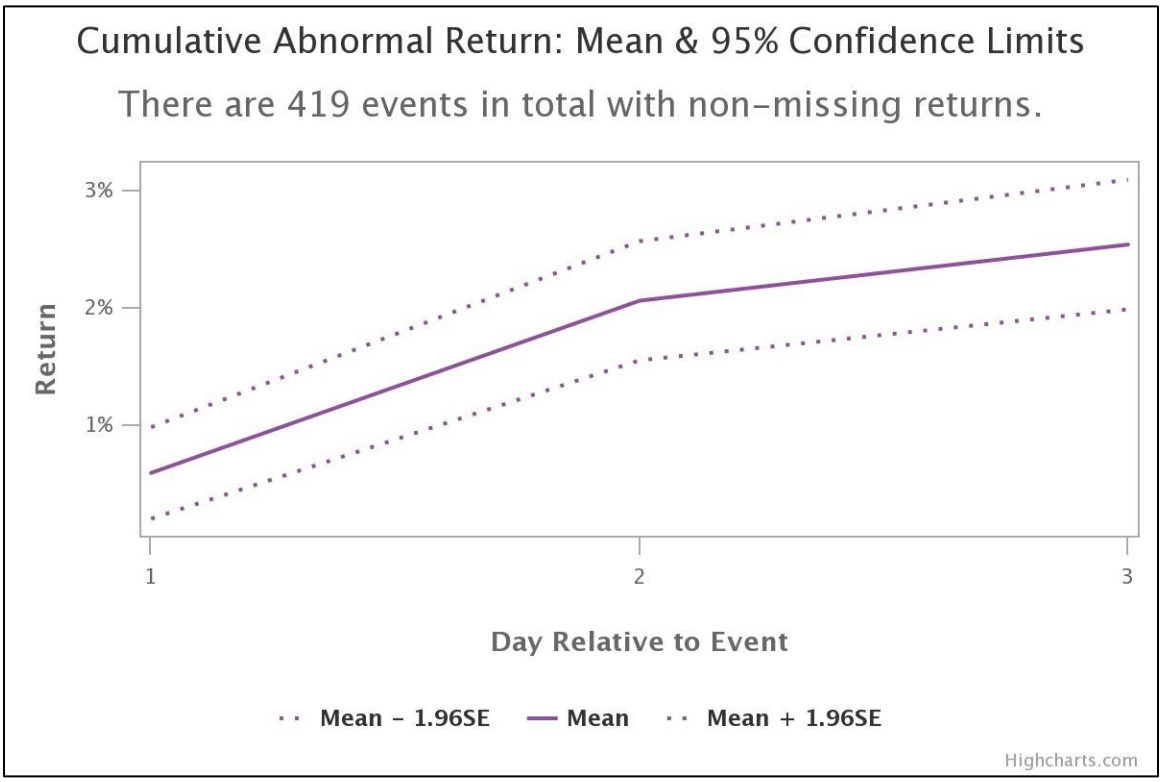

Figure 4-4: Event Study by WRDS graphical output of final sample over event window (+1, +3); event date is day 0.

Table 4-9. Final event study results for California

Sample Size	Event window	Mean CAR	Patell Z[1]	t-statistic[2]	Standardized cross-sectional statistic[3]
419	(+1, +3)	0.025353	5.738***	8.98174***	9.98365***
419	(0, +3)	0.029810	10.5264***	9.25161***	10.6313***
419	(+1, +2)	0.020556	10.0153***	7.92031***	8.76718***
419	(+1, + 4)	0.026590	9.12763***	7.87901***	9.40366***
419	(-1, +1)	0.012621	5.50794***	3.68575***	4.65435***

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

[1] Patell Z refers to a statistic calculated as in the study by Patell (1976) using standardized residuals.

[2] The cross-sectional t-statistic at the end of the event window as calculated by Brown and Warner (1985).

[3] The standardized cross-sectional statistic as calculated by Boehmer, Musumeci, and Poulsen (1991).

There is therefore significant support for Hypothesis 1 that the decision of the decision of the California Supreme Court to stop enforcing out-of-state employee

competes induced positive and abnormal returns for California-headquartered firms. In addition to these highly significant results, I provide statistics from two similar empirical studies to illuminate the economic importance of my preliminary findings. Riley and colleagues (2017) found an increase of 1.67% for firms that have won human capital training awards. Hillman, Zardkoohi, and Bierman (1999) demonstrated gains of 1.6% if an executive leaves a firm for a Cabinet-level appointment or Congressional position. Thus, the magnitude of the event study results in this project of 2.5% is remarkable.

Regression Analysis

After conducting the event study to determine that firm performance increased for California-based firms after the court's decision to not enforce out-of-state employee non-competes, following McWilliams and Siegel (1997), I attempt to explain the variation in firm-level financial performance by conducting the previously formulated regression analyses to test Hypotheses 2 through 6, by considering number of in-state competitors (Hypotheses 2), the county level unemployment rate (Hypothesis 3), the number of firm knowledge workers (Hypothesis 4), R&D intensity (Hypotheses 5) including the role of the square of this variable, and physical capital intensity (Hypothesis 6) including the role of the square of this variable. Due to data availability, a single comprehensive regression model was not ideal, and thus Hypotheses 2-6 are tested separately, as represented in Table 4-10, and then the full model is presented. In the table, Model 1 includes only controls for firm size, location in Silicon Valley, and industry fixed effects, then each hypothesis is tested in accordance with the model of the same number (thus Model 2 tests hypothesis 2, Model 3 tests Hypothesis 3, etc.). Model 7

includes only control variables for the reduced sample for which all available data is available, while Model 8 represents a test of the full model.

In the initial regression models (Models 2-6), the only statistically significant result was found for Hypothesis 3, regarding the positive association between firm-level financial performance and the local labor shortages (as measured by county level unemployment rate of the county in which the firm was headquartered). In Model 2, the coefficient for the number of in-state competitors is in the expected direction, as is the case in Model 5 for the role of R&D intensity. In Model 4, the coefficient on the number of firm knowledge workers is actually in the opposite of the direction hypothesized, as is the case in Model 6 with the role of physical capital intensity. In the full model (Model 8), there is a significant increase in R-squared from all prior models and, more importantly, there is statistically significant support for Hypotheses 2, indicating that the firms that benefited the most from the legal change were those without high in-state labor market competition. Moreover, there is strong statistical report for Hypotheses 3, implying that firms that faced local labor shortages due to low levels of local unemployment benefited more from the legal change than firms with abundant supplies of local labor. Contrary to the hypothesized negative relationship between firm performance and physical capital intensity, the full model reveals marginal support in the opposite direction, but that this increase is attenuated at higher levels of physical capital intensity such that it begins to increase at a decreasing rate, due to the statistically significant coefficient on the square of physical capital intensity. There is no support in any model for Hypothesis 5 regarding the role of R&D intensity in influencing firm

Table 4-10. Generalized least squares regression results for the (+1, +3) event window in California using industry (two-digit SIC code) fixed effects, with errors clustered at the industry level

	Model 1 (Controls)	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7 (Controls limited sample)	Model 8 (full)
Mean CAR (3 day window)	.0263457	.0263457	.0263457	.0263457	.0263187	.0265359	.0263187	.0263187
Independent Variables								
# In-state Competitors		-0.0001						-0.0002*
		(0.0001)						(0.0001)
County Unemployment Rate			0.0049*					0.0124**
			(0.0023)					(0.0035)
# Firm Knowledge Workers				-0.0005				-0.0010+
				(0.0005)				(0.0005)
R&D Intensity					0.0412			0.0836
					(0.0469)			(0.0660)
R&D Intensity Squared					-0.0717			-0.1092
					(0.0484)			(0.0662)
Physical Capital Intensity						0.0347		0.0739+
						(0.0487)		(0.0426)
Physical Capital Intensity Squared						-0.0574		-0.1418*
						(0.0401)		(0.0530)
Control Variables								
Firm Size	-0.0034	-0.0035	-0.0034	-0.0006	-0.0031	-0.0052	-0.003	0.0037
	(0.0042)	(0.0042)	(0.0041)	(0.0068)	(0.0037)	(0.0045)	(0.004)	(0.0061)
Silicon Valley	0.0142*	0.0149*	0.0176**	0.0145*	0.0117	0.0158**	0.012	0.0175+
	(0.0061)	(0.0068)	(0.0053)	(0.0063)	(0.0089)	(0.0055)	(0.008)	(0.0088)
Constant	0.0217***	0.0266***	-0.0122	0.0201**	0.0169*	0.0200**	0.020**	-0.0684*
	(0.0058)	(0.0046)	(0.0141)	(0.0072)	(0.0077)	(0.0063)	(0.008)	(0.0263)
Industry Fixed Effects	Included	Included	Included	Included	Included	Included	Included	Included
No. of Obs.	412	412	412	412	228	375	228	228
R-Squared	0.016	0.017	0.021	0.018	0.017	0.024	0.015	0.062

Robust standard errors in parentheses; + p<0.10, *p<0.05, ** p<0.01, *** p<0.001

performance, although the coefficients are in the expected direction for both R&D intensity and the square of R&D intensity. In the full model (Model 8), interclass correlation is 0.34993367, which means that 34.99% of the variance is due to differences across (two-digit SIC code) industry groups. For comparison, in the controls-only model (Model 1), interclass correlation is only 0.26555097.

Control variables were insignificant except for the role of firm location in Silicon Valley, which was at least marginally significant in all models except Model 5, with the introduction of R&D intensity. This result can be explained by the fact that, as mentioned above, firms reporting R&D were more likely to be located in Silicon Valley than those that did not report (or had zero dollars reported) R&D expenditures in COMPUSTAT.

Robustness checks

The event study results were robust to different specifications of the event window, as shown in Table 4-9. The results were also robust to different model specifications; specifically, using the (+1, +3) event window: Market Adjusted Model (mean CAR = 0.022851; Patell Z = 9.14466; t-statistic = 7.82614; standardized statistic = 9.07905); and Fama French Three Factor Model (mean CAR = 0.004585141; Patell Z = 1.99089; t-statistic = 1.66880; standardized statistic = 1.99800). Nonparametric tests for the (+1, +3) window was also robust and significant under the Market Model with the CRSP value-weighted index,[29] with generalized Z = 9.651, rank test Z = 3.362, and jackknife Z = 3.486.

In addition, I conducted a series of t-tests to determine whether the 419 firms for which I was able to obtain cumulative abnormal returns (who were therefore included in

[29]Robustness checks with additional model configurations (such as Market Model with equally-weighted index) were also significant.

the sample) were statistically significant from the ones that I was not able to (n = 696). There was no significant evidence that the firms that were included in the sample differed regarding number of employees or physical capital expenditures. However, the firms that were included in the sample did have higher sales ($p < .05$), higher R&D expenditures ($p < .01$) and more in-state competitors ($p < .01$) than those that were not included.

I re-ran the regression analysis without industry-clustered errors since the number of clusters (industries) ranges from 45 (in the control model, Model 1) to 24 in the full model, both of which are below the ideal number of 50 (Kézdi, 2004), particularly in light of the unbalanced cluster sizes (ranging from 1 to 74 in the control model and 1 to 66 in the full model) (Nichols & Schaffer, 2007). This analysis leaves point estimates (coefficients) unchanged, but would allow for different standard errors and therefore potentially different conclusions. However, this test indicated no change in significance levels in any of the regression models.

As a final robustness check, I conducted a series of sensitivity tests by excluding various observations that visually appear as potential outliers or extreme values in the scatter plots in Appendix C, as well as in Figures 4-2 and 4-3. These tests indicated that three observations (stock tickers RAE, ORCL, and UCTT) were overly influential on the results, while three other observations (NUVO, MOSY, and IMMR) made slight changes. I therefore re-ran the regression models with these 6 observations excluded, as presented in Table 4-11. As is clear from this table, this significantly improved the results. Notably, the coefficients on all items that had been significant in Table 4-10 were either the same or larger magnitude and became more significant. Of important note, R&D intensity and R&D intensity squared both became significant, supporting to Hypothesis 5.

To further explore the potential inverse U-shaped relationships between the dependent variable and R&D intensity, and the dependent variable and physical capital intensity, I followed Lind and Mehlum (2010), using the regression results from Table 4-10, Model 8. According to Lind and Mehlum (2010), the existence of a U- or inverse U-shape can be confirmed if two conditions are met: (1) the inflection, or turning, point must be located within the range of the observations; and (2) the slopes of the data before and beyond the inflection point must significantly confirm the assumed shape. For criteria (2), in the case of the inverted U-shape, this means that the slope prior to the inflection point is positive and significant and the slope following the inflection point is negative and significant. In the case of *RDint*, the turning point occurs at *RDint* = 0.4274838, which is well within the range of observation values (0.0008434 to 0.9102238, from Table 4-6) and the slope prior to this point is 0.1326669 with a t-value of 2.31 ($p = .01531$). After the extreme point, the slope is -0.1501114 with a t-value of -1.395 ($p = .0884581$). Thus, there is a marginally significant ($p < .1$) inverse-U shaped relationship between *RDint* and firm performance, measured as firm-level cumulative abnormal returns, following California's decision to not enforce out-of-state employee non-compete agreements. In the case of *PCint*, the turning point occurs at *PCint* = 0.2993237, which is well within the range of observation values (0.0012801 to 0.9965996, from Table 4-6) and the slope prior to this point is 0.090511with a t-value of 2.07 ($p = .025$). After the extreme point, the slope is -0.2117514 with a t-value of -3.1155 ($p = .00252$). Thus, there is a significant ($p < .05$) inverse-U shaped relationship between *PCint* and firm performance, measured as firm-level cumulative abnormal returns, following the California court decision.

Table 4-11. Generalized least squares regression results for the (+1, +3) event window in California using industry (two digit SIC code) fixed effects, with errors clustered at the industry level, excluding 6 unduly influential observations

	Model 1 (Controls)	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7 (Controls, limited sample)	Model 8 (full)
Mean CAR (3 day window)	.0250572	.0250572	.0250572	.0250572	.0239614	.0251213	.0239614	.0239614
Independent Variables								
# In-state Competitors		-0.0001						-0.0003***
		(0.000)						(0.000)
County Unemployment Rate			0.004*					0.012***
			(0.002)					(0.003)
# Firm Knowledge Workers				-0.000				-0.002***
				(0.000)				(0.000)
R&D Intensity					0.079			0.136**
					(0.049)			(0.057)
R&D Intensity Squared					-0.097			-0.153*
					(0.086)			(0.084)
Physical Capital Intensity						0.041		0.089**
						(0.045)		(0.042)
Physical Capital Intensity Squared						-0.063*		-0.159***
						(0.037)		(0.049)
Control Variables								
Firm Size	-0.002	-0.003	-0.003	-0.000	-0.001	-0.004	-0.002	0.007
	(0.004)	(0.004)	(0.004)	(0.006)	(0.003)	(0.004)	(0.003)	(0.005)
Silicon Valley	0.011*	0.012*	0.014***	0.011*	0.006	0.012**	0.008	0.011
	(0.006)	(0.007)	(0.005)	(0.006)	(0.008)	(0.006)	(0.008)	(0.008)
Constant	0.021***	0.028***	-0.009	0.020***	0.011	0.019***	0.020***	-0.068**
	(0.005)	(0.005)	(0.014)	(0.007)	(0.009)	(0.006)	(0.007)	(0.026)
Industry Fixed Effects	Included	Included	Included	Included	Included	Included	Included	Included
No. of Obs.	406	406	406	406	222	369	222	222
R-Squared	0.010	0.013	0.015	0.012	0.015	0.017	0.008	0.084

Robust standard errors in parentheses; + p<0.10, *p<0.05, ** p<0.01, *** p<0.001

DISCUSSION

This project proposes employee non-compete agreements as an isolating mechanism that operates to secure firm human capital from acquisition by rivals, and finds highly statistically significant support for the role of employee non-competes as an isolating mechanism under the RBV. The elimination of such isolating mechanism for a specific group of firms, as in the case of the *Edwards* court decision by the California Supreme Court, whereby out-of-state employee non-compete agreements were deemed non-enforceable in the state of California, allowed such firms to generate substantial stock market returns indicative of a human-capital based competitive advantage.

However, one possible interpretation of these results is that they do not represent a positive increase for California firms, but rather, because all firms outside California located in states that do enforce employee non-competes were *negatively* impacted by the change in California's enforcement policy, these results may indicate that *these* firms outside California experienced negative returns (thus lowering the overall market return and therefore causing California-headquartered firms to exceed the market rate of return). Even under this interpretation, however, this legal change appears to have caused at least some degree of state-level human capital-based competitive advantage by generating positive abnormal returns for California-headquartered firms. To explore this possibility, I used census data to gather information on state-to-stage immigration flows for 2007-2009 into California in order to identify the population of firms most "at risk" to be harmed by the California court decision (U.S. Census Bureau "State to State Migration Flows") . In aggregate from 2007 to 2009, the top states "sending" residents to California

were, in order, Texas, Arizona, Nevada, Washington, and New York.[30] I then gathered information from COMPUSTAT on all firms reporting fiscal data in the year prior to the court decision in these five states. Removing duplicates resulted in n = 1,877, for which I ran an event study using Event Study by WRDS with the same parameters as noted above (Market Model, same estimation and event windows, etc.) although, admittedly, this list of firms has not been checked for confounding events. The results are presented in Table 4-11 and Figure 4-5. I also re-ran this event study excluding New York-based firms (out of concern that the sheer number of New York firms might alter the market return) and obtain similar, although less highly significant, results (n = 958 firms with 472 firms providing results). Contrary to the predictions mentioned above, firms in these states do not appear to suffer ill effects as a result of the legal change and, in fact, demonstrate a slight 0.4% mean increase in CARs over the (+1, +3) event window. Thus, it does not seem that California firms benefit at the expense of firms in other states.

Table 4-12. Event study for firms located in Texas, Arizona, Nevada, Washington, and New York (confounding events not removed).

Sample Size	Event window	Mean CAR	Patell Z[1]	t-statistic[2]	Standardized cross-sectional t-statistic[3]
1,004	(+1, +3)	.004443929	2.01298*	2.19170*	1.62469+

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

[1] Patell Z refers to a statistic calculated as in the study by Patell (1976) using standardized residuals.

[2] The cross-sectional t-statistic at the end of the event window as calculated by Brown and Warner (1985).

[3] The standardized cross-sectional t-statistic as calculated by Boehmer, Musumeci, and Poulsen (1991).

[30] In 2007, the year before the court decision, the top five "sending" states were Texas, Arizona, Nevada, Florida, and New York. The year of the court decision, 2008, the states were Texas, Arizona, Nevada, Washington, and New York. The year after the court decision, 2009, had Texas, Arizona, Washington, Nevada, and New York as the top sources of immigration into California. Perhaps notably, all of these states enforced employee non-compete agreements to some degree as of 2009 (Bishara, 2011).

