

Legal Foundation of Silicon Valley: Lessons for Asian Hi-Tech Districts

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Abstract Policy planners in Asia readily covet high technology districts and regional systems of innovation such as Silicon Valley. We examine the law's role, by way of covenants not to compete (競業禁止條項) in the development of Silicon Valley by reviewing the literature from 1999 through 2013. The research suggests that in certain high-tech districts such as Silicon Valley, there are greater gains in the innovation of a region by prohibiting CNCs. While we emphasize CNC law as the main legal determinant to Silicon Valley's success, the application of trade secret law and the inevitable disclosure doctrine are also factors that can aid or restrict the mobility and knowledge spillover of a region. Even with much explored, perspectives are lacking from a regional innovation systems analysis, and more so in the context of Asian nations. To tackle these gaps, three analytical frameworks are presented that entails labor law, law and economics, and law and innovation. And from within the law and innovation framework, research is introduced in the hope that future discussions on Asian regional innovation systems consider the legal foundation of Silicon Valley.

Keywords Covenants not to compete, non-compete law, labor mobility, high-technology districts, knowledge spillover, regional systems of innovation, Asia

I. Introduction

Do not regard Silicon Valley as some sort of economic machine, where various raw materials are poured in at one end and firms such as Apple and Cisco roll out at the other, but rather as a form of ecosystem that breeds companies: without the right soil and the right climate, nothing will grow.

- The Economist, March 27, 1997

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Few places are robust as Silicon Valley in technological innovation. Its nexus to research institutes, world-class universities, and venture capital are widely emulated. Some regional frameworks embrace agglomeration (Marshall, 1890); venture capital (Florida, 1986); national systems (Freeman, 1987); regional systems (Cooke et al. 1997); clusters (Porter, 1998); and triple helix (Etzkowitz, 2000). Under any analysis, Silicon Valley is an exemplar of innovation and technological growth.

Saxenian (1996) accounted for the vitality and growth of Silicon Valley against the relative stagnation of Route 128 of Massachusetts in the 1970s and 1980s in her seminal book. She noted that Route 128 featured large firms and proximity to Washington, resulting in a culture where firms were secretive of their technology and contacts. Silicon Valley, on the other hand, had small firms and developed a “laid back” culture due to its distance from Washington and large East Coast electronic firms. Small firms in Silicon Valley by necessity shared knowledge and contacts with even Stanford and Hewlett-Packard encouraging startups to attract talent to the region.

Saxenian explained that Route 128’s vertical integration and traditional hierarchies ensued from a regional economy of autonomous enterprises. Employees at Route 128 valued stability and company loyalty and rarely started new ventures. Silicon Valley employees, contrarily, gathered often informally and emphasized risk-taking and job-hopping. As small firms and startups shared knowledge and grew, much wealth was created. Successful people later became venture capitalists and they provided firsthand experience to startups. Whereas Route 128 reared large vertically integrated firms, designed to develop and protect technological skill, Silicon Valley advanced horizontal networks, which encouraged abundant startups and growth. Saxenian attributed geography and culture from a sociological perspective as the difference in Silicon Valley’s and Route 128’s relative success or stagnation in the 1980s.

Gilson (1999) in light of Saxenian’s study offered an alternate explanation: the different legal infrastructure triggered the difference in each region’s culture and success. He theorized that covenants not to compete (CNCs; 競業禁止條項), or sometimes known as non-compete law, are a key dynamic to Silicon Valley’s success. He first lays out a framework citing Alfred Marshall’s concept of the agglomeration economy: “as the number of employers of skilled workers within a region increases, workers with those skills are drawn to the region. As the number of skilled workers within a region increases, employers in need of workers with those skills are drawn to the region.” He links Marshall’s work to high technology districts where knowledge is a critical input, but hedges against the idea that in the age of technology and internet, geographical proximity is unimportant by distinguishing instantaneous communication of information across the World

Wide Web to that of tacit knowledge or know-how (Nelson, 1982). He claims the transfer of tacit knowledge requires proximity and that labor mobility acts as a mechanism to transfer tacit knowledge between firms.

Both Route 128 and Silicon Valley were anchored and initially set by major university complexes and the innovation resulting from university R&D, which led to commercialization and standardization. However, he argues that while initial conditions in both regions were set, Silicon Valley was able to break out of the ensuing industry life cycles and its diminishing returns by new interruptions and innovation. At this point, Gilson stresses the importance of knowledge spillover: one is voluntary through technology exchanges and joint ventures and the other involuntary based on the knowledge that is transferred when an employee changes jobs. These mobile employees with embedded knowledge diffuse new techniques in design, production, and marketing, and he asserts they supercharge the region with new technologies that create new industrial life cycles. His account agrees with Saxenian's juxtaposition of Route 128 and Silicon Valley but instead credits the knowledge spillover that is critical to the second-stage agglomeration economy as the result of employee mobility by way of California's prohibition on CNCs.

The paper is arranged as follows. Section II states our method and analytical frameworks. Section III begins with an overview of CNC and trade secret law and the legal doctrines used to enforce CNCs. Section IV returns to the theoretical and empirical works that support or refute Gilson's assertion, which informs section V, where we discuss the implications of our study and conclude.

II. Method and Analytical Frameworks

1. Method

We surveyed the literature on how legal infrastructures, by way of CNCs, assist or hinder in the development of high technology districts or RISs. We reviewed the law itself and its study in multiple disciplines. By SCOPUS, Google Scholar, and the Thomas Reuters Westlaw legal database, we searched titles, keywords, and abstracts in journal articles using: covenants not to compete, non-compete agreements, non-competes, postemployment covenants not to compete, restrictive covenants, or CNCs alone and in conjunction with Silicon Valley, industrial cluster, knowledge spillover, and innovation.

Over 37,200 articles appeared in our search, mostly from the American style law review. American law review articles merit an explanation. First, American law students customarily learn for four years, later entering a doctorate program in law. Most American law schools publish a law review and some others are led by academic and professional societies. Under this system, articles from legal scholars, judges, and students are edited and managed by top law students. Despite this, over 106 law review journals are in the Social Science Citation Index, many students led.

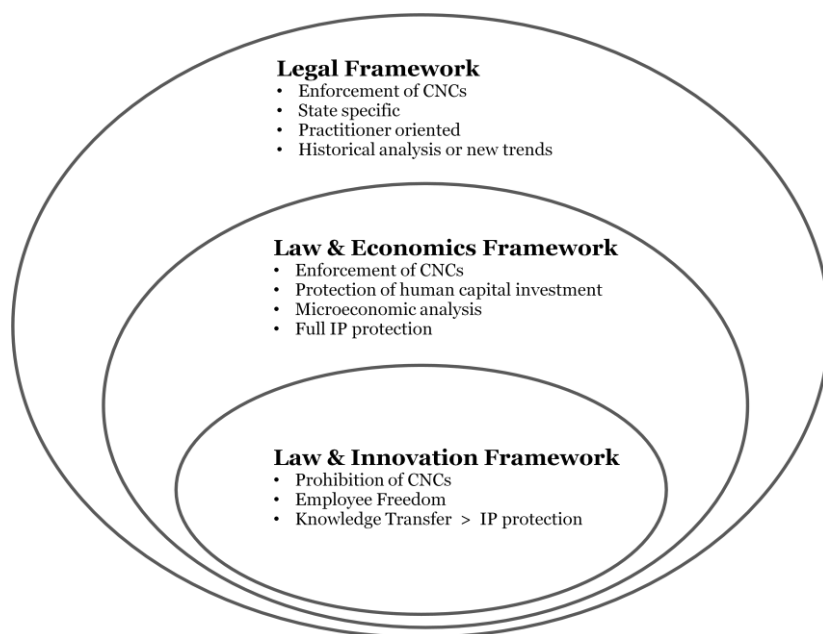


Figure 1 Analytical frameworks of CNC research

Our findings uncovered research related to CNCs in sociology, economics, law, finance, and innovation among other areas. The seminal paper related to our review was Gilson, which simplified our scope since we could trace all citing papers, along with crosschecking references of other papers that centered on CNCs from an innovation view (Gilson, 1999). A background in law assisted in confirming the current validity of legal cases and law. To further limit our scope, we excluded hundreds of articles unrelated to Gilson's assertion and papers of one state analysis of states without significant

innovation hubs. To understand papers in Gilson's chain, however, requires a comprehensive understanding of the law. Hence, some papers with a pure legal approach were included because of national scope or since they were seminal, visible by citations. Of significance to Gilson's assertion include papers linking CNCs to labor mobility, knowledge spillover, and innovation. Papers on labor mobility and knowledge spillover lacking CNCs as a basis were excluded. Through our method, we established three different frameworks on CNC law, and accentuated the research surrounding Gilson's paper.