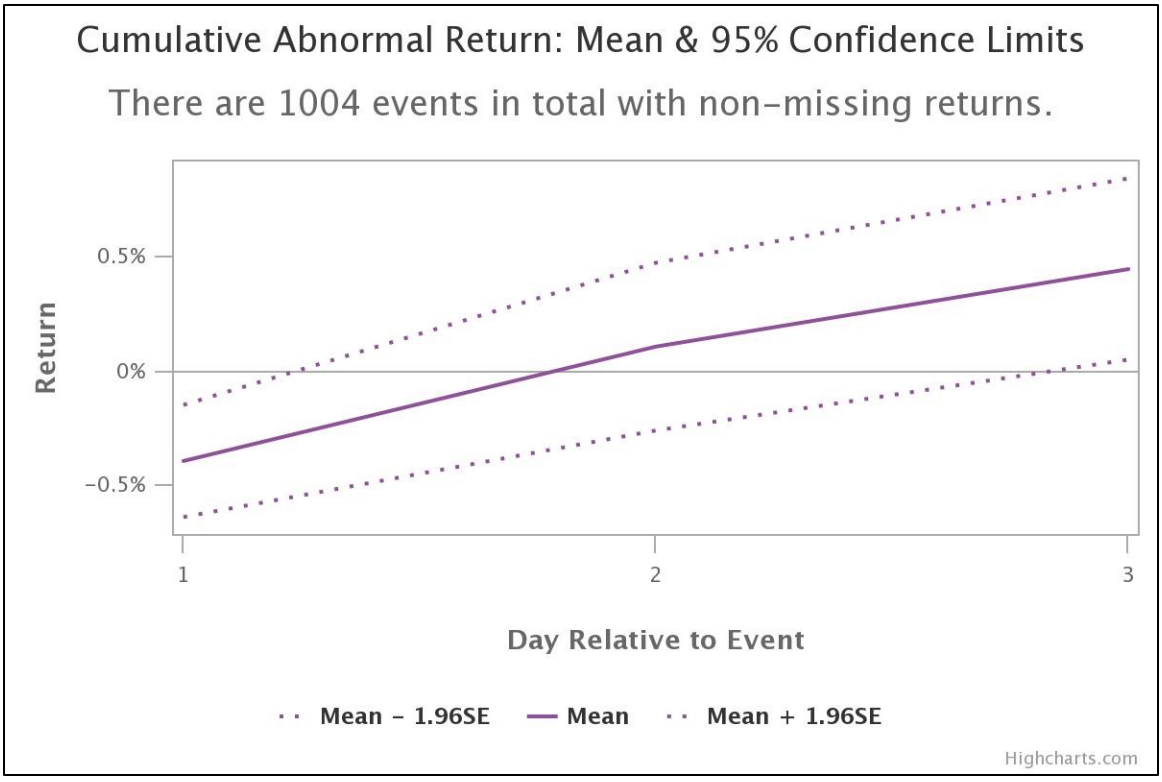

Figure 4-5: Event Study by WRDS graphical output of firms in Texas, Arizona, Nevada, Washington, and New York over event window (+1, +3); event date is day 0.

Therefore, this project empirically demonstrates that the human capital based competitive-advantage obtained by California-based firms was not a result of out-of-state firms in the market being harmed by the *Edwards* decision. Another key contribution of this project is to demonstrate that market investors do respond – emphatically – to state-level changes in the enforcement of employee non-competes. This project is contributes to the extant literature on employee non-competes by identifying another group of stakeholders, other than firms or employees themselves, that is invested in the impact on firms of employee non-competes.

Moving to the firm-level regression analysis, I empirically explored the relationship between this increased firm performance, as a result of the state-level change in enforcement of employee non-compete agreements, with local labor market conditions and firm characteristics, finding strong support for both types of factors. The results of

the regression analysis indicate that labor market competition, measured in this project as the number of in-state competitors, reduced the gains available to in-state firms after the *Edwards* decision, and that firms facing local labor market shortages, as evidenced by high county-level unemployment rates, were particularly advantaged by the legal change.

At the firm level, contrary to expectations, firms employing high numbers of knowledge workers prior to the legal change experienced a negative, not positive, impact as a result of the legal change. One potential explanation for this is that California-based firms may utilize other mechanisms, such as employee benefits, in order to induce knowledge workers to stay, and therefore did not need replacement workers, directly controverting the reasoning of Hypothesis 4. Alternatively, other scholars have suggested that the culture of California and its non-enforcement of employee non-competes has already operated to give California firms a type of competitive advantage (Gilson, 1999) driven by strong network connections among firms and a sort of "alumni" system (Lobel, 2013). Therefore, an influx of skilled labor would reduce the value of these informal networks, hampering firm advantage. However, this conclusion is not supported by the results indicating that firms located in Silicon Valley, a known "hot spot" (Pouder & St. John, 1996) particularly benefit from this change. Comparing the coefficients on the two variables (*correctedFirmKW* and *SiliconValley*) in the full regression model indicate that the Silicon Valley effect was over ten times stronger than the knowledge worker effect.

Turing to the role of complementary assets, this project found support for the role of R&D as a complementary asset to a newly available labor pool of skilled labor once unduly influential observations were removed, but after initial increases begin to increase at a decreasing rate, suggesting an inverted U-shaped relationship. In contrast to

expectations, physical capital appears to operate as a complement and not a substitute to potential new human capital, but only at low levels of physical capital intensity. It may be that initial investments in physical capital in one time period create opportunities for human capital investment in future time periods, via learning processes (Arrow, 1962), and that such an initial investment in physical capital signals a lack of current human capital, suggesting that firms with high physical capital intensity would benefit greatly from access to additional skilled labor. However, the overall effect of physical capital intensity on firm-level returns creates an inverse-U shaped relationship, meaning that after increasing initially, the returns begin to decrease after a "tipping" point.

Finally, these results reiterate the need to consider firm location, particularly in "hot spots" or clusters such as Silicon Valley, when discussing the role of human capital-based competitive advantages.

CONCLUSION

Results from this project indicate strong support for the role of state-level enforcement of employee non-competes as an isolating mechanisms in the quest for human capital-based competitive advantage (Coff & Kryscynski, 2011), and identify important labor market attributes and firm resource-based complementarities (Teece, 1986) that affect this competitive advantage. This research therefore speaks directly to the strategic human capital research stream and the RBV literature. This project also contributes to strategic human capital literature by introducing a better method to determine the number of firm knowledge workers by correcting the measure espoused of Younge and colleagues (2015) by building on the economic geography literature (Cader, 2008).

Employee non-competes therefore appear to operate as isolating mechanisms that both protect a firm's human capital from its competitors and operate as a powerful limitation on worker mobility. While it has been recognized that the search for "human capital-based advantages require[s] multilevel solutions to address vexing challenges associated with attracting, retaining, and motivating talented employees" (Coff & Kryscynski, 2011, p. 1430), the role of such human resources-based mechanisms in securing human capital-based advantages under the resource-based view of the firm has been underexplored in the extant literature. This project sought to clarify the role of human resource-based protection mechanisms such as non-competes in facilitating the management of firm knowledge. Finally, this project, and the one in the next chapter of this dissertation, are the first, to my knowledge, to avoid any cross-state methodological comparisons of employee non-compete enforcement by utilizing event study methodology.

Moreover, there are interesting practical implications of this project at the state policy level. Enforcement of employee non-competes has been empirically shown to reduce employee mobility (Fallick et al., 2006; Marx et al., 2009; Garmaise, 2011; Marx, 2011), human capital investment (Cooper, 2001; Garmaise, 2011), and entrepreneurship (Stuart & Sorenson, 2003; Marx & Fleming, 2012). Based on these effects negative effects, and the results of this study, states could be tempted to copy California's policy and refuse to enforce both in-state and out-of-state employee non-competes. In fact, there have been recent legislative proposals in several states, including Idaho, Maryland, Massachusetts, Michigan, Missouri, New Jersey, and Washington, to limit state-level enforcement of employee non-compete agreements. However, such efforts may be

misguided for two reasons. First, enforcement of such agreements may encourage innovation and economic growth, as well as encourage firms to invest in their human capital (Franco & Mitchell, 2008; Gomulkiewicz, 2015). Second, the results from this study suggest that such a policy decision to ban non-competes may only benefit in-state firms to the extent that *other* states do not engage in similar actions.

One limitation of this project is that a lack of enforceability of non-competes at the state level does not necessarily mean that employees are not requested (or required) to sign them: Garmaise (2011) found that 58% of California-headquartered publicly-traded firms reported using non-compete agreements for their executives while Kaplan and Stromberg (2003) found that similar amounts of California-based entrepreneurs were asked to sign non-competes as a requirement for investment by venture capital firms. Recently, Prescott, Bishara, and Starr (2016) conducted a large, nationwide employee-level survey on non-competes and found that the frequency of employee non-compete agreements in an employment contract had very little relationship to the level of non-compete enforcement in that state: "In other words, an employee in California (where noncompetes are prohibited) appears to be just as likely to labor under a noncompete as an employee in Florida (where noncompetes are much more likely to be enforced)" (p. 370). However, this isn't to say that non-competes enforcement is not an important policy consideration, as this project shows that state-level non-compete enforcement has important implications for firm financial performance. That is, this project shows that even if enforcement may not guide a firm's decision to *use* non-competes, it certainly matters to investors. Moreover, Lavetti and colleagues note that there may be significant implications at the firm level as well since, "[i]f firms are unsure whether an NCA [non-

compete agreement] they have imposed will be enforceable, they may temper their investments in workers" (2014, p. 23). In the aggregate, such confusion itself may have significant implications at the state level. Moreover, at the managerial level, firm executives considering whether to utilize non-compete agreement agreements may wish to consider both the role of competition and the role of human capital complementarities, such as R&D and physical capital intensity.

Future research directions

In future work I will look at different ways to measure firm performance and firm value, such as *Tobin's q*, as done in Younge and Marx (2015), and also explore varying time horizons, such as short- versus long-term changes to see if the predicted increases in firm value were persistent. Initial explorations suggest that a longer term event window of (+20, +45) yields impressively high mean cumulative abnormal returns (CARs) in California, up to 6% depending on selection of market index, which is consistent with the pattern of news reports of the court decision being circulated in September 2008 by law firms to their clients in newsletters. I will also explore buy-and-hold abnormal returns (BHARs) to investigate longer-term risk-adjusted returns over a holding period (Lyon, Barber, & Tsai, 1999).

Additional avenues for extension would be to further explore the interaction between R&D and physical capital intensity (Riley, et al. 2017). The reduced sample size due to lack of reporting of R&D expenditures may be concerning to some scholars. In future work, I can employ Heckman's (1976) two stage correction model to resolve any issues of sample bias related to non-reporting of R&D expenditures in annual reports and impute a value of R&D intensity that can be used in future work.

One final avenue of exploration would be to explore the potential moderating role of firm specific versus general human capital. Crook and colleagues (2011) find evidence that the link between human capital and performance is stronger when human capital is firm specific rather than general. The influence of human capital on R&D may be particularly influenced by whether the human capital is general or specific. Kor and Mahoney (2005) reported that managers "with tacit knowledge of employee skills and interests can more accurately dedicate funds to high margin R&D projects and also can do a superior job of matching skills to R&D projects, resulting in superior economic performance" (p. 495). Thus, as firm-specific human capital (e.g., years of experience with a firm) increases, managers become more effective resource allocators within firms, thus enabling better decisions and enhanced performance. Finally, the connection between specific and general firm human capital and the knowledge workers has not been explored but has intriguing intuitive connections. One such avenue of exploration would be to explore the relationship between general and specific firm human capital with Beck's (1992) three part categorization of knowledge workers.

CHAPTER 5

DON'T MESS WITH MY TEXANS: FIRM PERFORMANCE IN THE WAKE OF INCREASED ENFORCEMENT OF EMPLOYEE NON-COMPETE AGREEMENTS

INTRODUCTION

The human capital research stream is derived from the resource-based view (RBV) of the firm (Barney, 1991; Wernerfelt, 1984), but human capital, or the knowledge, skills, and abilities of employees (Coff & Kryscynski, 2011), can serve as a source of sustainable competitive advantage only if firm human capital can be protected from rivals. Unlike most resources, human capital "depend[s] on the continued presence of people, who—unlike property, plant, and equipment—are not owned by the firm, but merely *employed*" (Younge & Marx, 2015, p. 653, emphasis in original), and can be hired away.

The RBV suggests that a resource provides a competitive advantage if it is valuable, rare, inimitable, and non-substitutable (VRIN) (Barney, 1991). Firms gain control over valuable resources by availing themselves of isolating mechanisms which shield proprietary resources from competitors (Rumelt, 1984; Wernerfelt, 1984). Isolating mechanisms allow the firm to secure its rents from these resources, as well as protect the resources from imitation (Peteraf, 1993). Inimitability is regarded as the most important attribute in the RBV (Barney, 2001; Godfrey & Hill, 1995; King & Zeithaml, 2001), but how can human capital be made inimitable? This dissertation proposes employee non-compete agreements, which limit an employee's ability to work for or start a competitive

entity after the end of the employment relationship, as an isolating mechanism that can be used to ensure the imitability of firm human capital by limiting employee mobility (Marx, et al. 2009) and preventing valuable firm knowledge from being acquired by competitive firms (Franco & Mitchell, 2008).

This project investigates whether an increase in the enforcement of employee non-compete agreements allows firms to achieve sustainable human capital-based competitive advantage by exploiting a quasi-natural experiment: a 2011 Texas Supreme court decision that strengthened the enforcement of employee non-competes. This project therefore heeds the call of Newbert to empirically examine the role of an "isolation mechanisms that hinder[s] imitation" (2007, p. 139). This study therefore explores the role of employee non-competes as a human capital-specific isolating mechanism under the RBV that protects a firm's human capital from acquisition or imitation by rivals (Rumelt, 1984) and explores whether an increase in state-level enforcement of employee non-competes allows firms headquartered in such a state to experience increased firm performance.

Using event study methodology, I predict that increasing the strength of employee non-competes as an isolating mechanism to protect firm human capital from competitive firms will increase firm performance (Hypothesis 1). I also consider how labor market and firm resource-specific factors cause firm-level variations in this predicted result. Within the labor market, I predict that firm performance will be greater for firms whose employees have more local employment alternatives (Hypothesis 2) since if employees do not have external employment options, the value of employee non-competes as an isolating mechanism is reduced. Meanwhile, firms facing local labor market shortages

should especially benefit from greater mobility limitations on their existing human capital (Hypothesis 3) because it will be more difficult for such firms to replace current employees. Turning to firm resources, employees with greater human capital, or "knowledge workers," are most attractive to competitive firms and have the potential to cause the most damage when they leave a firm, taking firm knowledge with them. As such, I predict that firms employing more knowledge workers should benefit more from increased enforcement in employee non-compete agreements (Hypothesis 4). I also consider two specific firm-level complementarities, defined as firm assets or activities that work better together to increase firm performance (Teece, 1986). Such complementarities are particularly critical for knowledge-based assets such as human capital, since such knowledge assets alone may not be sufficient for competitive advantage as they must be "packaged into products or services to yield value" to a firm (Teece, 1998, p. 72). Two particular complementarities, research and development (R&D) intensity and physical capital intensity, are therefore proposed because they are particularly coupled to both human capital and the enforcement of employee non-competes. As Penrose notes, "there is an interaction between the two kinds of resources of a firm-its personnel and material resources-which affects the productive services available from each" (1959, p. 76). I predict that research and development intensity will be positively associated with the increased firm performance in response to increased enforceability of employee non-competes (Hypothesis 5), while physical capital intensity will be negatively related (Hypothesis 6).

Previewing the conclusions of this project, there is strong evidence that employee non-compete enforcement increases firm performance. Moreover, I find support for the

role of firm resources, particularly knowledge workers and physical capital assets, in shaping this relationship, but do not find the hypothesized effects of labor market factors. Moreover, this project demonstrate the importance of considering selection of market index when conducting event studies in strategic management, and raises potential avenues for future research on the role of firm size in the non-compete/firm performance relationship.

HYPOTHESIS DEVELOPMENT

The RBV stresses the importance of ownership or control over resources as the means to generate value from strategic actions (Amit & Schoemaker, 1993). Firms gain control over valuable resources by availing themselves of isolating mechanisms, such as causal ambiguity, firm-specification of assets, intellectual property rules such as patents or trademarks, or other mechanisms that insulate proprietary resources from competitors (Rumelt, 1984; Wernerfelt, 1984). Such isolating mechanisms allow the firm to secure its rents from these resources, as well as protect the resources from imitation (Peteraf, 1993). Under the RBV, human capital operates as a source of sustainable competitive advantage (Coff, 1997) only if isolating mechanisms are in place to prevent employees from taking their human capital – their valuable knowledge, skills, and abilities (Coff & Kryscynski, 2011) – to a competitive firm, and if the firm can appropriate the rents generated by this human capital (Barney, 1991; Rumelt, 1984). Employee non-competes can thus be seen as an isolating mechanism that strengthens the RBV's VRIN requirements for a firm's human capital by making such human capital inimitable or non-substitutable, thereby increasing the ability of the firm using non-competes to generate value from its human capital and obtain a sustainable human capital-based competitive advantage.

Moreover, literature based on the RBV does not limit itself to the VRIN characteristics. Collis and Montgomery (1995) assert that firm competitive advantage comes not only from resources and capabilities meeting the VRIN criteria, but also from the durability, appropriability, and superiority of these resources. Employee non-competes change the characteristics of firm human capital by changing the durability, appropriability, and superiority of firm human capital: human capital subject to non-competes is more *durable* than human capital not subject to such agreements because the firm's rights to its human capital are extended beyond the length of the employment agreement (to the extent of the law) by employee non-competes; it is *appropriable* since non-competes allow a firm to capture more value from its human capital (Garmaise, 2011; Starr, 2018[1]); and it is *superior* in that it provides the best – or perhaps the only – protection available (Samila & Sorenson, 2011) for human capital that cannot otherwise be protected from mobility via other mechanisms such as patents (Kim & Marschke, 2005[2]).

Employee non-competes therefore appear to operate as isolating mechanisms that shield a firm's human capital from its competitors, in addition to serving as strong *ex-post* limits on worker mobility (Peteraf, 1993). When an employee departs from a focal firm, the firm loses its access to the employee's general knowledge, skills, and abilities,

[1] While some might assert that non-competes only assert a short-term impact on firm performance, the "enforceability of noncompetes reduces the elasticity of labor supply and puts downward pressure on wages" (Starr, 2018, p. 4). Non-compete enforceability allows firms to reap the benefits of increased firm-sponsored training without any corresponding increase in wage premiums due to employees (Starr, 2018).

[2] Specifically, Kim and Marschke (2005) find that firms use patents to protect against a risk of employee departure, with important implications for knowledge codification and reduction of knowledge spillovers. Moreover, research on employee non-competes has frequently relied on patents as an indicator of inventory mobility (*e.g.*, Marx et al., 2009; Younge & Marx 2015), a potential problem if patents and employee non-competes effectively operate as substitutes. In fact, Younge and Marx (2015) find that the effect of non-competes on firm profitability may be partially attenuated by patent activity.

or what can be referred to as "general human capital," *and* its access to firm-specific knowledge or expertise, or "firm-specific human capital." However, enforceable employee non-compete agreements permit firms to transform general human capital into firm-specific human capital by limiting the employee's ability to apply his general human capital external to the firm due to mobility limitations (Marx, 2011). The classic argument advocating for enforcement of employee non-competes is that the benefits derived from allowing firms to use non-competes as an isolating mechanism to protect their intellectual property and human capital investments outweighs the cost to individuals and society from decreased employee mobility (Landes & Posner, 2003). General human capital can be replaced via the labor market, but firm-specific human capital is costly to replace, and employee non-competes allow firms to reduce these costs (Younge & Marx, 2015). Therefore, when such isolating mechanisms are strengthened, the value of firm human capital should increase, due to both reduced employee mobility and increased barriers to rival firms' access to that human capital. Moreover, such a change both increases the value of existing firm human capital, and the value of future firm capital (*i.e.*, future new human capital that will join the firm and be subject to enforceable employee non-competes). Therefore, an unanticipated increase in non-compete enforcement should result in increased firm performance.