2. Legal Framework

The vast majority of research on CNCs is in employment law (labor law) and other frameworks find their foundation here. The seminal paper on CNCs that summarized the history and gave advice to lawyers on how to draft a CNC for better chance of enforcement is by Harlem Blake, which has been cited 739 times according to Google Scholar (Blake, 1960). After Blake's paper, most if not all states have law review articles on the history of CNCs, state history of CNCs, and on how to draft effective CNCs for enforcement (Toronjo, 2011; Maloney, 2011; Still, 2013). Other papers are updates on trends across the U.S. or suggest approaches to mediate between enforcement and freedom or focus on the application of CNCs as it pertains to different industries like medicine, media, or law (Ingram, 2002; Packer, 2006; Garrison, 2008; Nicandri, 2011). Further papers focus on doctrines to enforce CNCs such as inevitable disclosure or on using theories from other disciplines such as business and philosophy to analyze the application of or theoretical foundations of CNCs (Hannes, 2001; Estlund, 2006; Wardwel, 2009; Hannah, 2010; Bishara, 2012). Shaped by our other frameworks, the characteristics of the legal framework are: historical analysis, practitioner oriented, state specific, and interdisciplinary works in and outside of the legal discipline, except law and economics or law and innovation, in which we draw independent frames.

3. Law and Economics Framework

The law and economics discipline using microeconomic analysis has been well developed since the 1960s and 1970s. The approach focuses on normative analysis, or the effects of law on real-life outcomes (Salzberger, 2012). The study of innovation through this orthodox model has only been by patent registration. A basic tenant of this framework is that the law on its own volition move towards efficient outcomes and that law be shaped to advance economically efficient results (Whitmore, 1990; Schulman, 1992; Glick, 2002). Under this model, contracts between two parties should be upheld and intellectual property rights fully protected, as long as without any market failure: asymmetric information, constrained choice, and externalities (Bishara, 2006). The criticism of this framework may be the inequality in bargaining power but supposing symmetrical information and perfect markets, efficient bargaining of CNCs is assumed. Research here emphasizes CNCs as a way of protecting and promoting human capital investments of employers (Rubin, 1981; Gillian, 2001; Bar-Gil, 2009; Nicola, 2009); CNCs as a way of optimizing efficient outcomes (Posner, 2004); or the economic benefits of enforcing CNCs, by for example, promoting executive salary (Garmaise, 2009). This neoclassical view accepts that market-based agreements are efficient and provides much of the theoretical support for the enforcement of CNCs. Accordingly, the characteristics of this framework are enforcement of CNCs, microeconomic analysis, and protection of human capital investment.

4. Law and Innovation Framework

A great chasm divides the view of CNCs under this approach to the neoclassical approach that emphasizes free competition and the protection of intellectual property rights to promote innovation. However, even leading law and economics scholars, William Landes and Richard Posner stated “it is not even clear that enforcing employee covenants not to compete generates social benefits in excess of its social costs.”(Landes, 2009; On & Lobel, 2013). Under the neoclassical framework, perspectives are absent from the Neo-Schumpeterian approach or evolutionary economics. Whereas Saxenian posits culture for shaping Silicon Valley’s success, Gilson highlights CNCs as the key for its unique infrastructure. Thus, the question of how CNCs shape

culture or effect infrastructure and the diffusion of knowledge and innovation fits into a Neo-Schumpeterian or evolutionary approach, such as systems analysis, that recognizes neglected factors from the traditional approach, such as culture, law, and infrastructure to influence the development, diffusion, and the use of innovations (Fagerberg, 2005). Even though the newly emerging field of law and innovation uses perspectives from the neoclassical approach and the approaches from the Schumpeterian or evolutionary tradition, CNC analysis in which knowledge transfer is emphasized over full protection of IP rights only finds support in the latter approaches. Accordingly, this section refers to the law and innovation framework outside of the neoclassical school and informs the findings section following the literature review in section IV. The law and innovation framework is noted by prohibition of CNCs, support of employee mobility, and a greater emphasis on knowledge transfer than the full protection of intellectual property rights.

III. Literature Review

1. Law in Action

A few years ago before Facebook's IPO, they poached at least 142 employees from Google including "stars" like Lars Rasmussen who helped create Google Maps (Miller, 2010). In high-tech, countless employees flee to smaller and nimbler firms despite the incentives of firms like Google. A study looking at Securities and Exchange Commission filings of CEO contracts of major U.S. corporations revealed 253 out of 375 CEO contracts (67%) contained a CNC (Bishara, 2010; Schwab, 2006). Most restrictions (118) were for two years, one year (80), and three years (29). Firms hope an employee who learns the inner workings, does not later exploit that knowledge at a rival firm. Conversely, employees aspire to use their know-how and pursue the best opportunities available.

A frequently highlighted case that shows this delicate balance is Google, Inc. v. Microsoft Corp (Google, Inc. v. Microsoft Corp., 2005). The dispute was between Microsoft Corporation (Microsoft), a Washington-based employer and its former employee, Dr. Kai-Fu Lee, and Google, Inc. (Google), a California-based employer. Dr. Lee was Microsoft's Vice

President for Research and Development and the exact clause from his CNC is below: Non-Competition and Non-Solicitation. While employed at Microsoft and for a period of one year thereafter, I will not (a) accept employment or engage in activities competitive with product, services or projects (including actual or demonstrably anticipated research or development) on which I worked or about which I learned confidential or proprietary information or trade secrets while employed at Micro-soft; (b) render services to any client or customer of Microsoft for which I performed services during the twelve months prior to leaving Microsoft's employ; (c) induce, attempt to induce, or assist another to induce or attempt to induce any person to terminate his employment with Microsoft or to work for me or any other person or entity. If during my employment with Microsoft I seek work elsewhere, I will provide a copy of this Agreement to any persons or entities by whom I'm seeking to be hired before accepting employment with or engagement by them (Pagnattaro, 2007).

Dr. Lee signed the agreement, containing a choice of forum clause, electing Washington law to govern. In exchange for signing, he received over \$4 million in compensation and was to lead Microsoft's foray into new search engine technologies. Despite Google being one of Microsoft's direct competitors, Dr. Lee less than a year later, informed Microsoft that he wanted to take Google's offer to "build and lead its China office end to end" (Pagnattaro, 2007). Initially, Microsoft sued in the Superior Court of Washington, of which Count II – Breach of Nondisclosure Promises and Misappropriation of Trade Secrets – concerned the CNC. Despite the contract electing Washington law to govern, Google and Dr. Lee sued in California court, since California has an interest in protecting its firms and citizens, and more importantly because CNCs are void under California's public policy. Eventually, Microsoft sued in Federal Court, where they hoped the Court would ask the parties to conclude under Washington law. Instead, the Court reasoned that Google and Mr. Lee had a valid argument regarding the application of California's law, even if the case were to be decided under a Washington court - soon after both parties settled and ultimately entered into a confidential settlement (Pagnattaro, 2007). However, Dr. Lee did go on to work for Google in China and quite possibly without California's prohibition of CNCs, this situation could have been more favorable to Microsoft. This case exhibits the world of CNCs in a global technological economy.

2. The Law in Majority of States

California's Business & Professions Code § 16600 states: except as provided in this chapter, every contract by which anyone is restrained from engaging in a lawful profession, trade, or business of any kind is to that extent void. Quite simply, California law favors employee freedom and mobility and trumps any motivation of the employer to impede the employee, outside of a few statutory exceptions related to the sale of business, dissolution of a partnership, or termination of a member's interest in a limited liability company. Other states have different statutes from California or follow the common law and apply some sort of "reasonableness test." Most reasonableness tests gauge (1) employer's interest, (2) employee's interest, and (3) the public's interest, which usually means limitations in duration and geography. The Restatements of the law, a highly respected secondary authority among lawyers and judges, states "A covenant in an agreement between the employer and the former employee restricting a former employee's activities is enforceable if it is reasonably tailored in scope, geography, and time to further a protectable interest of the employer." (Restatements in Employment Law, 2011). Majority of states share similar language but even though state courts can enforce a CNC, does not mean they always do.

A good recent case again in Washington court involves Amazon. com (Amazon.com, Inc. v. Powers, 2012). Mr. Powers signed a CNC spanning eighteen months from departure. Three months after leaving Amazon, he went to work as the Director of Global Cloud Platform Sales for Google, in California. The Washington Court considered Amazon's claim on the signed CNC, since it is an enforcement state, but concluded Amazon's attempt to ban Mr. Powers from working with Google because he will "inevitably disclose" trade secrets or confidential information was unsupported by evidence. The Court observed that Amazon's attempt to ban Mr. Powers or any employee they hired from working on the Cloud industry after departure amounts to enabling Amazon to "eliminate skilled employees from future competition by the simple expedient of hiring them." Amazon's case could have been ruled differently, if the facts would have been different, but in California no matter the facts, Amazon could not have enforced the CNC. Hence, employers and

employees knowing California’s stance negotiate under different rules of the game, leading to different strategies by workers and firms.