> *Hypothesis 1: An increase in employee non-compete enforceability will increase firm performance.*

Firm performance is not only affected by firm human capital, but also depends on the concurrent interactions between the public policy environment, the resources of a firm's competitors, and the firm's other existing resources (Conner, 1991). This project focuses on the role of employee non-competes in shaping the public policy environment

at the state-level. In the next two sections I discuss the role of labor market factors and firm-specific factors in shaping the relationship between state-level enforcement of employee non-competes and firm performance.

Labor market factors

External employment opportunities

The RBV is based on the idea that there exist heterogeneous resource differences among rival firms (Barney, 1991; Wernerfelt, 1984). Thus, the RBV assumes the existence of competitive firms, which is, of course, a central component of the Porter 5-Forces model (Porter, 1979) upon which the RBV built (Barney, 1991; Wernerfelt, 1984). Therefore, if employee non-competes operate as an isolating mechanism to protect human capital, they must safeguard this human capital *from competitors*. Moreover, due to the difficulty of enforcing state laws outside a focal state (Cheskin & Lerner, 2003), in-state competition is the appropriate level of analysis when considering the impact of state-level enforcement of employee non-competes as isolating mechanisms. The extant literature has adopted this framework and recognizes the role of in-state competition as extremely important when discussing the value of employee non-competes as a resource protection measure (Garmaise, 2011).

Therefore, firms facing greater in-state competition should benefit the most from increased in-state enforcement of non-competes that allows them to better shield their firm human capital from competitors and serve as strong *ex-post* limits on worker mobility (Peteraf, 1993). Younge and Marx (2015, p. 655) mention four different reasons for this, which I elaborate here. First, “poaching” employees is most valuable when there are other firms in the area that valuable similar skills, but non-competes limit this ability

to poach. Second, recruiting local workers is generally less costly than recruiting distant ones. Third, enforcement of non-competes is limited to the state level (Cheskin & Lerner, 2003) and it is therefore less costly to resolve non-compete cases when both parties are located within the same state (Garmaise, 2011). Finally, non-competes frequently contain a geographic limitation (Graves & DiBoise, 2006) which will therefore limit the enforcement of non-compete to a localized, likely in-state, area. Increased enforceability of employee non-competes strengthens the isolating mechanisms separating in-state firms from competitors generally, and particularly those located within the same state.

Moreover, it is the existence of competitors provides opportunities for high-value workers to job-hop (Cooper, 2001). Therefore, firms operating in similar fields as many others within a state have employees who would, without enforcement of employee non-competes, be better able to transfer their firm-specific human capital, or proprietary firm knowledge, to competitors. However, with the enforcement of employee non-compete agreements, such risk of knowledge transfer is reduced. I therefore expect a positive relationship between the increased firm performance due to greater enforceability of employee non-competes and the number of same-industry employment opportunities within the state available to firm employees:

> *Hypothesis 2: The increased firm performance following an increase in the state-level enforceability of employee non-compete agreements will be greatest for in-state firms with employees who have more in-state employment opportunities.*

Local labor supply

Beyond competing over resources, certain local labor market attributes affect the value of firm human capital. In particular, low local labor supply creates a hardship on firms by creating a war for talent (Branch, 1998) by decreasing the pool of available

qualified labor available to employers. Thus, firms faced with low local labor supply should benefit the most from being able to better protect their employees from poaching by competitor firms or from starting competitive ventures. Moreover, such firms will experience reduced turnover from the increased enforcement of employee non-competes.

> *Hypothesis 3: In-state firms facing low local labor supply will experience greater positive effects on firm performance following a state-level decision to increase enforcement of in employee non-compete agreemetns.*

Firm resource factors

Knowledge workers

Firms employing knowledge workers, those employees "with high degrees of expertise, education or experience" whose primary job purpose "involves the creation, distribution, or application of knowledge" (Davenport, 2005, p.10) face particular challenges in the labor market. Drucker (1969) similarly defines knowledge workers as employees who process existing information into new information. Beck (1992, p. 125) proposes that three types of employees qualify as " knowledge workers": (1) professionals, such as doctors, lawyers, and accountant, who are associated with educational achievements; (2) engineering, scientific, or technical workers, who are associated with specialized skills; and (3) senior managers, who are associated with experience.

Employees meeting these definitions of "knowledge workers" therefore possess greater general human capital, which makes them more valuable in the external labor market and raises their expected income from alternative employment (Gimeno, et al. 1997). Thus, such employees are "flight risks" if mechanisms – such as employee non-competes – cannot be used to limit their mobility. Such workers also possess greater firm

specific human capital due to their access to proprietary firm knowledge. Knowledge workers are thus best able, out of all employees, to take proprietary firm knowledge to a competitor or use it to start their own spin-off in competition with their former employer (Bhide, 2000), absent external restrictions. Moreover, extant literature has argued that employees utilize employee non-compete agreements specifically to protect the appropriation of firm knowledge by employees (Bishara, 2006), especially knowledge workers (Younge, et al. 2015).

Therefore, firms employing larger number of knowledge workers should especially benefit from the increased enforcement of employee non-competes for two reasons: (1) non-compete enforcement reduces the ability of knowledge workers to take their *general* human capital to another firm; and (2) non-compete enforcement knowledge workers cannot take their *firm-specific* human capital, which is particularly valuable to the focal firm, to a competitor.

> *Hypothesis 4: In-state firms employing more knowledge workers will experience greater positive effects on firm performance following a state-level decision to increase the enforceability of employee non-compete agreements.*

While organizational learning scholars assert that learning occurs at the individual level (Argyris & Schön, 1978), it is well recognized that firm knowledge is stored in more than just the minds of employees. In fact, the knowledge-based view (KBV), an off-shoot of the RBV, contends that firms exist in order to create, transfer, and manage knowledge (Kogut & Zander, 1992; 1993). Specifically, knowledge is regarded as a firm's most important asset, and, unlike the resource-based view of the firm (see Barney, 1991), "the firm is not a bundle of resources or capabilities, but a social organization in which individuals interact on the basis of their values, shared ideologies, and patterns of

interpretation" (Lechner, 2006, p. 143). Firm knowledge is stored both in the minds of employees as well as in the patterns of social context and organizational routines (Nonaka & Takeuchi, 1995). Thus, distinct "knowledge repositories" exist within a firm and interact to comprise a firm's knowledge management system (Starbuck, 1992). In order to obtain a knowledge-based competitive advantage under the KBV, firms must implement structures, policies, and processes that will allow knowledge to transfer freely within the firm, while at the same time protecting this knowledge from leaking out to competitors (Kogut & Zander, 1992). Non-competes can be such a firm policy, but when examining the impact of non-competes enforceability on human capital-based competitive advantage, the interaction of human capital and other knowledge repositories must be considered.

Complementary assets "are required to capture the benefits associated with a strategy, a technology, or an innovation" (Christmann, 2000, p. 664). Firm performance can be enhanced by investment in complementary assets (Helfat, 1997; Teece, 1986), and complementarities between firm human capital and other resources have demonstrated a positive effect on firm performance (Crocker & Eckardt, 2014; Mackey, et al. 2014; Wright, et al. 2014; Riley, et al. 2017). Activities are considered complementary when engaging in more of one activity increases, or at least does not decrease, the marginal profitability of the other (Milgrom & Roberts, 1990, 1995). The value of firm human capital can be influenced by a multitude of complementary assets (Arthur, 1992; Snell & Dean, 1992).

Firm human capital, a potentially mobile resource when not insulated from competitors by isolating mechanisms such as non-competes, is therefore more valuable

when combined with immobile firm-specific complementary assets (Hitt, Bierman, Shimizu, & Kochhar, 2001). In this project, I consider two types of assets complementary to human capital that may also be affected by changing enforcement of employee non-competes: R&D and physical capital.

Research & Development

Firm R&D is a complementary asset to firm human capital due a shared connection of firm knowledge. R&D is considered an indicator of the importance of knowledge and technology within a firm (Helfat, 1994) while human capital investments such as training operate as complements to the knowledge gained through firm R&D (Kor, 2006; Campbell, et al. 2012). Thus, "[e]ffective use of human capital investments that increases employees' knowledge increases the likelihood of success among multiple R&D investment options, and thus, enables the deployment of resources to higher-margin R&D projects in which the firm is more likely to create and sustain competitive advantage" (Riley et al., 2017, p. 1899, citing Kor, 2006).

In particular, non-competes limit knowledge outflow from firms by limiting movement of employees, as carriers of firm knowledge, to competitive firms. Knowledge outflow hinders a firm's ability to appropriate value from its internal efforts, which lowers its incentive to conduct R&D, particularly in geographic clusters (Furman, Kyle, Cockburn, & Henderson, 2006). Because non-competes reduce knowledge outflow from firms, they should encourage R&D investment which should increase firm performance.

Additionally, state-level enforcement of non-compete agreements affects firm R&D strategy (Conti, 2014). As Cabral (2003) notes, development of an R&D strategy includes both decisions on the amount to invest as well as how to invest it. Conti (2014)

found a positive correlation between non-compete enforcement and the risk level of R&D projects (chance of breakthroughs versus failures) that firms were willing to pursue. Firm profitability is thus impacted as there would be a high chance of high profitability should the project turn out to be a breakthrough, or a risk of profit losses should the invention be failure. Therefore, the increased firm performance caused by increased enforcement of employee non-competes should be greater the more a firm invests in R&D.

> *Hypothesis 5: In-state firms with greater research and development intensity will experience greater positive effects ons firm performance following a state-level decision to increase the enforceability of employee non-compete agreements.*

Physical Capital

In contrast to R&D, human capital and physical capital are much more distinct, if only because firms can assert total control and ownership over physical assets while only having limited rights, strengthened by non-compete enforcement, in their human capital which is "merely *employed*" (Younge & Marx, 2015, p. 653, emphasis in original). This reflects a common assumption of labor market economics research is that physical capital is perfectly mobile while human capital is immobile (Roubini & Milesi-Ferretti, 1994). Physical capital is also much less able than human capital to be converted to another use. As such, it is possible to consider physical capital as a substitute for high quality human capital (Romer, 1990) since "sectors that produce human capital use educated and other skilled inputs more intensively than sectors that produce consumption goods and physical capital" (Becker, Murphy, & Tamura, 1994, p. 324).

Seen differently, "[h]igh physical capital intensity could indicate that a firm has simply substituted away from labor and is now employing more automated equipment and procedures that require fewer and less-skilled employees" (Riley et al., 2017, p.

1900). This could be because a firm that invests heavily in its physical capital may not have sufficient funds available to invest in its human capital or that the human and physical may, under some circumstances, operate as substitutes if, for instance, automation drives out use of human capital or if employees with low human capital are the ones able to best take advantage of firm investments in physical capital. Empirically, Snell and Dean (1994) found that, in manufacturing, increases in physical capital investment was associated with less employee training. By this logic, a firm that invests significantly in its physical capital may be less able to obtain a human-capital based competitive advantage. Accordingly, the positive stock price reaction caused by changing enforcement of employee non-competes in both states should be weaker for firms with high physical capital intensity.

> *Hypothesis 6: In-state firms with high physical capital intensity will experience smaller positive effects on firm performance following a state-level decision to increase the enforceability of employee non-compete agreements.*

METHODOLOGY

This project examines firm performance following publication of a Texas Supreme Court decision increasing the enforcement of employee non-compete agreements within the state of Texas. Therefore, the methodology employed for this project follows the steps for an event study outlined by McWilliams and Siegel (1997). I first construct a unique event study using, as the event, the *Marsh* decision in Texas occurring on June 24, 2011. My empirical strategy uses this event study to generate mean cumulative abnormal returns (CARs), a measure of firm performance, across all publicly traded firms in Texas during the stock market trading days immediately following the announcement of this court decision. This event study provides a direct test of Hypothesis

1 as well as a dependent variable (firm-level cumulative abnormal returns for California-headquartered firms) for a regression model to test Hypotheses 2 through 6.

An event will only generate abnormal returns if it is both surprising and unanticipated (Fama, 1970). The event in this project – a Texas Supreme Court decision – was both surprising and unanticipated, as evidenced by the lack of news coverage found leading up to the event date. Thus, the value of the Texan firms' human capital¸ a difficult to measure firm construct, "is (imperfectly) measured in absolute and competitive terms through stock market abnormal returns on or around" (Riley et al., 2017, p. 1902) the Texas Supreme Court decision.

Research context: Employee non-competes in Texas

The empirical studies in this dissertation, in this chapter and the one prior, focus on judicial (court) decisions rather than legislative (statutory) decisions. This it to ensure that the events selected for the event study analysis both *apply to existing and future agreements* and are *unanticipated*. The selection of the event for this chapter is discussed in Appendix A.

The state of Texas has a particularly rich history of changing its enforcement status of non-compete agreements in radically different directions and such changes have been initiated by both the Texas court system and the Texas legislature (Vethan, 2013). Additionally, the legal changes that occurred in Texas affected all future interpretations of non-compete agreements in the state regardless of when the agreement was signed, which allows for more "clean" analysis than analyzing the impacts of a purely prospective legal change (such as that in Oregon in 2008). Prior to 1989, Texas relied solely on case law in determining the enforceability of non-compete agreements, with an

overriding consideration about only whether the agreement was reasonable, and generally non-competes were regarded as enforceable (Vethan, 2013). In 1989, the Texas implemented the Covenants Not to Compete Act (Texas Business & Commercial Code §§ 15.50 and 15.51), clearly indicating that non-competes were enforceable in Texas (Vethan, 2013). However, in 1994, the Texas Supreme Court dramatically limited the enforcement of non-competes in Texas (Vethan, 2013; Conti, 2014). This interpretation held for 12 years until court decisions in 2006 and 2009 incrementally relaxed the standards of the 1994 decision, thereby increasing the ability of firms to enforce non-compete agreements within the state (Vethan, 2013). A June 2011 Texas Supreme Court decision, *Marsh USA, Inc. v. Cook*, eviscerated the limitations in the 1994 decision and was almost (although not quite) a return to the pre-1987 days of "pure reasonableness" (Vethan, 2013). This unanticipated[3] and immediately effective 2011 Texas decision was therefore selected as a change of enforcement event for this project, and was selected over the 2006 and 2011 changes because of its magnitude. [4]

Sample

To build the sample for this project, I used COMPUSTAT to identify the population of publicly traded firms (both active and inactive) headquartered in Texas in 2011 (n = 765). I requested data on all active and inactive firms headquartered in Texas that reported data to COMPUSTAT within the 14 months prior to the event date to allow for variations in firm fiscal year dates. Removal of duplicates left 683 firms.

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[3] A Factiva search for publications mentioning the *Marsh* case prior to the Supreme Court decision on June 24, 2011, yielded no results.

[4] Although it does not affect the event analysis here, which uses an event window of one to three days after the June decision, in December 2011, the Texas Supreme Court withdrew its original opinion in *Marsh USA, Inc. v. Cook* and replaced it with text that, while less dramatic, amounted to a similar legal effect.

I then conducted an initial event study using stock market data from the University of Chicago Booth School of Business's Center for Research in Security Prices (CRSP). This initial event study was run to determine which of these 683 firms had adequate stock market information available. For the event study in this project, I used the market model[5] where the rate of return on the share price of firm *i* on day *t*, $R_{i,t}$, is calculated as:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \qquad \text{(Eq. 5-1)}$$

where $R_{m,t}$ is the rate of return on a market portfolio of stocks (here, the CRSP value weighted index return with dividends) on day *t*, α_i represents the intercept term for firm *i*, β_i represents the systematic risk of firm *i*'s stock, and $\varepsilon_{i,t}$ is the error term, with $E(\varepsilon_{i,t}) = 0$.[6] From this equation, abnormal returns (AR) can be calculated for firm *i* on day *t* as:

$$AR_{i,t} = R_{i,t} - (a_i + b_i R_{m,t}) \qquad \text{(Eq. 5-2)}$$

where a_i and b_i are ordinary least squares (OLS) estimates obtained from regressing $R_{i,t}$ on $R_{m,t}$ over an estimation period prior to the event in question. Firm level abnormal returns for firm *i* on day *t*, $AR_{i,t}$ represents the difference between the actual stock market return of the firm and the expected return based on the market rate. To calculate the cumulative abnormal return (CAR_i) for firm *i* over the event window (t_1, t_2), he daily abnormal returns of firm *i* are summed as follows:

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[5] The market model assumes a linear relationship between the return of firm *i* and the return of a market index (MacKinlay, 1997). The market model, as well as parametric tests such as the t-statistic, are generally believed sufficiently powerful for most event study research (Brown & Warner, 1985), and the market model is the norm in most management research (*e.g.*, McWilliams & Siegel, 1996; Riley, et al. 2017) as well as most finance research (Ahern, 2009).

[6] Note that any reference in an event study to "days" refers to trading days, which therefore do not include weekends or holidays.

$$CAR_i = \sum_{t=t_1}^{t_2} AR_{i,t} \qquad \text{(Eq. 5-3)}$$

For the event studies in this project, I used the market model to estimate the market return over the prior year (255 days), stopping 5 days before the event date; that is, the estimation window is (-255, -5); and the event window selected for the study was (+1, +3) with day 0 being the day of the California Supreme Court decision. Thus, in Equation 3, $t_1 = 1$ and $t_2 = 3$. The +1 start date of the event window was chosen because there was no indication of any information about the court decision being publicized prior to the day after the court decision (day +1). To be included in the data sample, I required firms to have at least 3 observations (trades) during the estimation window. I therefore gathered initial data for 683 Texas-headquartered firms. The results of this initial event study are presented in Table 5-1; all test statistics test to see if the cumulative abnormal return is statistically significant from zero.

Table 5-1. Initial event study results in Texas

Sample Size	Event window	Mean CAR	Patell Z[1]	t-statistic[2]	Standardized cross-sectional t-statistic[3]
341	(+1, +3)	-0.006258123	-2.67351***	-2.92543***	-2.89124***

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

[1] Patell Z refers to a statistic calculated as in the study by Patell (1976) using standardized residuals.

[2] The cross-sectional t-statistic at the end of the event window as calculated by Brown and Warner (1985).

[3] The standardized cross-sectional t-statistic as calculated by Boehmer, Musumeci, and Poulsen (1991).

However, these initial results cannot be interpreted as indicating statistical significance without removal of potentially confounding events occurring during the event window (McWilliams & Siegel, 1997), To accomplish this, I first checked for confounding events at the state level, such as other Texas state Supreme Court decisions published around the event window or state-level legislation with an effective date during the event window (and found none). I then investigated all firms in the initial sample for firm-level confounding events that occurred during or around the (+1, +3) event window.

To look for confounding firm-level events, I completed the following analyses, removing the noted number of firms at each step:

- First, I eliminated all firms who reported quarterly earnings data during the event window, as well as a day before and after – so an event window of (0, +4) – due to potential information leakage about earnings reports that occurs frequently in the window (-1, +1) where day 0 is the day of the reported earnings announcement. Since the event window was at the end of June, this resulted in only 3 firms being removed from the sample (leaving n = 338).
- I next searched for analyst recommendations as I did not want the event study results to be affected by an analyst's recommendation to buy or sell the stock of the firm during the event window. I removed any firm from the sample for which an analyst made a recommendation during a (0, +3) window, resulting in the removal of 21 firms and leaving n = 317.
- I next decided to remove any firms with a two digit SIC code of 67 because these are classified as "Holding and other Investment Offices," such as mutual funds or trusts, not actual firms engaged in business. This resulted in the removal of 28 firms, leaving n = 289.
- I then looked for additional stock events occurring during the (0, +3) event window, including dividend announcements (none), stock splits (1), dividend payments (5), and record dates[7] (3). Removing these 9 events from the sample left 280 firms.

[7] "Record Date" is the date on which the stockholder must be registered as holder of record on the stock transfer records of the company in order to receive a particular distribution directly from the company.

- Next, I checked for all material event filings of 8-Ks with the Securities and Exchange Commission, which includes any press releases occurring during a window of (0, +4). This analysis revealed that 28 of the firms in the sample had filed an 8-K during the applicable time period. I then personally reviewed each one of these 8-Ks and identified 17 firms that experienced material events during the event window and then excluded them from the sample (leaving 263 firms in the sample).

The final sample included 263 Texas-headquartered firms, belonging to 50 different industry groups (based on two-digit SIC codes); specifically, 54 firms (20.5% of the sample) belonged to SIC code 13 (Oil and Gas Extraction), 20 firms belonged to SIC code 49 (Electric, Gas and Sanitary Services), and 22 firms belonged to SIC code 73 (Business Services). Over 80% of the firms in the sample were located in a metropolitan area (as defined below), and 77.19% belonged to an industry cluster recognized by the State of Texas. As detailed in Tables 5-4 and 5-13, sample sizes for the regression analyses were dependent upon data availability in COMPUSTAT as some values (notably R&D expenditures, required for calculating firm R&D intensity, as described more thoroughly below) are reported on a voluntary basis.

Variables and measures

Dependent variables: For the event study exploring the impact of the Texas' increased enforcement of employee non-competes (Hypothesis 1), the dependent variable is operationalized as the mean cumulative abnormal return (CARs), calculated as described above except using the equally-weighted CRSP market index (see "Event Study Results" below for an explanation of this change), of all the 263 Texas-

headquartered publicly traded firms over an event window of (+1, +3) where day 0 is the day of the court decision. For Hypotheses 2 through 6, the dependent variable for the regressions exploring the variation in these returns at the firm-level are firm-level CARs over the same event window.

Independent variable for regression analysis – Hypothesis 2: Hypothesis 2 predicts a positive relationship between the number of in-state within-industry job opportunities and the firm performance experienced by Texas-headquartered firms in response to the 2011 judicial decision. The independent variable to test this hypothesis, the number of in-state competitors (*numComp*), was calculated by counting the number of other in-state firms from the cleaned COMPUSTAT data pull (n = 683) with the same four-digit NAICS code as the focal firm.[8]

Independent variable for regression analysis – Hypothesis 3: Hypothesis 3 predicts a negative relationship between the local labor supply and the firm performance due to the increased enforcement of employee non-competes. The local labor supply is operationalized as the county-level unemployment rate (*UnemploymentRate*) and was calculated using the May 2011 county-level, not seasonally adjusted, unemployment rate, as obtained from the Texas Workforce Commission's Labor Market Information division. I first matched firm 5-digit zip codes from COMPUSTAT with the matching county using Zipcodestogo, and then matched the firm's county with the Texas unemployment rate information.

[8] I also calculated *numCompCITY*, the number of competitive firms (same four digit NAICS code, excluding the focal firm) with the same city, and *numFirmCITY*, the number of firms (excluding the focal firm) out of the 683 located in the same city.

Independent variable for regression analysis – Hypothesis 4: Hypothesis 4 predicts a positive relationship between the number of knowledge workers (KWs) at the firm and the increased firm performance due to an increase in non-compete enforceability. I use the revised methodology described in detail in Chapter 4 to first calculate an industry-based ratio (*KWratio*), as described below, and then multiplied this ratio by the number of employees in the firm (from COMPUSTAT) to calculate the number of knowledge workers employed by the firm (*firmKW*). This methodology required obtaining data from the Occupational Employment Statistics (OES) survey from the Bureau of Labor Statistics (BLS) occurring closest to the event date, in this case, May of 2011. This data gives the number of employees working in each standard occupational classification (SOC) code at both the national and state levels. In the national files, the OES breaks these SOC codes at varying 2-digit sector, 3 digit sub-sector, 4 digit-industry, and, for some NAICS codes, down to 6 digit NAICS codes. Starting in 2009, the OES breaks out ownership categories in the industry files in to private firm, federal, state, and local government ownership categories. At the state level, however, May 2011 data is only broken out by SOC codes and there is no conversion from SOC to NAICS codes, so I was unable to utilize the state data.

I thus calculated an industry-based ratio of KW (*KWratio*) as of May of 2011 using the national files for all types of private firms for all available NAICS reported (287 codes), and I then matched these codes with the NAICS codes from the "full" sample of 683 firms. Data was unavailable in the May 2011 OES for NAICS 4-digit industry codes 7225 ("Restaurants and Other Eating Places"), and 9999 (Nonclassifiable Establishments). 7225 was proxied by 7221 ("Full Service Restaurants"), and 9999 was

proxied by data available for subsector 999. I then multiplied *KWratio* for each firm's four-digit industry level by the number of employees (from COMPUSTAT) to compute number of KWs employed by each firm in the sample (*firmKW*).

Independent variable for regression analysis – Hypothesis 5: Hypothesis 5 predicts a positive relationship between R&D intensity (*RDint*), measured as R&D investment (listed in COMPUSTAT as "Research and Development Expense") divided by sales, and the firm-level financial performance experienced by firms in Texas. R&D expenditures and sales data are from the most recent fiscal year prior to the event date of June 24, 2011 (for most firms, fiscal year 2010) to prevent any data from the fiscal year of the event date being influenced by the court decision.

Independent variable for regression analysis – Hypothesis 6: Hypothesis 6 predicts a negative relationship between physical capital intensity (*PCint*), measured as physical capital investment ("Property, Plant, and Equipment – Total (Net)" in COMPUSTAT) divided by sales, and the firm-level CARs experienced by firms headquartered in Texas. Like *RDint*, data for *PCint* was data was from the most recent fiscal year prior to the event date.

Control variables for regression analyses: The regression model was formed with controls for firm size, firm location, and three controls addressing firm industry. Empirically, large firms have a greater amount of firm valued tied to physical assets (Brown & Kapadia, 2007) and in the analysis in this project, I did not want to conflate the value of a firm's human capital with the sheer size of the firm's employee base. I therefore controlled for firm *size*, measured as the natural logarithm of the number of

employees (plus 1, to avoid sign changes after the transformation) for all firms that reported their number of employees in COMPUSTAT (n = 257).

It was necessary to control for firm location in an industry cluster, as firm location, especially in a cluster or "hot spot" (Pouder & St. John, 1996), can provide its own competitive advantage due to knowledge flows and other agglomeration effects (DeCarolis & Deeds, 1997). Firms in industry clusters benefit from knowledge outflows to and from competitors, commonly referred to as knowledge spillovers, access to specialized labor which facilitates employee mobility (Almeida & Kogut, 1999), and, perhaps, job hopping, as well as access to specialized intermediate inputs due to co-location with, for instance, with suppliers. R&D activities especially benefit from knowledge transfer between competitive firms and thus show the highest level of concentration within clusters (Audretsch & Feldman, 1996; Alcácer, 2006). Moreover, geographic proximity of firms enables frequent interpersonal interactions through existing social networks (Almeida & Kogut, 1999) and, therefore, local institutions such as the enforcement employee non-competes (Gilson, 1999; Stuart & Sorenson, 2003), should particularly affect the transfer of knowledge in firm clusters.

To operationalize this, I first generated a binary variable (*metro*) equal to one if the firm was located in a large city (Houston, San Antonio, Dallas, Austin, Fort Worth, and El Paso) or the Dallas-Fort Worth Metroplex (including the counties of Collin, Dallas, Denton, Ellis, Hood, Hunt, Johnson, Kafman, Parker, Rockwall, Somervell, Tarrant, and Wise). Building on this, I wanted to further probe the role of industry clusters. In Texas, the governor's office (Texas Workforce Commission, *Industry Cluster*) has identified a set of 6 industry clusters within the state: (1) Advanced

Technologies and Manufacturing; (2) Aerospace and Defense; (3) Biotechnology and Life Sciences; (4) Information and Computer Technology; (5) Petroleum Refining and Chemical Products; and (6) Energy. Moreover, the state of Texas has identified 140 4-digit NAICS codes are either core, supporting, or ancillary to these 6 industry clusters. I thus created a binary variable (*GovCluster*) equal to 1 if the firm's 4-digit NAICS code was one of these 140 identified codes, and 0 otherwise.

Finally, I controlled for firm *industry* (measured as the two-digit SIC code) using industry fixed effects, as noted below.

Econometric specification of regression model: Building on this, I identified the following econometric specification to test Hypotheses 2-6:

$$CAR_{i,w} = \beta_0 + \beta_1 numComp_{i,t-1} + \beta_2 UnemployentRate_{i,m} + \beta_3 firmKW_{i,t-1} + \beta_4 RDint_{i,t-1} + \beta_5 PCint_{i,t-1} + \beta_6 size_{i,t-1} + \beta_7 metro_{i,t-1} + \beta_8 GovCluster_{i,t-1} + \alpha_i + u_{i,t} \quad \text{(Eq. 5-4)}$$

where *i* indexes firms, *w* denotes the event window, *m* denotes the month prior to the court decision (here, May), *t* denotes the fiscal year of the applicable court decision (here, 2011), α_i represents industry fixed effects at the two-digit SIC code level, and $u_{i,t}$ represents the error terms. Including industry fixed effects mitigates concerns that unobserved heterogeneity at the industry level will drive the results by controlling for the magnitude of the court decision across industries.

Variable Investigations and Transformations

Because the regression model includes fixed effects, standard regression diagnostics available for linear regressions, such as examination of leverage, studentized residuals, etc., are not available Therefore, prior to proceeding with the analysis, I investigated the range and distribution of all variables for the regression analysis. The

initial summary statistics are presented in Table 5-2 and initial correlations are presented in Table 5-3. Histograms of the initial independent variables and the only non-binary control variable (firm size) are in Appendix E, while scatter plots of these variables against the dependent variable are attached in Appendix F.

Table 5-2. Initial summary statistics for the (+1, +3) event window in Texas

Variables	**n**	**Mean**	**S.D.**	**Min.**	**Max.**
CAR (3 day window)[9]	263	.0027561	.0340596	-.1816334	.0919801
# In-state Competitors	263	26.56274	40.1354	0	118
County Unemployment Rate	263	7.465399	.6942928	4.7	9.3
# of Firm Knowledge Workers *(thousands)*	257	2.597673	9.973439	0	126.3338
R&D Intensity	80	.4396914	2.232423	0	15.99837
Physical Capital Intensity	255	1.289163	2.46403	0	22.01809
Firm Size	257	1.12534	1.124801	0	5.589456
Metropolitan Area	263	.8479087	.359794	0	1
Government Cluster	263	.7718631	.4204314	0	1

[9] Market Model using CRSP equal-weighted market index.

Table 5-3. Initial pairwise correlations for the (+1, +3) event window in Texas, n = 80

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) CAR (3 day window)	1								
(2) # In-state Competitors	-0.0137	1							
(3) County Unemployment Rate	0.120	0.274*	1						
(4) # Firm Knowledge Workers	0.0813	0.256*	0.139	1					
(5) R&D Intensity	-.362***	-0.0641	-0.115	-0.0564	1				
(6) Physical Capital Intensity	-0.328**	-0.0594	-.0118	0.0229	0.746***	1			
ha(7) Firm Size	0.0972	0.123	0.237*	0.589***	-0.190+	-0.0724	1		
(8) Metropolitan Area	0.151	0.156	0.200+	0.0861	-.380***	-0.262*	0.138	1	
(9) Government Cluster	0.0558	0.316**	-.0610	0.0819	0.0943	0.0613	-0.0485	0.0299	1

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

As shown in Table 5-3, there is a significant correlation of 0.746 between R&D intensity and physical capital intensity. I first examined the distribution of these two variables. As discussed in Chapter 4, zero values of R&D and property, plant, and equipment are not actually reliable, so as such, these observations were excluded from as potential ranges of value. This removed 24 observations having *RDint* = 0 and 3 observations of *PCint* = 0.

I next investigated extreme values of *RDint* and *PCint*. Only three firms had values of *RDint* greater than 1. Upon investigation of their actual 10-Ks filed with the SEC, two of the firms (tickers LXRX and RPRX) were removed from observations of *RDint* and *RDint* since they actually had zero dollars in sales. The third firm (ticker VRML) was also removed from observations of both variables because fiscal year 2010 was the first year the firm had generated *any* revenue from products sales. The revised

scatter plot of *RDint* versus firm-level *CAR* is presented in Figure 5-1 (n = 53). As in Chapter 4, there is a weak inverse-U shaped relationship among the variables, with an inflection point around *RDint* = 0.05.[10] I thus introduced the variable *RDintSq*, equal to the square of *RDint*, to account for this nonlinearity.

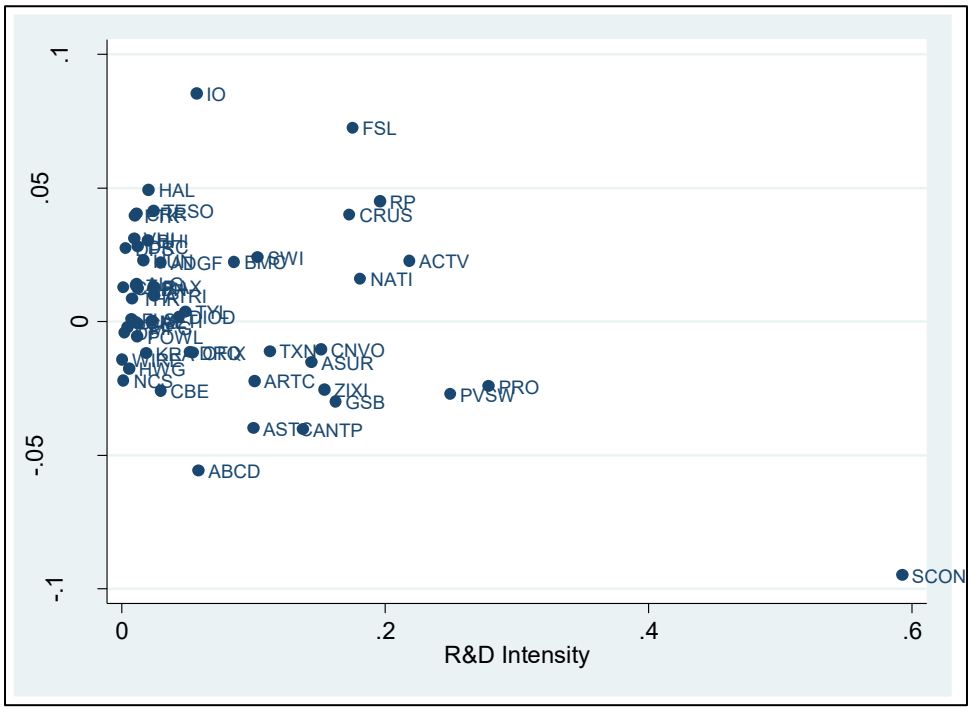

Figure 5-1: *RDint* versus *CAR* for 0 < RDint < 1, n = 53

Extreme values of *PCint* were more challenging, as 72 firms had values of *PCint* greater than 1. Of these 73, 39 were classified as SIC industry code 13 ("Oil and Gas Extraction"), and 16 were classified as SIC industry code 49 ("Electric, Gas and Sanitary Services"); these are industries for which it makes sense for firms to make exceptional outlays of property, plant, and equipment. Moreover, none of these firms exhibited particularly low sales volume, with the mean sales of the group at $1,879,475, and due to the sheer number of firms, I was hesitant to eliminate them from the sample as this was

[10] This is supported by the correlations: the correlation between *CAR* and *RDint* is 0.0797 for 0 < *RDint* < 0.05 and -0.3893 for 0.05 < *RDInt* < 1.

clearly not an anomaly. Thus, I introduced the *PCintSq* variable, equal to the square of *PCint*, to account for the visible nonlinearity as shown in Appendix E, under the rationale that the industry fixed effects should address most of the extreme values.[11]

One final issue with the *RDint* variable is the issue of reduced sample size due to non-reporting of R&D expenditures. I conducted a series of t-tests[12] to determine if the firms that had missing or zero values (as explained above) of R&D expenditures in COMPUSTAT were statistically different from firms that reported non-zero values of R&D. There was no statistically significant difference between the two groups for the dependent variable (cumulative abnormal returns), number of in-state competitors, number of firm knowledge workers, firm size, location in a metropolitan area, or likelihood of belonging to a government identified industry cluster. However, firms that reported non-zero values of R&D expenditures had lower physical capital intensity and are located in counties with slightly lower unemployment.

Moving to the control variables, there were issues with the variance inflation factors in some models due to potential multicollinearity between *UnemploymentRate* and *metro*. As such, the control variable for *metro* was eliminated from the regression models. Due to the moderate correlation between *firm size* and *firmKW*, I looked at alternative measures of size using natural log of total assets as well as firm sales. However, both of these variables resulted in variance inflation factors over 10 in multiple

[11] I considered other options, such as "capping" *PCint* at 1 to or winsorizing *PCint* but even winsorizing at the 90th percentile still resulted in values over 1. However, none of these improved model fit as much as introducing the squared term and allowing for industry fixed effects.

[12] All reported t-tests were run allowing the two groups to have unequal variance. Requiring equal variance resulted in statistically identical results.

regression models, so I kept my original variable of firm size based on the number of employees.

A final change was to cluster errors for the regression analysis[13] since a modified Wald test for group-wise heteroscedasticity in fixed effect regression models indicated the presence of heteroscedasticity in several of the models. To address this heteroscedasticity, building on Stock and Watson (2007) and Cameron and Miller (2015), errors were clustered at the same level used for fixed effects (here, industry level via two-digit SIC codes). From a model design perspective, clustering at the industry level is correct in order to eliminate any remaining within-industry correlation remaining after the fixed effects have been applied (Nichols & Schaffer, 2007).

Revised econometric specification

In light of the above issues, the econometric specification for the model to test Hypotheses 2-6 was changed to:

$$\begin{aligned} CAR_{i,w} = {} & \beta_0 + \beta_1 numComp_{i,t-1} + \beta_2 UnemployentRate_{i,m} + \beta_3 firmKW_{i,t-1} \\ & + \beta_4 RDint_{i,t-1} + + \beta_5 RDintSq_{i,t-1} + \beta_6 PCint_{i,t-1} \\ & + \beta_7 PCintSq_{i,t-1} + \beta_8 size_{i,t-1} + \beta_9 GovCluster_{i,t-1} + \alpha_i + u_{i,t} \end{aligned} \quad \text{(Eq. 5-5)}$$

where *i* indexes firms, *w* denotes the event window, *m* denotes the month prior to the court decision (here, May), *t* denotes the fiscal year of the court decision (here, 2011), α_i represents industry fixed effects at the two-digit SIC code level, and $u_{i,t}$ represents the error terms which are clustered at the industry (two-digit SIC code) level. Only values of *RDint* between 0 and 1 and *PCint* > 0 are included.

[13] Using Eicker-Huber-White-robust treatment of errors in order to make as few assumptions at possible (Nichols & Schaffer, 2007). This selection of error treatment is also correct given that the conclusions being drawn from this project are meant to be applied only to the firms in the sample (Abadie, et al. 2017).

Revised summary statistics and correlations

Because of the reductions in sample size and change in variables described above, I have included revised summary statistics and pairwise correlations in Tables 5-4 and 5-5 below based on the revised econometric specification described in Equation 5-5.