Table 1 Strength of enforcement ranking (2009)

State	Rank	State	Rank	State	Rank
Florida	1	Massachusetts	18	North Carolina	35
Kansas	2	Alabama	19	Arizona	36
Connecticut	3	Tennessee	19	Rhode Island	37
Illinois	4	Indiana	21	District of Columbia	38
Idaho	5	Maine	21	South Carolina	38
Utah	6	Pennsylvania	23	Virginia	38
Iowa	7	New Hampshire	24	Wisconsin	41
Missouri	7	Oregon	24	New York	42
New Jersey	7	Colorado	26	Georgia	43
Kentucky	10	Delaware	26	Nebraska	44
South Dakota	11	Mississippi	26	West Virginia	44
New Mexico	12	Wyoming	26	Montana	46
Louisiana	13	Hawaii	30	Oklahoma	47
Washington	13	Ohio	31	Alaska	48
Maryland	15	Texas	32	Arkansas	49
Michigan	15	Neveda	33	California	50
Vermont	15	Minnesota	34	North Dakota	51

Source: Bishara (2010)

Note: 1=strongest; 51 = weakest

Norman Bishara, a scholar in this area, systematically gauged the strength of CNCs across the United States using the American Bar Association’s state by state survey (Malsberger, 2008; Bishara, 2010). He gauged the levels of enforcement across all states but his analysis needs explaining: He ranks Arkansas with 49, Alaska 48, and Oklahoma 47; only within a few points from California but the legal regimes differ in a significant way – those states enforce CNCs and only California and North Dakota voids CNCs. Moreover, only a handful of states including California have clusters of high technology districts, leaving nothing for analysis in innovation systems in most states irrespective of CNC policy.

3. Trade Secret Law and Doctrines to Enforce CNCs

Currently, the Uniform Trade Secrets Act (USTA) is enacted by 47 states. Under the USTA, trade secret is defined as: “information including a formula, pattern, compilation, program, device, method, technique, or process, that: (i) derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by other persons who can obtain economic value from its disclosure or use, and (ii) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy” (Uniform Trade Secrets Act, 1990). Some consider trade secret laws just another layer of protection along with CNC laws to prevent employees from unlawfully disclosing intellectual property or trade secrets. Moreover, since it is a legal remedy designed to prevent the transfer of trade secrets, it may appear as an impediment to the knowledge spillover that occurs when an employee changes jobs. Under this reasoning, the CNC law as a mechanism to enhance knowledge spillover appears diminutive, considering that employers could just use or threaten the use of the USTA to prevent employees from sharing any knowledge learned from the former firm to the sequential firm. Besides the reputational damage to firms prosecuting employees under a trade secret violation, Gilson asserts two reasons on its ineffectiveness to control employees from leaving and spilling knowledge: first substantive, the second procedural. The substantive problem he mentions is that an employer has the difficult task of proving all three factors of the UTSA were violated: (1) Employer would have to show employee misappropriated the information of the original employer, (2) that the information was generally unknown, (3) and that the employer made reasonable efforts to protect that information’s secrecy. Procedurally, proving a violation is expensive and slow and difficult to prove considering the judge or jury would have to decide what is general industry knowledge or the employee’s tacit knowledge that derives economic value, actual or potential, from being unknown (Gilson, 1999).

Besides, even though most states have adopted the USTA, how they go about on enforcing it is a different matter, as Hyde noted California’s weak enforcement (Hyde, 1998; 2003). Another point Gilson makes on trade secrets is the idea that an employee owns their discovery, until the stage of conception – “the first occurrence of the complete invention in the mind of

the inventor – as corroborated by objective evidence.” This mean that an employee could possibly observe and work, without making documentation (objective evidence), and share with a new firm the trials and errors of the innovation process without incurring a trade secret violation. In other words, the employee has the ability to control the knowledge within his mind, and to do as he wishes.

Except California and possibly North Dakota, a variety of legal doctrines are used to enforce CNCs. For example, the inevitable disclosure doctrine potentially allows a judge to bypass CNC analysis, and yet still restrict the employee from working at a rival firm. And a new working paper empirically found that a ruling against inevitable disclosure was associated with a 0.3% point or 15% increase in the mobility of engineers and scientists with twenty four states to date ruling on the doctrine: “eight states (Arkansas, Delaware, Illinois, Iowa, Ohio, Pennsylvania, Utah, and Washington) clearly embracing it, four states (California, Louisiana, Maryland, and Virginia) clearly rejecting it, and twelve states giving mixed rulings” (Png, 2013). The “inevitable disclosure” theory is when an employer claims that a former employer has no choice but to disclose trade secrets in order to do their job. If a court follows this theory, it may prevent the employee from working for a rival even without a signed CNC (Ingram, 2002).