Table 5-4. Revised summary statistics for the (+1, +3) event window in Texas

Variables	**n**	**Mean**	**S.D.**	**Min.**	**Max.**
CAR (3 day window)	263	.0027561	.0340596	-.1816334	.0919801
# In-state Competitors	263	26.56274	40.1354	0	118
County Unemployment Rate	263	7.465399	.6942928	4.7	9.3
# of Firm Knowledge Workers *(thousands)*	257	2.597673	9.973439	0	126.3338
R&D Intensity	53	.0754794	.1033731	.0002197	.5928396
R&D Intensity Squared	53	.0161815	.0498779	4.83e-08	.3514588
Physical Capital Intensity	249	1.275731	2.411473	.0063833	22.01809
Physical Capital Intensity Squared	249	7.419338	36.38402	.0000407	484.7961
Firm Size	257	1.12534	1.124801	0	5.589456
Government Cluster	263	.7718631	.4204314	0	1

Table 5-5. Revised pairwise correlations for the (+1, +3) event window in Texas, n = 53

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) CAR (3 day window)	1									
(2) # In-state Competitors	-.000230	1								
(3) County Unemployment Rate	0.168	0.239 +	1							
(4) # Firm Knowledge Workers	0.102	0.253	0.193	1						
(5) R&D Intensity	-0.392 **	-.0790	-0.336 *	-0.134	1					
(6) R&D Intensity Squared	-0.452 ***	-.0838	-0.250	-.0753	0.889 ***	1				
(7) Physical Capital Intensity	0.0991	-.0666	0.125	0.335 *	-.247	-0.154	1			
(8) Physical Capital Intensity Squared	-0.0610	-.0213	-.0401	0.245	-.112	-.0940	0.913 ***	1		
(9) Firm Size	0.319*	0.143	0.319 *	0.641 ***	-.299 *	-0.212	0.235 +	0.0549	1	
(10) Government Cluster	0.0589	0.327*	-0.187	0.0872	0.121	0.119	0.0310	0.0439	0.0315	1

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Reviewing the correlations in Table 5-5, correlations between the dependent variable and local unemployment rate and the number of firm knowledge workers are in line with the expected directions, while the correlations between the dependent variable and number of in-state competitors, R&D intensity, and physical capital intensity are in the opposite of the hypothesized directions. The only rather strong correlation is between firm size and the number of firm knowledge workers. However, this was to be expected given how these variables were calculated and, moreover, as noted above, alternative measures of firm size, such as those using sales or total assets, resulted in potential issues. As such, I

continued to use this measure of firm size, despite this high correlation. The negative correlation between firm size and R&D intensity indicates that larger firms are less R&D intensive than smaller firms, which could be explained by smaller firms engaging in R&D in order to remain competitive with larger firms. Not surprisingly, larger firms are also more physical capital intensive.

Because of the reduction in sample size associated with data availability from COMPUSTAT and the restrictions noted above on *RDint* and *PCint*, I also report summary statistics for the sample (n = 53) used in testing the full regression model in Table 5-6.

Table 5-6. Summary statistics for the (+1, +3) event window for observations included in the full regression model in Texas .

Variables	**n**	**Mean**	**S.D.**	**Min.**	**Max.**
CAR (3 day window)	53	.0042649	.0313687	-.0948929	.0853616
# In-state Competitors	53	31.4717	45.24022	0	118
County Unemployment Rate	53	7.250943	.7281754	6.2	8
# of Firm Knowledge Workers *(thousands)*	53	4.868291	17.97906	.0073426	126.3338
R&D Intensity	53	.0754794	.1033731	.0002197	.5928396
R&D Intensity Squared	53	.0161815	.0498779	4.83e08	.3514588
Physical Capital Intensity	53	.2586289	.2538556	.0101917	1.426784
Physical Capital Intensity Squared	53	.1301157	.3029727	.0001039	2.035714
Firm Size	53	1.339475	1.286144	.0544882	5.589456
Government Cluster	53	.7735849	.4225158	0	1

RESULTS

Event Study Results

To test the effect of the Texas Supreme Court's decision to strengthen enforcement of employee non-competes within the state of Texas, I conducted an event study following the methodology outlined in McWilliams and Siegel (1997) using the Eventus program. Event studies allow researchers to calculate the market reaction to the release of new information – in this case, the unanticipated court decisions relating to the increased enforceability of employee non-compete agreements in Texas. As described in detail previously, the estimation model uses all trading data from the year prior to and ending 5 days before the event itself (that is, between 255 and 5 trading days prior to the court decision). The event window of (+1, +3), where day 0 is the actual day of the court decision, was selected for the study since there was no indication of any news leakage regarding the Texas Supreme Court decision prior to or on the event date, and the earliest news announcing the court decision was not until the next day (+1).

I then generated a predictive model estimating the expected market returns for each firm had the court decision not occurred utilizing a market model, CRSP value-weighted index (with dividends) to estimate cumulative abnormal returns (CARs) for each firm in the sample. Cumulative abnormal returns (CARs) were then generated by subtracting these expected returns from the actual market return, and summing them over the three-day event window. The results are presented in the first row of Table 5-7.

Table 5-7. Texas event study results (Market Model, Value-Weighted CRSP Index)

Sample Size	Event window	Mean CAR (%)	Patell Z[1]	t-statistic[2]	Standardized cross-sectional statistic[3]
263	(+1, +3)	-0.73	-2.437**	-3.441***	-3.250***
263	(0, +3)	0.12	0.796	0.588	1.108
263	(+1, +2)	-0.32	-1/278	-1.870*	-1.679*
263	(+1, + 4)	-0.93	-3.111***	-3.719***	-4.108***
263	(-1, +1)	0.61	3.161***	2.558***	3.355***

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

[1] Patell Z refers to a statistic calculated as in the study by Patell (1976) using standardized residuals.

[2] The cross-sectional t-statistic at the end of the event window as calculated by Brown and Warner (1985).

[3] The standardized cross-sectional statistic as calculated by Boehmer, Musumeci, and Poulsen (1991).

These results do not yield support for Hypothesis 1 and, in fact, suggest that Texas firms actually experienced a decrease of 0.73% in the (+1, +3) event window. However, nonparametric tests, which do not make assumptions for the distribution of stock market returns are regarded by some scholars as more powerful (Ahern, 2009), for the (+1, +3) window were of mixed significance under the Market Model with the CRSP value-weighted index, with generalized Z = -1.348 (p-value .0888), rank test Z = -0.936 (p-value .1751), and jackknife Z = -2.121 (p-value .0170). In line with these mixed results, the results in the first row of Table 5-7 are not robust to different event windows, as demonstrated by the later rows in that table, or specifications of the market index, as demonstrated in Table 5-8, or to different model specifications, as demonstrated in Table 5-9 via the use of the Market Adjusted Model[14] with the original value-weighted CRSP market index.

[14] The Market Adjusted Model subtracts the market return on day t, $R_{m,t}$, from firm i's return, $R_{i,t}$,and thus abnormal returns are calculate as $AR_{i,t} = R_{i,t} - R_{m,t}$ (Eq. 6). Like the Market Model, the market return in the Market Adjusted Model can be calculated using either an equal or value-weighted index.

Table 5-8. Texas final event study results (Market Model, Equal-Weighted CRSP index)

Sample Size	Event window	Mean CAR (%)	Patell Z[1]	t-statistic[2]	Standardized cross-sectional statistic[3]
263	(+1, +3)	0.28	2.373**	1.312+	3.080**
263	(0, +3)	0.16	1.039	0.768	1.440+
263	(+1, +2)	0.22	1.941*	1.311+	2.498**
263	(+1, + 4)	0.17	1.471+	0.715	1.890*
263	(-1, +1)	-0.35	-1.278	-1.509+	-1.360+

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001
[1] Patell Z refers to a statistic calculated as in the study by Patell (1976) using standardized residuals.
[2] The cross-sectional t-statistic at the end of the event window as calculated by Brown and Warner (1985).
[3] The standardized cross-sectional statistic as calculated by Boehmer, Musumeci, and Poulsen (1991).

Table 5-9. Texas event study results (Market Adjusted Model, Value-Weighted CRSP Index)[15]

Sample Size	Event window	Mean CAR (%)	Patell Z[1]	t-statistic[2]	Standardized cross-sectional statistic[3]
263	(+1, +3)	-0.16	-0.618	-0.723	-0.722
263	(0, +3)	0.59	2.142*	2.706**	2.895**
263	(+1, +2)	0.08	0.286	0.434	0.331
263	(+1, + 4)	-0.18	-1.025	-0.675	-1.160
263	(-1, +1)	0.68	3.497***	2.927**	3.778***

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001
[1] Patell Z refers to a statistic calculated as in the study by Patell (1976) using standardized residuals.
[2] The cross-sectional t-statistic at the end of the event window as calculated by Brown and Warner (1985).
[3] The standardized cross-sectional statistic as calculated by Boehmer, Musumeci, and Poulsen (1991).

In Table 5-8, the market return has been estimated using the CRSP equal-weighted index. CRSP notes that the "equal-weighted index is an equal-weighted portfolio built each calendar period using all issues listed on the selected exchanges with valid prices on the current and previous periods" while the value-weighted index has stocks "weighted by their market capitalization at the end of the previous period." Thus, the equally-weighted index requires every stock in the index to have the same weight, regardless how large or small the company. While Ahern (2009) notes that the selection of market-index in event study models is not well-defined, Loughran and Ritter caution that "[v]alue-weighted portfolios can also have some periods in which a single firm is a large proportion of the

[15] Nonparametric tests for the (+1, +3) window were mostly nonsignificant under the Market Adjusted Model with the CRSP value-weighted index, with generalized Z = -1.348 (p-value .0888), rank test Z = -0.514 (p-value .3038), and jackknife Z = 0.391 (p-value .3477

portfolio, resulting in a high variance of returns because this firm's unique risk is not diversified away" and conclude that "a traditional event study approach in which all observations are weighted equally will produce point estimates that are relevant from the point of view of a manager, investor, or researcher attempting to predict the abnormal returns associated with a random event" (2000, p. 363). Therefore, based on Loughran and Ritter (2000), I re-calculated the event study results using the CRSP equally-weighted index and the Market Model. These results are presented in Table 5-8.

Supporting the use of the equal-weighted index, nonparametric tests for the (+1, +3) window using this index were supportive of the results in Table 5-8, with all tests at least marginally significant, with generalized Z = 3.581 (p-value .0002), rank test Z = 1.309 (p-value .0958) , and jackknife Z = 1.556 (p-value .0599). Further supporting the validity of the equal-weighted index results, statistically similar results were obtained using either the Market Adjusted Model (Table 5-10) or the Fama-French 3 Factor Model[16] (Table 5-11).

Table 5-10. Texas event study results (Market Adjusted Model, Equal-Weighted CRSP index)

Sample Size	Event window	Mean CAR (%)	Patell Z[1]	t-statistic[2]	Standardized cross-sectional statistic[3]
263	(+1, +3)	0.79	4.102***	3.512***	4.863***
263	(0, +3)	0.68	2.564**	3.122***	3.450***
263	(+1, +2)	0.62	3.539***	3.315***	4.082***
263	(+1, + 4)	0.89	3.550***	3.403***	4.116***
263	(-1, +1)	-0.17	-0.602	-0.713	-0.649

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001
[1] Patell Z refers to a statistic calculated as in the study by Patell (1976) using standardized residuals.
[2] The cross-sectional t-statistic at the end of the event window as calculated by Brown and Warner (1985).
[3] The standardized cross-sectional statistic as calculated by Boehmer, Musumeci, and Poulsen (1991).

[16] Fama and French (1996) use a three-factor model based on market index, size index, and book-to-market index.

Table 5-11. Texas event study results (Fama French 3 Factor Model, Equal-Weighted CRSP index)

Sample Size	Event window	Mean CAR (%)	Patell Z[1]	t-statistic[2]	Standardized cross-sectional statistic[3]
263	(+1, +3)	0.35	*Not reported*	1.661*	3.301***
263	(0, +3)	0.18	*Not reported*	0.844	1.455+
263	(+1, +2)	0.27	*Not reported*	1.527+	2.598**
263	(+1, + 4)	0.28	*Not reported*	1.137	2.143*
263	(-1, +1)	-0.41	*Not reported*	-1.754*	-1.401+

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

[1] Patell Z refers to a statistic calculated as in the study by Patell (1976) using standardized residuals, however this calculation is not reported in Eventus for multi-factor benchmark models such as Fama French.

[2] The cross-sectional t-statistic at the end of the event window as calculated by Brown and Warner (1985).

[3] The standardized cross-sectional statistic as calculated by Boehmer, Musumeci, and Poulsen (1991

Thus, choice of index drives whether there are statistically significant positive or negative results in the event study. One possible explanation for the difference in results between the equal and value weighted CRSP indices is that an equally weighted index may better act as a comparison for the (relatively) smaller publicly traded firms headquartered in Texas. This conclusion is supported by the results of using the Fama French 3-Factor Model using the CRSP value-weighted index, as presented in Table 5-12. The Fama French model includes a consideration of firm size, and under that model, there are mean positive returns of borderline statistical significance (p = .1190) even using the value-weighted index.

Table 5-12. Texas event study results (Fama French 3 Factor Model, Value-Weighted CRSP index)

Sample Size	Event window	Mean CAR (%)	Patell Z[1]	t-statistic[2]	Standardized cross-sectional statistic[3]
263	(+1, +3)	0.05	*Not reported*	0.245	1.180
263	(0, +3)	0.36	*Not reported*	1.756**	2.386**
263	(+1, +2)	-0.02	*Not reported*	-0.137	0.275
263	(+1, + 4)	0.00	*Not reported*	0.004	0.360
263	(-1, +1)	-0.10	*Not reported*	-0.414	0.302

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

[1] Patell Z refers to a statistic calculated as in the study by Patell (1976) using standardized residuals, however this calculation is not reported in Eventus for multi-factor benchmark models such as Fama French.

[2] The cross-sectional t-statistic at the end of the event window as calculated by Brown and Warner (1985).

[3] The standardized cross-sectional statistic as calculated by Boehmer, Musumeci, and Poulsen (1991).

Since the results using the equally-weighted index were robust to model specifications, I decided to use these results as my dependent variable for the hypothesis testing. Using the chosen event window of (+1, +3) the market model, and the CRSP equal-weighted market index, the mean cumulative abnormal returns (CARs) for Texas firms is 0.28%, as shown in the first line of Table 5-8, which is significant at $p < .1$ for all test statistics and robust to all model and event window specifications. Thus, there is significant support that Texas-headquartered firms experienced positive cumulative abnormal returns in the event window immediately following the Texas Supreme Court's decision to strengthen the enforcement of employee non-compete agreements. To provide some context to the magnitude of this increase, other scholars have found that investors react favorably to divestiture announcements, with mean CARs of +0.7% (Feldman, Amit, & Villalonga, 2016), while announcements of a new male CEO yielded negative mean CARs of -0.58% (Lee & James, 2007). Firms that increase their customer service activities experience positive CARs between 0.14 and 0.96%, depending on the method and type of improvement (Nayyar, 1995).

Regression Analysis

After conducting the event study to determine that firm performance is increased for Texas-based firms after the court's decision to strengthen enforcement of in-state employee non-competes, following McWilliams and Siegel (1997), I attempt to explain the variation in firm-level performance by conducting the previously formulated regression analyses to test Hypotheses 2 through 6, by considering number of in-state competitors (Hypotheses 2), the county level unemployment rate (Hypothesis 3), the number of firm knowledge workers (Hypothesis 4), R&D intensity (Hypotheses 5)

including the role of the square of this variable, and physical capital intensity (Hypothesis 6) including the role of the square of this variable. Due to data availability, a single comprehensive regression model was not ideal, and thus Hypotheses 2-6 are tested separately, as represented in Table 5-13, and then the full model is presented. In the table, Model 1 includes only controls for firm size, involvement in a government-identified cluster, and industry fixed effects, then each hypothesis is tested in accordance with the model of the same number (thus Model 2 tests hypothesis 2, Model 3 tests Hypothesis 3, etc.). Model 7 represents a test of the control variables with the limited sample (n = 53) of firms with R&D intensity between 0 and 1, while Model 8 represents the full model.

Table 5-13. Generalized least squares regression results for the (+1, +3) event window in Texas using industry (two digit SIC code) fixed effects, with errors clustered at the industry level

	Model 1 (Controls, full sample)	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7 (Controls, limited sample)	Model 8 (full)
Mean CAR (3 day window)	.0029587	.0029587	.0029587	.0029587	.0042649	.004317	.0042649	.0042649
Independent Variables								
# In-state Competitors		-0.000						-0.000
		(0.000)						(0.000)
County Unemployment Rate			-0.001					-0.008
			(0.003)					(0.010)
# Firm Knowledge Workers				0.000				-0.001*
				(0.000)				(0.001)
R&D Intensity					0.157			0.193**
					(0.108)			(0.071)
R&D Intensity Squared					-0.528**			-0.598***
					(0.180)			(0.145)
Physical Capital Intensity						-0.002		0.074**
						(0.003)		(0.029)
Physical Capital Intensity Squared						0.000		-0.064***
						(0.000)		(0.017)
Control Variables								
Firm Size	0.002	0.003	0.002	0.001	0.002	0.001	0.005	0.005
	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)	(0.002)	(0.006)	(0.007)
Government Cluster	-0.000	0.002	-0.000	-0.001	0.012	-0.001	0.009	0.010
	(0.005)	(0.005)	(0.004)	(0.005)	(0.008)	(0.004)	(0.006)	(0.006)
Constant	0.001	0.001	0.006	0.002	-0.011	0.006	-0.010	0.039
	(0.004)	(0.004)	(0.021)	(0.005)	(0.010)	(0.004)	(0.012)	(0.076)
Industry Fixed Effects	Included	Included	Included	Included	Included	Included	Included	Included
No. of Obs.	257	257	257	257	53	245	53	53
R-Squared	0.005	0.011	0.005	0.006	0.294	0.010	0.053	0.394

Robust standard errors in parentheses; + p<0.10, *p<0.05, ** p<0.01, *** p<0.001

In Models 2-6, there is no support for any of the hypotheses, except for the role of *RDintSq*, although all coefficients are in the expected direction except for that of *numComp*. Moreover, control variables are insignificant in all models. However, in the full model, there is support for the opposite of Hypothesis 4, indicating that firms that employed large numbers of firm knowledge workers actually had decreased cumulative abnormal returns. In support of Hypothesis 5, the full model demonstrates a statistically significant increase in CARs for R&D intensive firms but indicates that these returns follow an inverse U-shape relationship due to the negative and significant coefficient on *RDintSq*. Contrary to the hypothesized negative relationship between firm CARs and physical capital intensity in Hypothesis 6, the full model reveals significant support in the opposite direction, but that this increase is attenuated at higher levels of physical capital intensity such that it begins to increase at a decreasing rate, due to the statistically significant coefficient on the square of physical capital intensity.

In the full model (Model 8), interclass correlation is 0.73909646, which means that 73.9% of the variance is due to differences across (two-digit SIC code) industry groups. For comparison, in the controls-only model (Model 1), interclass correlation is only 0.33577708, and in the controls-only model with firms reporting full data (Model 7), interclass correlation is .32717794. Also notable is that in the full model, there is a dramatic increase in R-squared from all earlier models.

Robustness checks

Robustness checks for the event study results were discussed in detail above; the event study results with the Market Model using the CRSP equal-weighted index were robust to different event window and different model specifications.

To test the robustness of the regression results, I conducted a series of t-tests to determine whether the 263 firms for which I was able to obtain cumulative abnormal returns (who were therefore included in the sample) were statistically significant from the ones that I was not able to obtain stock market data on (n = 342). There was no significant evidence that the firms that were included in the sample differed regarding the number of in-state competitors, unemployment rates, total sales, or likelihood of belonging to a government cluster. However, firms that were included in the sample did have higher R&D and physical capital expenditures than those that were not included, and had more employees and knowledge workers (all $p < .05$). Finally, firms that were not included were more likely to be in metropolitan regions ($p < .05$).

I also conducted a series of t-tests to determine if the excluded firms (n = 78) that did provide stock market data but were dropped from the sample due to confounding events different from the ones that remained in the sample (n = 263). There was no significant evidence that the firms that were dropped from the sample differed from those that were included regarding the R&D or physical capital expenditures, the number of in-state competitors, number of employees, unemployment rates, or likelihood of belonging to a government cluster. However, firms that were included in the sample had higher sales and more knowledge workers than those that were dropped ($p < .05$). Finally, firms that were dropped from the sample were more likely to be in metropolitan regions ($p < .001$).

I re-ran the regression analysis without industry-clustered errors since the number of clusters (industries) ranges from 50 (in the control model, Model 1) to 13 in the full model, the latter of which is below the ideal number of 50 (Kézdi, 2004), particularly in

light of the unbalanced cluster sizes (ranging from 1 to 52 in the control model and 1 to 14 in the full model) (Nichols & Schaffer, 2007). This analysis leaves point estimates (coefficients) unchanged, but allows for different standard errors and therefore potentially different conclusions. This test resulted in a loss of significance for all variables except *RDintSq*.

Due to the large number of firms engaged in "Oil and Gas Extraction" (54 firms or 20.5% of the sample) and "Electric, Gas and Sanitary Services" "(20 firms or 7.5% of the sample), I re-ran the regression results without such firms, reported in detail in Appendix G. Results were largely consistent, although significance was lost for the coefficient on firm knowledge workers.

As a final robustness check, I conducted a series of sensitivity tests by excluding various observations that visually appear as potential outliers or extreme values in the scatter plots in Appendix F, as well as in Figure 5-1. The exclusion of ticker "T" resulted in a dramatically decreased interclass correlation coefficient of .43417706, due to the fact that this firm was the only one in its industry in the final sample of 53 firms. However, this is still a notable within-industry correlation. The exclusion of ticker "SCON" unfortunately resulted in the loss of significance on the R&D intensity variables, raising concerns about the robustness of the results on these measures.

To further explore the potential inverse U-shaped relationships between the dependent variable and R&D intensity, and the dependent variable and physical capital intensity, I followed Lind and Mehlum (2010), using the regression results of Table 5-13, Model 8 and then again using the same regression but excluding tickers "T' and "SCON." According to Lind and Mehlum (2010), the existence of a U- or inverse U-

shape can be confirmed if two conditions are met: (1) the inflection, or turning, point must be located within the range of the observations; and (2) the slopes of the data before and beyond the inflection point must significantly confirm the assumed shape. For criteria (2), in the case of the inverted U-shape, this means that the slope prior to the inflection point is positive and significant and the slope following the inflection point is negative and significant. In the case of *RDint* and the regression from Table 5-13 Model 8, the turning point occurs at *RDint* = 0.1611131, which is well within the range of observation values (0.0002197 to 0.5928396, from Table 5-4) and the slope prior to this point is 0.192556 with a t-value of 2.73 (p = .009). After the extreme point, the slope is -.5166872 with a t-value of -5.045208 (p = .0001434). However, repeating this analysis excluding the two observations changes the turning point to *RDint* = 0. .1797758, and while the slope does change sign from .1575324 to -.362399, there is not statistical significance on either side. Thus, there is a potential, but insufficiently robust evidence to conclusively claim, an inverse-U shaped relationship between *RDint* and firm performance, measured as firm-level cumulative abnormal returns, following Texas' increased enforcement of employee non-compete agreements. In the case of *PCint*, excluding the influential observations, the turning point occurs at *PCint* = 0.5870226, which is well within the range of observation values (.0063833 to 22.01809, from Table 5-4) and the slope prior to this point is 0.074574with a t-value of 2.759 (p = .009). After the extreme point, the slope is -2.752484 with a t-value of --4.05 (p = . 00095). Thus, there is a significant (p < .01) inverse-U shaped relationship between *PCint* and firm performance, measured as firm-level cumulative abnormal returns, following the Texas court decision.

DISCUSSION

The results of this project provide statistically significant support that employee non-compete enforcement can affect firm performance. Moreover, this project addresses criticism of the existing literature on non-competes that there has been insufficient firm-level research, specifically questions over firm usage versus enforceability. That is, this project finds that at the very least, investors appear to care about *the ability to* enforce non-competes even if there is no evidence here about which firms in the sample actually use or enforce non-competes.

One particular concern with this research is that it may appear to be one-sided since, on the one hand, increased enforcement of employee non-compete agreements can protect existing firm human capital. However, at an aggregate level, if all employees in a state are subject to non-competes, firms may have significant difficult hiring new employees who possess any industry-specific human capital. As a result, firms may be forced to recruit outside of their particular industries, which may not be a bad thing. In fact, Rosenkopf and Almeida (2003) find that firms may intentionally broaden their knowledge bases by hiring from non-related firms, and find that in the semiconductor industry, hiring inventors with greater technological distance produces the most firm-level benefits. Investigating this "learning by hiring," Song, Almeida, and Wu (2003) also conclude that firms experience greater patenting activity when patenting engineers originate from technologically less-related firms. Admittedly, the results of this project do not speak directly for these conclusions, but future research in this vein may help elucidate this relationship.

A second potential concern with these results is that the increased enforcement of employee non-compete agreement may make it more difficult in the long run for firms to attract high-quality, new human capital, or, at the least, that such new, high quality human capital would demand compensation or, in strategic management terms, would appropriate more of the rent generated due to the increased enforcement of employee non-compete agreements. However, this may not be a bad thing as, building on Chapter 3, it would require the firm and the prospective new employee to engage in negotiation over the terms of the non-compete. Moreover, there is evidence that by presenting a non-compete at the start of employment negotiations, a firm can cause net gains in employee satisfaction. Specifically, prospective employees presented with an employee non-compete prior to job offer acceptance have been found to earn 9.7% greater wages, receive 11% more training, and report 6.6% greater job satisfaction than employees who do not have employee non-competes (Starr, et al. 2018a). It remains an open question whether firm performance may increase due to increased employee productivity from this increased training and job satisfaction.

One disappointment in this project is the dramatic reduction in sample size due to R&D not being reported by many firms in the sample. As a result, it was not possible to conduct statistical analysis at individual industry levels. For example, analysis on the largest group of 54 firms engaged in Oil & Gas Extraction resulted in multicollinearity issues, greatly due to the reduced sample size (only 4 Oil & Gas firms provided full data).

CONCLUSION

This project provides further support, beyond that presented in Chapter 4, that employee non-compete agreements operate as an isolating mechanism that secures firm

human capital from acquisition by rivals, and finds statistically significant support for the role of this isolating mechanism in generating sustainable human capital-based competitive advantage. I empirically explore the relationship between an increase in state-level enforcement of employee non-compete agreements and the subsequent financial performance of firms headquartered in such a state, and consider how two groups of factors, those occurring at the labor market level and those occurring at the firm-resource level, may affect firm performance. In this project, I find support for the role of firm resources, particularly knowledge workers and physical capital assets, in shaping this relationship, but do not find the hypothesized effects of labor market factors on this relationship.

These non-results on labor market factors may simply be the result of the superiority of RBV's statistical power. Alternatively, it may simply be that the operationalization of these measures in this project do not adequately reflect the labor market conditions these firms are dealing with. For instance, the BLS State-to-State migration tables indicate that in 2011, 2% of the population of the state of Texas had resided in another state a year prior, including 58,992 people who moved from California and therefore are unlikely to have had enforceable employee non-compete agreements. This demonstrates that the labor market may not be limited to the physical state boundary. A second concern is that these firms are only *headquartered* in Texas, but may not actually conduct most of their business in the state. Future research can help clarify both of these points.

Despite these limitations on labor market considerations, this project found strong support for the role of firm resources in shaping the relationship between employee non-

compete enforcement and firm performance. Like the project reported in Chapter 4 of this dissertation, this project reinforces the conclusion that human capital and physical capital operate as complements and not as substitutes, contravening the results of Riley and colleagues (2017). Furthermore, like the California project, the effect of non-compete enforcement on firms employing more knowledge workers was negative and significant. This may be due to concerns about longer-term effects of non-competes on a firm's ability to further recruit additional knowledge workers, as discussed above.

Nonetheless, employee non-competes appear to work as an isolating mechanism that both protects a firm's human capital from its competitors and operates as a powerful limitation on worker mobility. While it has been recognized that the search for "human capital-based advantages require[s] multilevel solutions to address vexing challenges associated with attracting, retaining, and motivating talented employees" (Coff & Kryscynski, 2011, p. 1430), the role of such human resources-based mechanisms in securing human capital-based advantages under the resource-based view of the firm has been underexplored. This project sought to clarify the role of human resource-based protection mechanisms such as non-competes in facilitating the management of firm knowledge by reinforcing theoretical basis of knowledge protection for the effects of non-compete agreements on firm performance. In order to do this, this project proposed employee non-competes as an isolating mechanism to promote, under the RBV, sustainable human capital-based competitive advantage. Finally, this project and that in Chapter 4 are the first, to my knowledge, to avoid any cross-state methodological comparisons of employee non-compete enforcement by utilizing event study methodology.

Future work

The major limitation of this study is the reduced sample size due to the few firms headquartered in Texas reporting R&D expenditures. In future work, I can employ Heckman's (1976) two stage correction model to resolve any issues of sample bias related to non-reporting of R&D expenditures in annual reports, and impute a value of R&D intensity that can be used in future work.

In order to address the longer term implication of non-compete enforceability, future work on this project should consider longer-term buy-hold abnormal returns (BHARs) to investigate longer-term risk-adjusted returns over a holding period (Lyon, et al. 1999), as well as alternative measures of firm performance, such as *Tobin's Q* (Younge, et al. 2015).

Finally, the results of this study demonstrate that when conducing an event study analysis, considerations of market index matter greatly, likely due to concerns with firm size. The conclusions of this study therefore provide preliminary support that enforcement of employee non-competes affects smaller firms differently than large firms, warranting future investigations.

CHAPTER 6

DISCUSSION & CONCLUSION

The ultimate goal of this dissertation is to address the question whether employee non-compete agreements can be good – particularly for firms – due to two significant gaps in the literature regarding research on the ethics of non-compete agreements themselves and research on how employee non-competes affect firm performance. This dissertation therefore contributes to the growing literature on research on employee non-competes by exploring three different contexts: (1) when a state chooses not to enforce out-of-state employee non-competes; (2) when a state strengthens in-state enforcement of employee non-competes; and (3) regardless of state policy, when, how and for whom should firms use employee non-competes. Beyond research on employee non-compete agreements, this dissertation contributes both to research on the resource-based view of the firm and the strategic human capital research stream. In the paragraphs that follow, I summarize the findings of the three papers of this dissertation, delineate the contributions of the dissertation to the extant literature, and discuss the findings of my research. I conclude with identification of open avenues for additional research.

SUMMARY OF FINDINGS

In Chapter 3, the first essay of the dissertation, titled *The Case for Ethical No-Compete Agreements: Executives versus Sandwich-Makers*, I propose a normative schema for when the use of employee non-competes can be considered ethical. While past research considers whether non-competes are effective tools at limiting employee mobility, few have consider if non-competes *should* be used. In Chapter 3, I tackle this

question by ethically evaluating the use of non-competes in a variety of employee roles. I begin my evaluation by reviewing the existing literature on the ethics of employee non-competes, finding that the limited literature has unduly focused on questions of property rights and overlooked – or at least, misclassified – other important ethical constructs. Due to this insufficiency, I then compare and contrast employee non-competes with the extant literature on the ethics of similar agreements, specifically confidentiality agreements, and similar doctrines, specifically employment-at-will. I determine the negotiation process is key to determining the ethical nature of a non-compete, and provide two real-world examples of non-compete agreements: an executive at Amazon and a Jimmy John's sandwich-maker. Analysis of these illustrative examples allows me to develop a three-prong approach to evaluating non-competes based on ethical dimensions of power, autonomy, and fairness, which I examine in detail. I end by proposing – although further research is warranted – a measure of employee-level absorptive capacity, which is closely coupled with an employee's pre-employment human capital, as an employee-level attribute independent of, although likely coincidental with, my three-part requirements of power/autonomy/fairness for ethical employee non-compete agreements.

In Chapter 4, the second essay, titled *Opening the Labor Market Doors: Firm Performance Following California's Refusal to Enforce Out-of-State Employee Non-Compete Agreements*, I empirically exploit a quasi-natural experiment of the California Supreme Court's decision to stop enforcing out-of-state employee non-compete agreements. Applying the resource-based view of the firm, I conceptualize employee non-compete agreements as isolating mechanisms that operate to insulate proprietary firm knowledge from rival firms. When a unique group of firms (in this case, those

headquartered in California) are able to avoid such an isolating mechanism (via such a court decision), they gain access to a pool of previously unavailable human capital (in this case, located outside of California). This access alone results in public firms in California gaining on average 2.5% *more* in stock market value in the three days immediately following the court decision than what would have been predicted based the firms' prior market performance. Moreover, this increase is strongly influenced by both labor market and firm-level factors. Specifically, firms currently facing high in-state labor market competition and/or local labor market shortages particularly benefit from this newly available labor pool. Meanwhile, firms already employing large numbers of knowledge workers actually experience lower firm performance than those without following this new access to skilled labor, while those with high research and development intensity and physical capital intensity experience increased stock market returns.

In Chapter 5, *Don't Mess with My Texans: Firm Performance in the Wake of Texas' Increased Enforcement of Employee Non-Competes*, I exploit a quasi-natural experiment of a Texas Supreme Court decision in 2011 that dramatically increased enforcement of employee non-competes in that state. I find the performance of Texas-headquartered firms, measured by stock market returns, increased 0.28% over the three days immediately following the court decision strengthening enforcement of employee non-competes. This paper also points to the importance of considering the role of firm size in the selection of a market index when conducting event studies. While I find no support for the role of labor market factors in altering the relationship between non-compete enforcement and firm performance, the effect of firm-specific resource factors

identified in the prior paper persists. That is, I find that firms employing large numbers of knowledge workers experience, contrary to expectations, lower firm performance following the legal change, while firms exhibiting both research and development and physical capital intensity exhibit greater performance.

Contributions

Research on employee non-compete agreements must address research questions and impacts that extend across levels of analysis because such agreements are contained in the *individual* employment contracts of employees, who work at *firms*, that operate in *competitive industries*, and the enforceability of such agreements is dependent upon *state* law. Employee non-compete agreements are therefore a multi-level – and nested – phenomenon, as show in Figure 6-1 (a reprise of Figure 2-1) below.

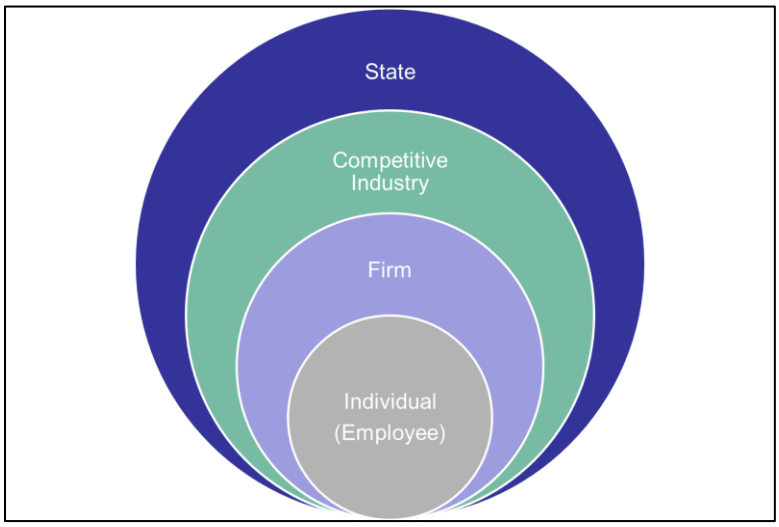

Figure 6-1: The multi-level aspects of employee non-compete agreements.

Prior research on employee non-competes has explored research questions across these levels. For instance, the state level includes Gilson's (1999) proposition that enforcement of employee non-competes was the primary reason behind the success of Silicon Valley and the collapse of Route 128 in Massachusetts, and Bishara's (2006) analysis of what an

ideal state-level enforcement policy should be, while the individual level encompasses research on both how enforcement of non-competes affects individual employee mobility, such as Marx, Strumsky, and Fleming (2009), and on how presence in an employment contract (without regard to state-level enforceability) affects employee mobility (Prescott, et al. 2016). However, research at the firm level has been surprisingly lacking, with only one published study exploring the impact of non-compete enforcement on firm performance (Younge, et al. 2015), and only two papers (Bishara & Westermann-Behaylo, 2012; Kafker, 1993) tangentially exploring the ethical use, as opposed to enforcement, of employee non-compete agreements. This lack of prior firm-level research is likely because such agreements represent theoretical and methodological challenges occurring at multiple levels (as described in Figure 6-1) since employee non-competes both "prevent the loss of human capital to a competitor *and* block the firm's ability to poach from a competitor" (Younge & Marx, 2015, p. 652, emphasis added; see also Belenzon & Schankerman, 2013). The primary intent of my three-paper dissertation was to fill the gap of firm-level research. My dissertation therefore addresses not only *should* firms use employee non-competes from an ethical standpoint but also *when* employee non-competes positively affectively firm performance. More specifically, given state policies on non-compete enforcement, my dissertation research indicates that use of non-competes impacts firm performance for in-state firms.

Moreover, prior empirical research on employee non-competes has relied exclusively on methodological models that ultimately compare enforcement of employee non-competes across two (or more) U.S. states, using an enforceability "score" for each such state. However, at least five distinct methods of generating these "scores" exist

within the literature, and are not fully consistent among each other. At a practical level, states receiving the same numeric "score" under these method may have very different requirements for enforcement, but such methodological models (falsely) imply that enforceability would be identical in the two states. Thus, the extant literature on non-competes has not given adequate methodological considerations to the real differences in content of different state laws. To address these methodological issues, the empirical projects of this dissertation are the first I am aware that utilize event study methodology to explore the impact of changing state-level enforcement of employee non-competes on the performance of such firms headquartered in a single state, thereby avoiding any issues of cross-state comparison.

This dissertation also contributes to research applying the resource-based view of the firm. The resource-based view of the firm (the "RBV") has emerged as a dominant theory in strategic management research, whereby firm-level resources provide sustainable competitive advantage if they are valuable, rare, inimitable, and non-substitutable (Barney, 1991) (the "VRIN" characteristics). Despite the dominance of the RBV, to my knowledge, there has only been one prior publication that directly connected the RBV with employee non-compete agreements. However, that paper (Bishara & Orozco, 2012) applies the RBV as a normative guide to answer the question of when employee non-compete agreements should be enforced. In contrast, this dissertation conceptualized employee non-compete agreements as an isolating mechanism that can promote sustainable competitive advantage. This dissertation therefore fulfills Newbert's call to empirically examine the role of a specific "isolation mechanisms that hinder[s] imitation" (2007, p. 139). The second and third papers of this dissertation explore the role

of employee non-competes as a human capital-specific isolating mechanism under the RBV that protects a firm's human capital from acquisition or imitation by rivals (Rumelt, 1984).