Gilson warned of inevitable disclosure in his 1999 paper and California has strongly rejected it. An influential case in “inevitable disclosure” is *Pepsico, Inc. v. Redmond* (*Pepsico, Inc. v. Redmond*, 1994). Mr. Redmond without signing a CNC was unable to work for Gatorade because he knew of Pepsi’s pricing and marketing and distribution systems, and the Seventh Circuit District Court ruled that Mr. Redmond would certainly have to rely on his former employer’s trade secrets on the job, thus preventing him from working (Ingram, 2002). Interestingly, this theory is in agreement with most law and economics theorists who claim intellectual property should always be protected but according to Gilson, endangers the knowledge spillover so critical to Silicon Valley’s success (Gilson, 1999). Other approaches are available to courts enforcing CNCs. One is the “all or nothing” rule, which completely prohibits the CNC if any part is unenforceable and the “blue pencil rule” which allows courts to only enforce those parts that are lawful (Ingram, 2002; Garrison, 2008; Nicandri, 2011). Another mentioned but rarely used approach in the U.S., from the U.K. is Garden Leave. Unlike a

typical CNC, the employer pays the employee to go “tend to their garden,” instead of working for a rival firm.

IV. Findings on CNC’s Role in Innovation

1. View of Research

Like all of western philosophy could be linked as footnotes to Plato, the papers in this section owe some regard to Gilson. We identified 26 papers augmenting or rebutting the assertion that CNCs are exigent to the development of a RIS. All papers are from the U.S., where most of the discussion has taken place and the topic by nature is narrow: CNC and surrounding laws and its effect on innovation. Moreover, available data is limited; most studies rely on the Current Population Survey – a primary source of labor force statistics in the United States, and the U.S. Patent Database. Thus, we could not protract large macro trends from the literature, yet a steady amount of papers has arisen from Gilson’s paper in 1999 through the end of 2013. After Gilson in 1999 – some years had multiple works: 2 in 2000; 2 in 2003; 3 in 2006; 2 in 2008; 2 in 2009; 5 in 2010; 4 in 2011; and 4 in 2013. Of those 9 out of 26 were theoretical, of which 8 out of 9 are law review articles. Theoretically, Professor Alan Hyde is notable, as Gilson acknowledged him for his insights in his seminal paper. Empirically, some authors presented multiple papers: Franco et al. wrote 3 papers; Marx et al. led on 3 papers, 1 book, and 1 influential working paper; and Sorenson et al. wrote 3 papers. These authors led the bulk of empirical research (10 out of 19) on the relationship between CNCs, mobility, knowledge transfer, and innovation.

2. Theoretical Reinforcements

Woods argues if Gilson is precise, the effects should be self-evident. He compares four high technology regions: Silicon Valley, Route 128, Austin, Texas, and the research triangle in North Carolina and showed all regions were successful despite differences in CNC policy (Woods, 2000). However,

no empirical studies have followed his claim, unlike that of Gilson's paper (Sampsa, 2011). Moreover, he acknowledges that each region's success may be due to other factors such as record unemployment and economic boom. Hyde, in recent years has argued for the prohibition of CNCs nationwide (Hyde, 2010) and the crux of his earlier arguments were that CNCs with immigration visas, stock options, health insurance, and other factors lead to a high velocity labor market resulting in innovation and knowledge transfer since "all of the firm's technical property has life only in the minds and bodies of its employees and is realized in labor markets" (Hyde, 1998; 2003). Bishara accepts Gilson's and Hyde's assertions and proposes a hybrid approach distinguishing creative workers from service workers to protect employer investment in service workers and encourage higher mobility of creative workers thought to enhance innovation (Bishara, 2006).

Further support comes from Graves who criticizes the law and economics approach and claims strict trade laws and enforcement of CNCs obstruct innovation (Graves, 2006). His later paper along with Moffat in a separate paper, argues CNCs are inept at protecting intellectual property thus weakening the law and economics models favoring enforcement (Graves, 2011; Moffat, 2010a). Moffat in another paper called for the complete abolishment of CNCs nationwide, since state differences can lead to inefficient markets and forum shopping (Moffat, 2010b). In California, Trossen finds Silicon Valley employers hire for specific skill sets and experience, thus reducing the training and investment obligations of firms, further wilting the law and economics approach (Trossen, 2009). Finally, Grant accepts the role of CNCs in the development of innovation ecosystems and compares labor laws in China, India, and Brazil, arguing that while CNCs may lead to greater mobility and knowledge transfer, it could also result in lower FDI as investors want strong intellectual property protection (Grant, 2013). Except the paper by Woods, these papers reinforce Gilson's approach of prohibiting CNCs by attacking the law and economics approach to CNCs and the intellectual property justification for enforcing them.

3. Empirical Support

Franco and Filson examined the rigid disk industry where 25% of firms were spinouts. They discovered that impeding employee mobility led to

inefficient resource allocation, and that firms were training grounds for later startups, contrasting with other models of diffusion (Franco et al., 2000; Franco et al., 2006). Franco and Mitchell laid out an economic model that explains Saxenian's and Gilson's take on how Silicon Valley overtook Route 128 (Franco et al., 2008). Stuart and Sorenson found positive effects of new venture formation in the biotechnology industry in only states not impeding mobility and further discovered through their panel study on venture capital from 1993-2002 that prohibiting CNCs led to more venture capital and entrepreneurship (Stuart et.al, 2003; 2008).