Moreover, literature arising out of the RBV goes beyond the VRIN characteristics to consider the attributes of firm resources themselves. Collis and Montgomery (1995) assert that firm competitive advantage comes can also derive from the durability, appropriability, and superiority of these resources. This dissertation demonstrate that employee non-competes have the ability to change the characteristics of firm human capital by altering its durability, appropriability, and superiority: human capital subject to non-competes is more *durable* than human capital not subject to such agreements because the firm's rights to its human capital are extended beyond the length of the employment agreement (to the extent of the law) by employee non-competes; it is *appropriable* since non-competes allow a firm to capture more value from its human capital (Garmaise, 2011; Starr, 2018); and it is *superior* in that it provides the best – or perhaps the only – protection available (Samila & Sorenson, 2011) for human capital that cannot otherwise be protected from mobility via other mechanisms such as patents (Kim & Marschke, 2005).

Research in strategic human capital looks at how human capital, defined as the valuable knowledge, skills, and abilities of employees (Coff & Kryscynski, 2011), affects firm performance. It therefore builds on the resource-based view (RBV) of the firm (Barney, 1991; Wernerfelt, 1984), but addresses the complexity that human capital, unlike other firm resources, "depend[s] on the continued presence of people, who—unlike property, plant, and equipment—are not owned by the firm, but merely *employed*"

(Younge & Marx, 2015, p. 653, emphasis in original). Within such research, there have been calls to address "the need for a more robust framework connecting human capital and competitive advantage" (Campbell, et al. 2012, p. 376). Results from the second and third papers of this dissertation can help bridge such a connection. The results of these papers find strong support for the role of state-level enforcement of employee non-competes in the quest for human capital-based competitive advantage and identify important labor market attributes and firm resource-based complementarities that affect this competitive advantage. Notably, contrary to one line of literature, physical capital intensity was found to be complementary to firm human capital. This project also contributes to strategic human capital literature by introducing a better method to determine the number of firm knowledge workers by correcting the measure espoused of Younge and colleagues (2015) by building on the economic geography literature (Cader, 2008).

DISCUSSION

The two empirical papers presented together in this dissertation may appear to suggest that state policies increasing non-compete enforcement *and* eliminating non-compete enforcement can *both* increase firm performance. However, that is not an accurate characterization because the legal decisions in the two event study projects resulted in different effects; that is to say, the mechanisms causing the increased firm performance found in the two event studies are different. The California study represents a labor market story due to access to (newly available) skilled labor, while the Texas study is a more traditional RBV-paper looking at enhanced protection of a firm's own human capital. This may also explain why labor market factors were only statistically

significant in the California study, while the effect of firm-level resource factors (firm knowledge workers, R&D intensity, and physical capital intensity) was consistent across the two studies.

Nonetheless, the two studies can be read together to make interesting insights about the effect of non-compete enforcement on labor mobility. This California project demonstrates that state policies that *increases* in skilled labor mobility can not only be associated with but cause *increases* in firm value, at least for firms uniquely able to access this newly available human capital. What this paper does not demonstrate conclusively is what happens to the firms that served as the source of this skilled labor. However, there is possible evidence that – at least in the short term – these source firms were not harmed. This suggests that, at least at the firm level, human capital based competitive advantage need not be a "zero sum" game in which one firm's losses become another firm's gain.

In juxtaposition, the Texas paper finds that a state policy that *limits* skilled labor mobility also causes increased firm value. The primary difference between the two papers is a different subject construct of what constitutes skilled labor: the California project considers the mobility of *external sources* of potential skilled labor while the Texas project looks primarily at the mobility of *current employees*.

Comparing these event study results across two papers, California firms experienced a much greater percentage increase in their stock market performance than Texas firms over the same number of days following the applicable legal decision. A few potential insights may explain these results. First, the legal change in California gave California firms unfettered access to potential new human capital from all other states

that enforce non-competes, while the change in Texas only increased the rights and mobility barriers Texas-headquartered firms in their existing human capital bound by non-competes, or in their future new hires that would be bound by non-competes. Thus, the size differential of *skilled new labor* may have driven the difference in magnitude. As well, it is impossible to separate in the case of the Texas study the effect of greater isolating mechanisms for *existing* (currently employed) human capital versus *future* human capital that *may* join the Texas-based firms in the future. This latter group may have been too tenuous for investors to value, or, alternatively, perhaps investors were concerned that new hires would not agree to be bound by the now very-enforceable employee non-competes in Texas or would require additional compensation (and thus appropriate away the rents generated from the greater enforceability). Another potential explanation is that the legal change in California might have been more unanticipated than that of Texas. In California, it had been a decade since the last major court decision on employee non-competes, while in Texas there had been legal changes both five and two years prior.

A final question on the empirical chapters of this dissertation is the result of firm knowledge-workers having a statistically significant negative influence on firm performance in both studies. This was contrary to the hypothesized direction in both studies.

An open avenue of debate is over the selection of the *knowledge worker* variable instead of other measures that could have been used. For instance, one alternative could be the Bureau of Labor Statistics classification of science, technology, engineering, and math (STEM) occupations (Bureau of Labor Statistics, n.d.). However, such a definition,

in my opinion, ignores occupations for which require significant use of knowledge, such as executives. Moreover, the knowledge worker variable had already been used in connection with research on employee non-compete agreements (Younge, et al. 2015), although this dissertation showed that this prior use was partially inaccurate and led to misleading conclusions. Finally, the original intent behind why I decided to include such a variable was a desire to somehow measure skilled human capital at the firm level. Therefore, in a sense the (fixed) definition of firm knowledge-workers used in this dissertation represents the general human capital of a firm's employees. Human capital is something that is not reported on a firm's balance sheet, and such an operationalization therefore makes a significant contribution to strategic human capital research.

Finally, I would like to bridge the empirical papers with the normative ethics paper. Putting state policy on non-compete enforcement aside, I perform an ethical analysis of the use of non-competes and made progress in answering the question of when or whether firms should, from an ethical perspective, be using non-competes. The conclusion of the ethics paper proposes a sort of employee-level absorptive capacity as a standalone attribute that should coincide with the tripartite schema for ethical non-competes in conjunction with power, autonomy, and fairness. This employee-level variable is intuitively similar to the knowledge worker categorization from Chapters 4 and 5. Thus, an interesting proposal would be to apply the normative categorization from the ethics paper (Chapter 3) and apply it to knowledge workers. This would suggest that as long as the negotiation process for a knowledge worker's non-compete meets the requirements of the three ethical dimensions (employee has bargaining power, the autonomy of both parties is respected, and the non-compete derived at the end of the

negotiating process meets the requirements of distributive justice), then the non-compete for such a worker would be ethical in, for instance, Texas. Such an agreement for the same worker would *not* be ethical in California since state policy does not allow for the enforcement of employee non-compete agreements. This suggests that, provided they are allowed by state policy, there are less ethical concerns with the non-competes imposed for workers meeting the definition of "knowledge workers." This may seem like a natural conclusion since skilled workers often have access to the core technologies and other proprietary information of their employers. This access may make such employees attractive to rival firms that may attempt to gain a competitive advantage over the original firm, and could particularly hold true when there is significant product market competition.

ADDITIONAL RESEARCH

Much additional work remains to be done to fully explore the issue of whether employee non-compete agreements are good – financially or ethically – for firms. We also know little about *why* firms decide to use (or not use) employee non-compete agreements. There are few surveys on the *use* of non-compete agreements and those that have been done, such as the 2014 Noncompete Survey (Prescott, et al. 2016), have all been conducted at the employee-level.

Regarding financial performance, the empirical projects of this dissertation do not demonstrate a sustainable competitive advantage; to do so will require looking at longer term firm actions and performance. For instance, one avenue of future work is whether there is a change in employee mobility patterns subsequent to each state Supreme Court

decision. In the case of California, this would require exploring whether more out of state workers were recruited by California firms following the legal change.

There are also interesting questions about the net impact of employee non-compete agreements on firms – that is to say, there has yet to be research fully separating out the benefits from the costs of such agreements. For instance, if increased enforcement of employee non-competes make it harder to attract talent, this could increase wages for new hires, which may result in any short-term gains from increased non-compete enforcement being eliminated.

CONCLUSION

This dissertation demonstrates that employee non-competes can ethically operate as isolating mechanisms that both protect a firm's human capital from its competitors and operate as a powerful limitation on worker mobility. Thus, the dual intent of employee non-competes as both a mobility limitation and a knowledge protection mechanism can be ethically fulfilled in the search for firm competitive advantage. State policy on non-compete enforcement is therefore an important tool that policy makers should attend to in order to increase the financial performance of in-state firms. Putting issues of non-compete enforcement aside, I also address the question of when or whether firms should, from an ethical perspective, use non-competes.

This dissertation therefore bridges both strategic management and business ethics literature and makes important contributions to the extant literature on employee non-compete agreements, strategic human capital, and the resource-based view of the firm. Read together, the three essays of this dissertation demonstrate the ability of employee

non-competes to be used as tools by which firms can ethically create and sustain human capital-based competitive advantages.

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APPENDIX A

SELECTION OF EVENTS FOR ANALYSIS

My research identified 24 states that experienced changes in their enforcement of employee non-competes due to either state Supreme Court (or equivalent) decisions or legislative changes since 1980. These states are, in alphabetical order: Alabama (legislative change in 2016); Arkansas (legislative change in 2015); California (court changes in 1998 and 2008; legislative change in 2017); Florida (legislative change in 1996, court change in 2017); Georgia (legislative change in 2011); Hawaii (legislative change in 2015); Idaho (legislative changes in 2008 2016, and 2018); Illinois (court change in 2011, legislative change in 2016); Kentucky (court change in 2014); Louisiana (court change in 2001, legislative change in 2003); Massachusetts (court change in 2004); Michigan (legislative change in 1985); Montana (court change in 2011); Nebraska (court change in 2015); Nevada (court change in 2016, legislative change in 2017); New Hampshire (legislative change in 2012); New Mexico (legislative change in 2015); Ohio (court change in 2004); Oregon (legislative change in 2008); Pennsylvania (court change in 2010); South Carolina (court change in 2010); Texas (multiple years from 1987 to 2011, both judicial and legislative changes); Utah (legislative change 2016); Vermont (court decision in 2005); and Wisconsin (court changes in 2009 and 2015). Due to the complexity of identifying such changes, other states may have been omitted by accident from this list, and I have not included proposed legislation in this list.

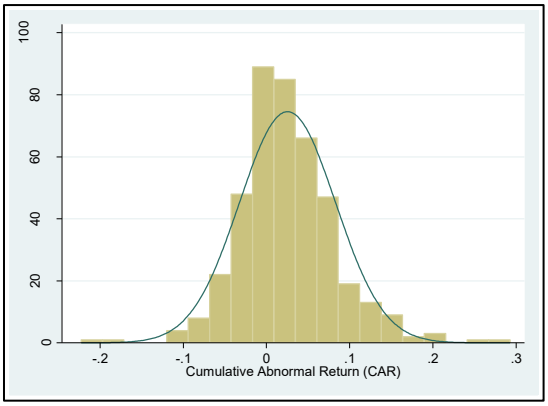
Of these, 15 states experienced changes due to state Supreme Court (or equivalent) decisions, as preferred for an event study as described in Chapters 4 and 5. I next focused on changes of dramatic magnitude and excluded changes that were best classified as clarifications on or minor changes to existing policy, as such changes would be unlikely to solicit significant reactions by investors. I also excluded legal decisions having to do primarily with contract interpretation in the state or with franchise, not employment, agreements. In total, I eliminated the 2017 Florida decision, the 2011 Illinois decision, the 2010 Pennsylvania decision, the 2004 Massachusetts decision, the 2015 Nebraska decision, the 2016 Nevada decision. This left only the judicial decisions in California, Kentucky, Louisiana, Montana, Ohio, Texas, Vermont, and Wisconsin, for consideration as potential "events." Based purely on the number of publicly traded companies in each of these states, since only publicly traded records are compiled by the Center for Research in Security Prices (CRSP), I decided to focus on the judicial decisions in California (Chapter 4) and Texas (Chapter 5) for this dissertation; the details of these changes explained in the applicable Chapter.

APPENDIX B

HISTOGRAMS OF INITIAL VARIABLES IN CALIFORNIA PROJECT

Plotted against normal distribution curve.

Sample size: n = 419



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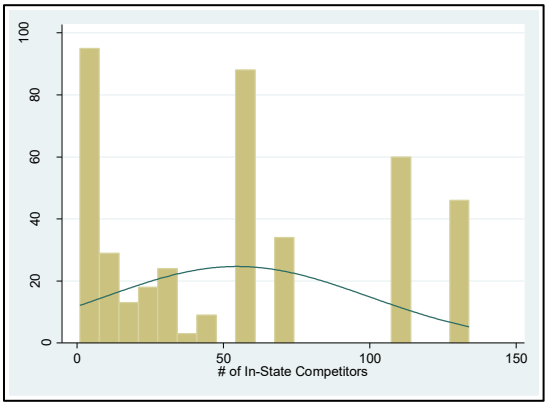

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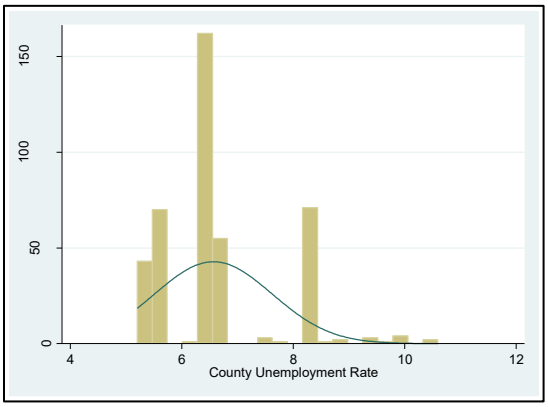
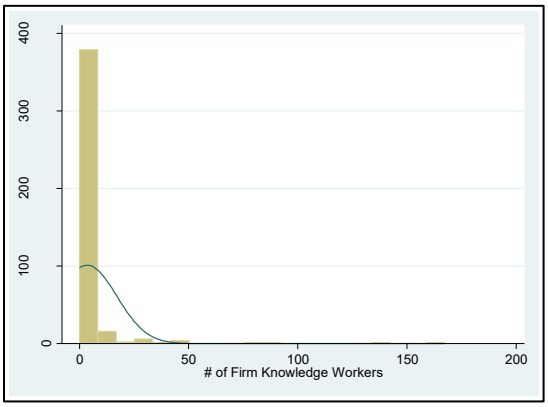


Sample size: n = 412



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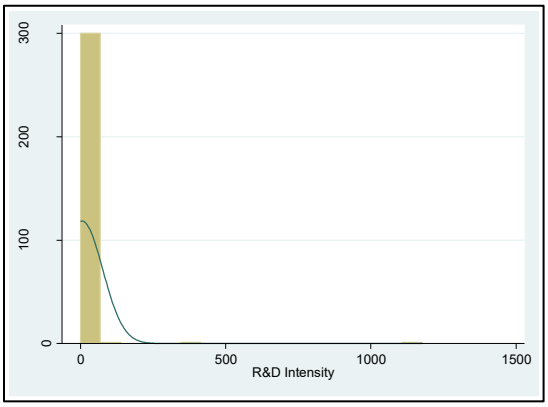

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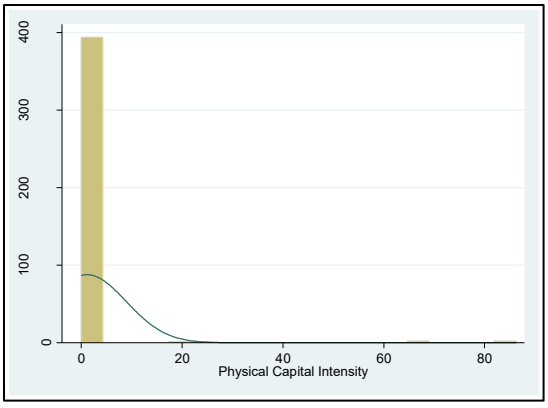

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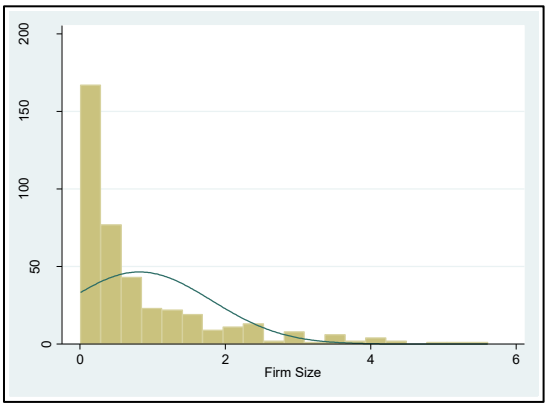
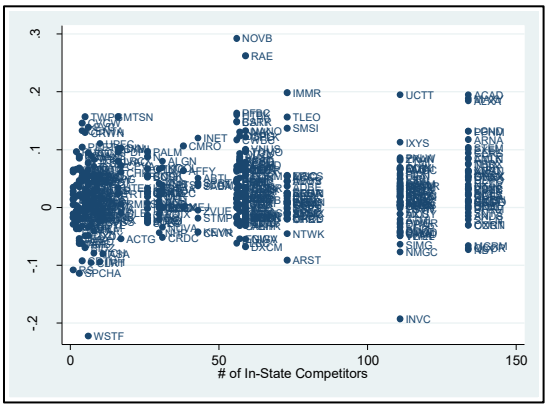


APPENDIX C

SCATTER PLOTS OF INITIAL INDEPENDENT VARIABLES IN CALIFORNIA REGRESSION VERSUS DEPENDENT VARIABLE

Points are labeled with stock market ticker

Sample size: n = 419



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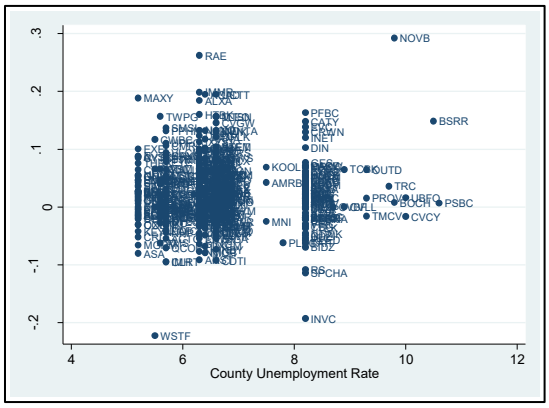

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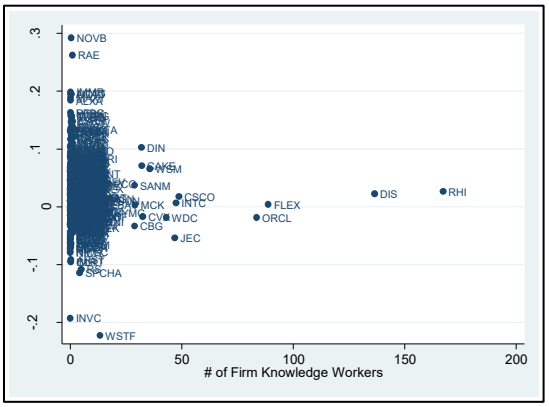
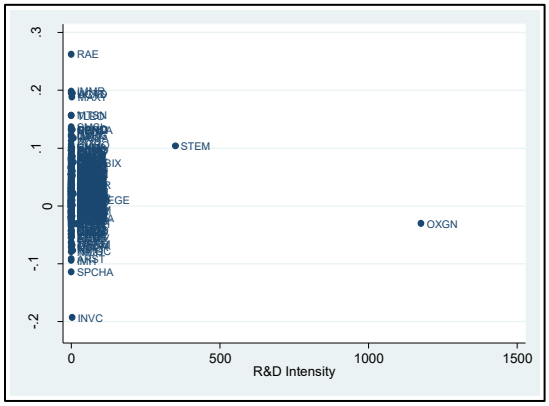


Sample size: n = 303



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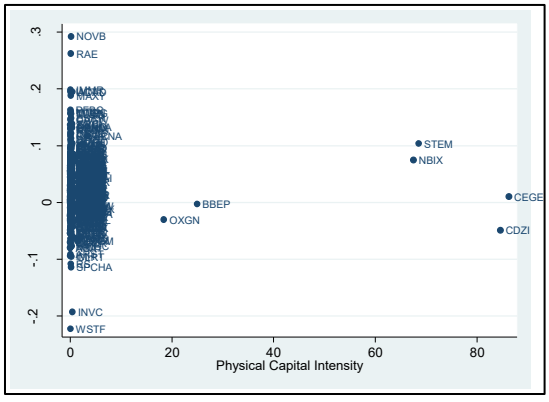


Sample size: n = 412

APPENDIX D

CALIFORNIA KNOWLEDGE WORKER INDUSTRY-LEVEL CALCULATIONS

Using May 2008 OES Data from the BLS; sorted hightech and the NAICS code.

Four Digit NAICS Code	NAICS Description	hightech	KWPerc (per Younge, et al. 2015)	KWratio (revised)
1113	Fruit and Tree Nut Farming*	0	0.840	0.029
2111	Oil and Gas Extraction	0	0.819	0.451
2211	Electric Power Generation, Transmission and Distribution	0	0.851	0.307
2213	Water, Sewage and Other Systems	0	0.643	0.114
2361	Residential Building Construction	0	0.985	0.138
2362	Nonresidential Building Construction	0	0.952	0.190
2373	Highway, Street, and Bridge Construction	0	0.868	0.090
3114	Fruit and Vegetable Preserving and Specialty Food Manufacturing	0	0.293	0.069
3116	Animal Slaughtering and Processing	0	0.174	0.034
3119	Other Food Manufacturing	0	0.357	0.095
3121	Beverage Manufacturing	0	0.474	0.098
3152	Cut and Sew Apparel Manufacturing	0	0.243	0.080
3162	Footwear Manufacturing	0	0.165	0.070
3222	Converted Paper Product Manufacturing	0	0.284	0.090
3231	Printing and Related Support Activities	0	0.387	0.117
3241	Petroleum and Coal Products Manufacturing	0	0.500	0.252
3256	Soap, Cleaning Compound, and Toilet Preparation Manufacturing	0	0.460	0.184
3259	Other Chemical Product and Preparation Manufacturing	0	0.420	0.188
3273	Cement and Concrete Product Manufacturing	0	0.340	0.062
3313	Alumina and Aluminum Production and Processing	0	0.309	0.089
3325	Hardware Manufacturing	0	0.325	0.128
3332	Industrial Machinery Manufacturing	0	0.536	0.307
3333	Commercial and Service Industry Machinery Manufacturing	0	0.555	0.312
3339	Other General Purpose Machinery Manufacturing	0	0.435	0.209
3353	Electrical Equipment Manufacturing	0	0.391	0.216
3359	Other Electrical Equipment and Component Manufacturing	0	0.368	0.189
3363	Motor Vehicle Parts Manufacturing	0	0.301	0.148

Four Digit NAICS Code	NAICS Description	hightech	KWPerc (per Younge, et al. 2015)	KWratio (revised)
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	0	0.254	0.068
3391	Medical Equipment and Supplies Manufacturing	0	0.399	0.207
3399	Other Miscellaneous Manufacturing	0	0.414	0.155
4231	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers	0	0.697	0.092
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	0	0.900	0.321
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers	0	0.523	0.110
4236	Electrical and Electronic Goods Merchant Wholesalers	0	0.860	0.234
4242	Drugs and Druggists' Sundries Merchant Wholesalers	0	0.884	0.222
4244	Grocery and Related Product Merchant Wholesalers	0	0.516	0.090
4412	Other Motor Vehicle Dealers	0	0.931	0.063
4422	Home Furnishings Stores	0	0.914	0.056
4451	Grocery Stores	0	0.832	0.045
4481	Clothing Stores	0	0.971	0.027
4511	Sporting Goods, Hobby, and Musical Instrument Stores	0	0.969	0.048
4529	Other General Merchandise Stores	0	0.865	0.044
4541	Electronic Shopping and Mail-Order Houses	0	0.881	0.216
5111	Newspaper, Periodical, Book, and Directory Publishers	0	0.819	0.415
5121	Motion Picture and Video Industries	0	0.635	0.147
5151	Radio and Television Broadcasting	0	0.996	0.706
5152	Cable and Other Subscription Programming	0	0.996	0.396
5171	Wired Telecommunications Carriers	0	0.995	0.296
5179	Other Telecommunications	0	0.998	0.339
5191	Other Information Services	0	0.987	0.611
5221	Depository Credit Intermediation	0	0.947	0.290
5222	Nondepository Credit Intermediation	0	0.998	0.408
5231	Securities and Commodity Contracts Intermediation and Brokerage	0	0.790	0.185
5239	Other Financial Investment Activities	0	0.997	0.574
5241	Insurance Carriers	0	0.998	0.512
5242	Agencies, Brokerages, and Other Insurance Related Activities	0	0.999	0.248
5259	Other Investment Pools and Funds	0	0.985	0.538
5311	Lessors of Real Estate	0	0.980	0.165

Four Digit NAICS Code	NAICS Description	hightech	KWPerc (per Younge, et al. 2015)	KWratio (revised)
5312	Offices of Real Estate Agents and Brokers	0	0.995	0.147
5322	Consumer Goods Rental	0	0.871	0.062
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	0	0.793	0.147
5331	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	0	0.988	0.482
5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	0	0.991	0.547
5416	Management, Scientific, and Technical Consulting Services	0	0.968	0.621
5419	Other Professional, Scientific, and Technical Services	0	0.972	0.561
5613	Employment Services	0	0.614	0.200
5614	Business Support Services	0	0.965	0.140
5615	Travel Arrangement and Reservation Services	0	0.975	0.123
6215	Medical and Diagnostic Laboratories	0	0.994	0.664
6219	Other Ambulatory Health Care Services	0	0.930	0.732
6233	Community Care Facilities for the Elderly	0	0.983	0.588
7211	Traveler Accommodation	0	0.966	0.060
7221	Full-Service Restaurants	0	0.992	0.023
7225	Restaurants and Other Eating Places**	0	0.992	0.023
9999	Nonclassifiable Establishments***	0	0.940	0.403
3254	Pharmaceutical and Medicine Manufacturing	1	0.684	0.495
3341	Computer and Peripheral Equipment Manufacturing	1	0.860	0.704
3342	Communications Equipment Manufacturing	1	0.736	0.534
3344	Semiconductor and Other Electronic Component Manufacturing	1	0.549	0.415
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	1	0.713	0.531
3364	Aerospace Product and Parts Manufacturing	1	0.649	0.456
5112	Software Publishers	1	0.993	0.792
5182	Data Processing, Hosting, and Related Services	1	0.981	0.576
5413	Architectural, Engineering, and Related Services	1	0.969	0.776
5415	Computer Systems Design and Related Services	1	0.995	0.791
5417	Scientific Research and Development Services	1	0.976	0.806

*OES data not available at the 4-digit industry or 3 digit subsector codes, so was proxied by 2-digit sector (11).

Four Digit NAICS Code	NAICS Description	hightech	KWPerc (per Younge, et al. 2015)	KWratio (revised)

**OES data not available at the 4-digit industry code, so was proxied by four digit code 7221 due to similarity.

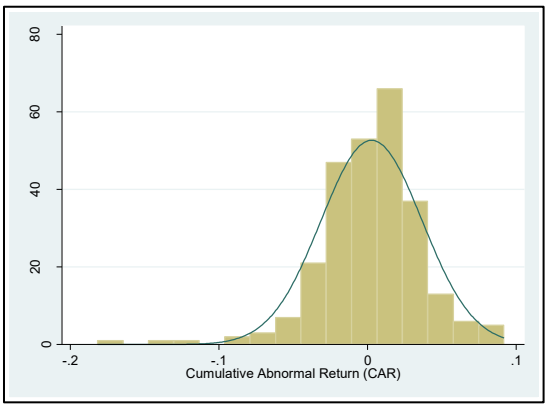
***OES data not available at the 4-digit industry, so was proxied by 3 digit subsector (999).

APPENDIX E

HISTOGRAMS OF INITIAL VARIABLES IN TEXAS PROJECT

Plotted against normal distribution curve.

Sample size: n = 263



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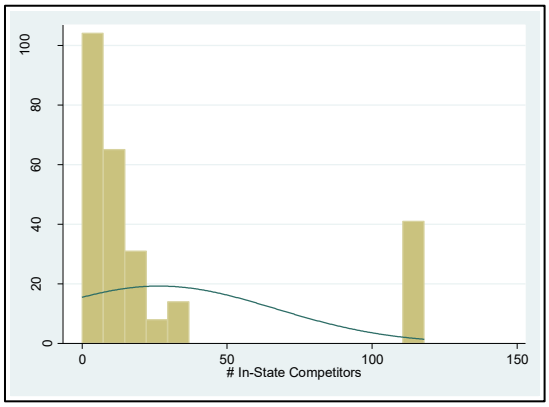

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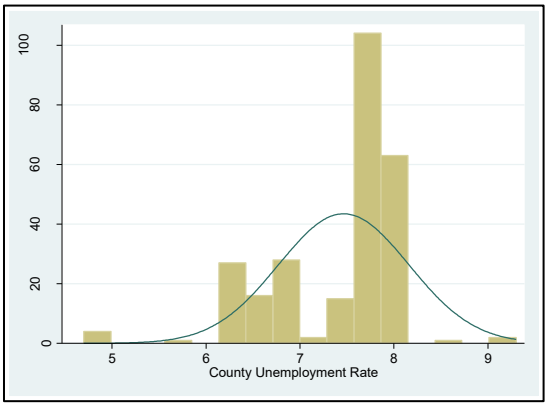

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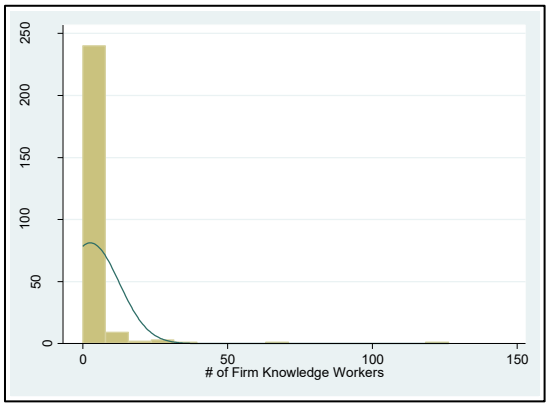

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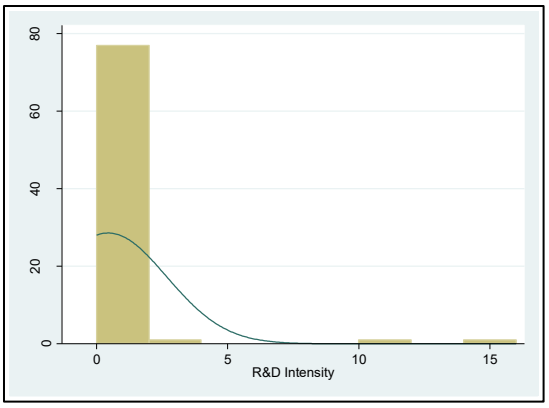

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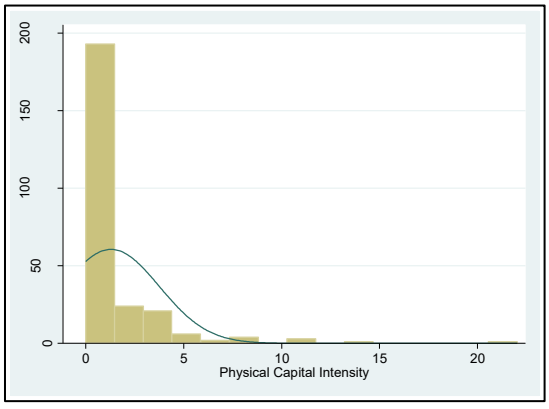

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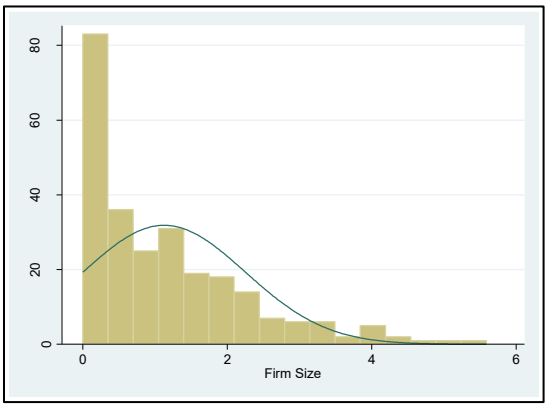
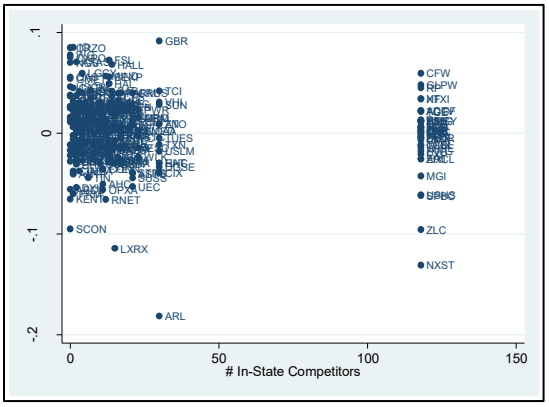


APPENDIX F

SCATTER PLOTS OF INITIAL INDEPENDENT VARIABLES IN TEXAS REGRESSION VERSUS DEPENDENT VARIABLE

Points are labeled with stock market ticker

Sample size: n = 263



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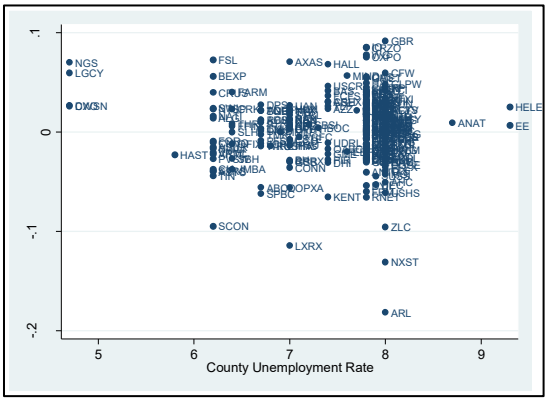

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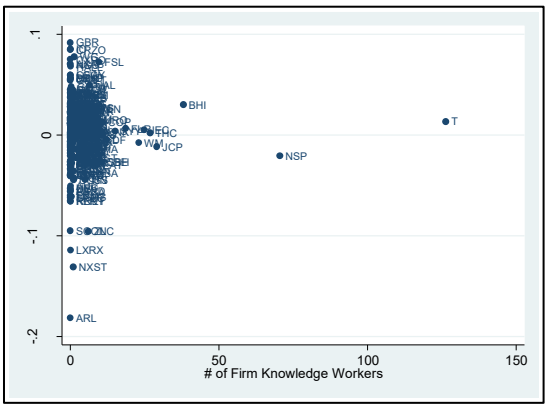

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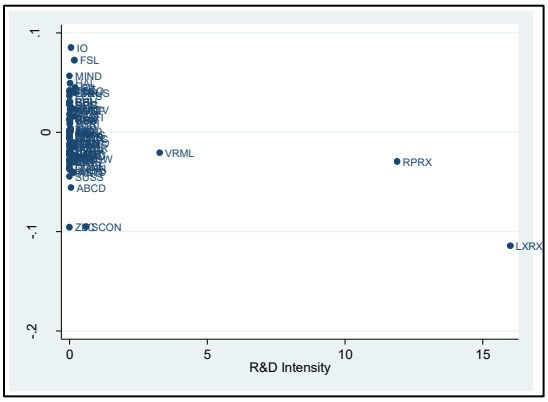

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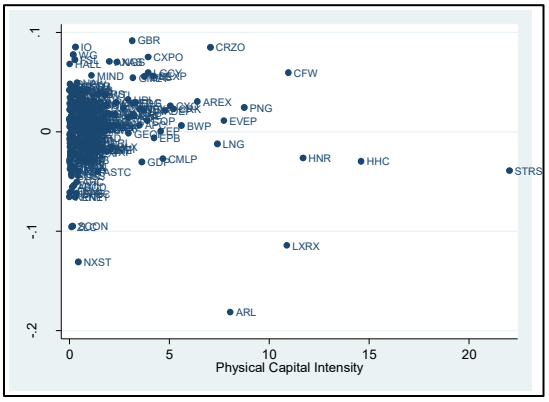

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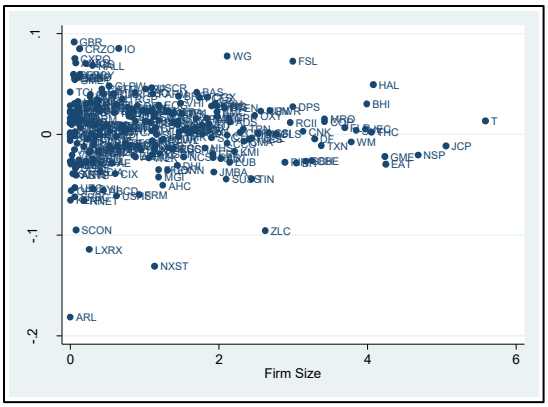

APPENDIX G

ADDITIONAL REGRESSION RESULTS FOR TEXAS

Generalized least squares regression results for the (+1, +3) event window using industry (two digit SIC code) fixed effects, with errors clustered at the industry level, excluding Oil & Gas and Electricity (SIC codes 13 and 49)

	Model 1 (Controls, full sample)	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7 (Controls, limited sample)**	**Model 8 (full)**
Mean CAR (3 day window)	-.0038909	-.00389	-.00389	-.00389	.0009829	-.00238	.0009829	.0009829
Independent Variables								
# In-state Competitors		-0.000						0.000
		(0.000)						(0.000)
County Unemployment Rate			0.000					-0.008
			(0.004)					(0.010)
# Firm Knowledge Workers				0.000				-0.002
				(0.000)				(0.004)
R&D Intensity					0.094			0.151**
					(0.113)			(0.062)
R&D Intensity Squared					-0.414 **			-0.515 ***
					(0.188)			(0.134)
Physical Capital Intensity						-0.004		0.071**
						(0.005)		(0.031)
Physical Capital Intensity Squared						0.000		-0.058 **
						(0.000)		(0.021)
Control Variables								
Firm Size	0.004	0.005*	0.004	0.004	0.006	0.003	0.010**	0.010
	(0.002)	(0.003)	(0.002)	(0.003)	(0.005)	(0.002)	(0.004)	(0.013)
Government Cluster	0.002	0.007	0.002	0.002	0.017*	0.001	0.013	0.013
	(0.007)	(0.006)	(0.007)	(0.007)	(0.008)	(0.006)	(0.008)	(0.008)
Constant	-0.010**	-0.011**	-0.011	-0.010	-0.020*	-0.005	-0.021*	0.032
	(0.005)	(0.005)	(0.031)	(0.007)	(0.010)	(0.005)	(0.010)	(0.068)
Industry Fixed Effects	Included	Included	Included	Included	Included	Included	Included	Included
No. of Obs.	186	186	186	186	49	175	49	49
R-Squared	0.015	0.037	0.015	0.015	0.356	0.024	0.140	0.434

Robust standard errors in parentheses; + p<0.10, *p<0.05, ** p<0.01, *** p<0.001