Another later paper involving Sorenson showed that labor mobility aids the effects of venture capital on innovation and the overall regional economy, identifying it as a critical factor in the development of a regional innovation center, even suggesting that enforcement of CNCs impedes innovation (Sorenson et al., 2011). In their conclusion, they mention how China with a few improvements to labor market fluidity received great returns in economic efficiency and raised the case of Ontario, Canada – a place with Research in Motion, venture capital, and great universities, that never developed a dynamic RIS perhaps due to its legal system in which management-level employees cannot leave for competing firms, even in the absence of CNCs (Sorenson et al., 2011).

Fallick et al. in a study using the Current Population Survey, also found more mobility in the California computer industry than other states but only in the high-tech sector – which is consistent with Gilson's assertion that non-enforcement of CNCs are critical to high technology districts (Fallick et al., 2005).

Marx, feasibly, provides the greatest support for Gilson's assertion. Michigan's Congress inadvertently reversed its CNC law, from non-enforcement to enforcement as part of a general change that came with an adoption of trade secret laws. This accidental reversal provided perfect experimental settings to test the impact of CNCs on mobility. The studies based on the U.S. patent database found that job mobility of inventors fell 8.1% following Michigan's law change and for those "star" inventors, job mobility fell 15.4% which strongly supports Gilson (1999), Sorenson et al. (2003), Fallick et. al. (2006), and other papers that support the role of CNCs on mobility and innovation (Marx et al., 2007; Marx et al., 2009). In other papers, he even found brain drain from regions where CNCs are enforced to

places where they are not, and discovered through extensive surveys that many employees involuntarily took career detours or avoided working altogether, to avoid potential lawsuits stemming from CNCs (Marx et al., 2010; Marx, 2011).

Another wrinkle in this chain of papers is by behavioral analysis. The studies from On and Lobel based on experimental research designed to stimulate a job market, shows that those who feel free have greater motivation and performance (On & Lobel, 2010). They suggest that enforcement of CNCs may reduce the motivation of employees to perform well and attempt to link the empirical studies on regional knowledge spillovers with behavioral studies on motivation and performance (On & Lobel, 2013).

Also, in recent years Professor Png has rolled out a series of working papers that are similar in design to the empirical studies on CNCs to examine the effects of trade secret law and inevitable disclosure on knowledge spillover and mobility. He found that more enforcement of trade secret law, shown by cases, was associated with lower inventor mobility. He even noted that trade secret law was more influential in the mobility of inventors but his assertion may be flawed due to his study design of only analyzing numerically the available case law, without any substantive analysis, which could just mean there have been more litigation under the trade secret law than under CNCs (Png, 2011, 2012). He also empirically found that rulings against the inevitable disclosure theory were associated with a 15% gain in mobility of engineers and scientists (Png., 2013). Even though Png takes a slightly different direction by focusing on trade secret law and inevitable disclosure, he augments Gilson's chain by finding that mobility is helpful to spillover and innovation and that strong enforcement of trade secret law and the inevitable disclosure doctrine impedes mobility – ideas strongly suggested in Gilson's seminal paper.

One suggested drawback of employee mobility and the non-enforcement of CNCs is a recent paper from Conti who used the U.S. patent database from 1990 to 2000. He empirically found that firms in strict enforcement states were more likely to undertake riskier R&D projects than firms in less strictly enforcing states. He suggests that when firms can restrain mobility by way of a CNC, they are more likely to give researchers the freedom to take on

higher risk projects that can lead to more radical or path-breaking innovation (Conti, 2013).

V. Discussion and Conclusion

1. Discussion

Much ink has been spilt on CNCs and its effects on mobility, entrepreneurship, and innovation. Particularly confirmed by many studies is that California, a place that prohibits CNCs, enjoys greater inventor mobility than places that enforce (Fleming, 2006). Following the logic of greater mobility leads to greater knowledge transfer by employees is not too difficult when you consider the nature of tacit knowledge embedded into the employee and the difficulty of firms to sue under trade secret law in a high technology district where speed matters.

There are many different types of systems of innovation in Asia, usually designed around a western model (Timberman, 2013). Places where policy planners invest in world-class universities and links between government and industry and venture capital but less attention has been paid to the importance of labor law, and in particular CNCs. At least concerning U.S. RISs, it is clear that labor law matters. In Asia, strong discussions on the impact of CNCs have yet to take place, and no significant technology clusters on the level of Silicon Valley exists, despite strong policy support, world-class universities, and research institutes. Even in other places like Ontario, Canada, no dynamic RIS exists even with the much-discussed components and yet Silicon Wadi of Tel Aviv, Israel, prohibits CNCs and is thriving (Royker, 2011; On & Lobel, 2013).

In the hopes of spurring discussion in Asia, this paper presents a review over CNC law and three analytical frameworks in which research takes place, in addition to reviewing trade secret law and some doctrines used to enforce CNC laws at present. From the frameworks, the law and innovation framework informs the findings which are abridged into theoretical and empirical platforms on which future research on Asia could spring. The implications of this study become further apparent, when related to the existing frameworks on RISs. Most RIS studies only casually mention the role institutions or laws can play and focus on the university-industry-

government nexus, perhaps due to the difficulty of identifying certain laws or policies that are empirically verifiable. The significant literature on CNCs may however provide an entry to such inquires. In reality, Asian governments have spent vast resources to develop RISs since such a system could be a driver of growth with national implications. Even so, the role that labor law can play to mobilize the human capital trapped within labor markets is not even mentioned in Asian RIS studies, nor directly mentioned in any international study strictly focused on RISs. Hence, this paper hopes to timely add to the RIS discussion as Asian countries move from the catch-up period of importing technology to the post-catch up period that is built on the knowledge-driven creative economy (Hwang & Choung, 2013). Especially if CNCs played a role in the spinouts, knowledge transfer, and innovation in Silicon Valley, as the findings suggests.

Not to say that RIS and CNC studies must be linked. Gilson used Alfred Marshall's work on industrial districts and agglomeration as a backdrop, and highlighted proximity as a key to the innovation and learning that occurs between the cooperation of local actors (Doloreux, 2002). Additionally, RIS studies and other theoretical perspectives are somewhat blurred. Even within the RIS discussion, there are at least a few different perspectives such as historical, institutional, and evolutionary. But in all perspectives, learning networks exist such as trade networks – which are the links between user-producer trades, and knowledge networks – which are the flow of know-how information relations positive to innovation (Doloreux, 2002). Then the question is when an employee takes their knowledge and moves onto a nearby firm, what kind of network or learning occurs and more broadly what role does CNCs play in the development of such learning networks? Hopefully, the answer to this question can be answered under the perspectives of RIS studies, where much policy action in Asia follows.

Within the literature under the law and innovation framework, California's small and nimble hi-tech firms are the focus. But we believe spinouts as characterized by Silicon Valley are unlikely in certain industries because of the enormous investments needed in R&D. Likewise, radical and potentially path-breaking innovations may benefit from firms being able to enforce a CNC, since firms would feel more comfortable in providing large funds to researchers who are restrained from spilling knowledge over to a rival firm (Conti, 2013). That is, certain industries and sectors may benefit

from a “California law,” especially regions that share features with Silicon Valley, but more traditional or capital-intensive industries as well as industries where long-term radical innovations are emphasized may be better suited by a CNC enforcement regime.

This discussion poses some interesting questions: In Asia, do cultural factors such as loyalty to firms and expectations of lifetime employment impact its CNC policy or do industry characteristics shape the culture and policy? Can traditional and capital-intensive industries thrive in a RIS like Silicon Valley where proximity plays a role? Lastly, what CNC frameworks are suitable to what types of sectors, regional systems, or industries?

2. Conclusion

The law and innovation framework is a salient discussion on utilizing knowledge spillovers from the human capital confined within the labor market. Still, the link between labor law and innovation is nascent in Asian contexts. Our research suggests that at least in Silicon Valley, the spillover effects gained from employee freedom outweigh any motivations of the employer to impede employee mobility. California seems to grasp the benefits of its legal foundation, since it has fought off all challenges despite numerous pressures. Asian countries around the world have engaged the RIS discussion, beyond words through bold actions, yet not so in the context of labor laws and its role to innovation.

We acknowledge the focus was on the law and innovation framework concerning CNCs, and certainly the law and economics framework diverge. Indeed, there are 50 states in the U.S. that diverge on the impact of CNCs and on which policy is the greater hand. Hence, we include analysis on a U.S. national scope to show how CNCs operate in different places. But at least in high technology districts, we think the empirical basis by Franco et al., Marx et al., and Sorenson et al. is strong, while rebuttals are weak. To close, we wish to plant a seed for discussion from an innovation perspective in Asia, in the hope that further research sprouts. In the future, if law changes in Asia to allow employees more freedom to be entrepreneurs, then Gilson’s ideas will have bloomed.

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