

Trade Secrets, Non-Competes, and Mobility of Engineers and Scientists: Empirical Evidence

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As they change jobs, engineers and scientists carry knowledge from one employer to another. Spillovers of knowledge, and so, innovation and economic growth, depend on institutions that influence professional mobility.

Here, I investigate the impact of U.S. state-level trade secrets law on the movement of engineers and scientists among employers within states. I find that mobility was negatively associated with the legal protection of trade secrets, as characterized by a new index of trade secrets law. Specifically, an increase in the index by 0.417, representing the effect of California's enactment of the Uniform Trade Secrets Act, was associated with 0.4% lower mobility of postgraduate-qualified engineers and scientists.

The negative association between the strength of trade secrets protection and the mobility of postgraduate-qualified engineers and scientists was weaker to the extent that the state enforced covenants not to compete.

My results have implications for the degree of knowledge spillovers between established organizations as well as the rate of entrepreneurial start-ups, and ultimately, the overall economy-wide rate of innovation and economic growth.

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1. Introduction

In the fall of 1999, three senior engineers quit semiconductor manufacturer, Intel, to join Broadcom, a manufacturer of communications equipment.¹ They were Greg Young, product manager for Fast Ethernet and gigabit MAC products, Steven Lindsay, described as the “chief architect” of software for gigabit MAC products, and Martin Lund, an engineering manager. Subsequently, in March 2000, Intel engineer, Brad Gunther, approached Broadcom Chief Executive Officer, Henry T. Nicholas III, for a job.

Intel sued Broadcom and the four engineers for misappropriating its trade secrets. Further, claiming that Broadcom’s hiring of the four engineers would result in the “inevitable disclosure” of Intel’s trade secrets, Intel applied for an injunction to bar each of the engineers from working on gigabit Ethernet for Broadcom, pending trial. Judge William F. Martin of the California Superior Court in Santa Clara County refused to grant the injunction against Messrs Young, Lindsay, and Lund. However, Judge Martin described Mr Gunther as “not trustworthy” and enjoined Broadcom from employing him in “any capacity” pending trial.

Intel’s suit against Broadcom and the four engineers illustrates several issues of importance to public policy and managerial practice. Scientists and engineers who move between employers bring technical knowledge from one organization to another. Such communication plays a central role in innovation and economic growth. To the extent that the transfer of knowledge is not completely internalized by the new and original employers, the transfer will result in an externality – a knowledge spillover. Accordingly, it is important for policy-makers and managers to understand the institutions that influence professional mobility.

Png (2012) showed that state enactment of trade secrets laws was associated with more R&D among high-tech and larger companies, and reduced patenting in industries where patents have been assessed as being useful in appropriating innovations. However, his research did not investigate the mechanism by which trade secrets laws affected corporate innovation.

Intel’s suit suggests one answer – trade secrets law affected corporate innovation by inhibiting the movement of technical professionals among employers. Indeed, more than 75% of trade secrets cases in state courts and over half of cases in federal courts involved an existing or

¹ The following case study of the dispute between Intel and Broadcom is based on “Intel Corporation and Level One Communications, Inc. vs Broadcom Corporation and others”, CV 788310, Order, Superior Court, Santa Clara County, May 25, 2000, *Los Angeles Times* (2000a and 2000b) and Hyde (2003: 26-27).

former employee (Almeling et al. 2010 and 2011). To the extent that fewer professionals move from one employer to another, less knowledge would be communicated from one employer to another. This would affect the return from and incentive for expenditure on R&D.

In the United States, trade secrets are a state matter and the law comprises both statute (in all but three states) and case law. So, the policy and managerial issue is whether, and to what extent, state trade secrets law has affected the mobility of technical professionals.

Intel's suit indirectly raises another important issue. The information and communications technology industry germinated in both Silicon Valley, Northern California, and along Route 128, Massachusetts. However, Silicon Valley eventually eclipsed Route 128. Saxenian (1994) famously attributed the Valley's relative success to a culture of job-hopping and vertically specialized businesses. In turn, Gilson (1999) ascribed the easy worker mobility to a California statute that prohibits covenants not to compete (CNCs). However, trade secrets law, working through the doctrine of "inevitable disclosure", could effectively serve to enforce CNCs (Gilson 1999; Hyde 2003; Graves and DiBoise 2006). So, to what extent did professional mobility and Silicon Valley's success depend on the law of trade secrets vis-à-vis the law of CNCs?²

Here, I draw on data from multiple sources to investigate the effect of the legal protection of trade secrets on the mobility of engineers and scientists using a difference-in-differences design. Building upon Png's (2012) compilation of major trade secrets cases and enactment of trade secrets statutes, I constructed an index of trade secrets law on a scale of 0 to 1. This index represented the strength of legal protection of trade secrets on three dimensions. The index varied within states over time and across states, with a higher value of the index representing laws and legal procedures that favor the plaintiff (owner of the trade secret), and a lower value of the index representing laws and legal procedures that favor the defendant (alleged misappropriator of the trade secret).

I then drew on the Current Population Survey for records of changes of employer within states among engineers and scientists with postgraduate qualifications, engineers and scientists with bachelor degrees, and engineering and scientific technicians. I found that increases in the legal protection of trade secrets were negatively associated with the movement of postgraduate-qualified engineers and scientists from one employer to another. Specifically, an increase in the index of 0.417, representing the effect of California's enactment of the Uniform Trade Secrets Act, was associated with mobility of postgraduate-qualified engineers and scientists being 0.4% lower.

² "So far the empirical literature deals only with covenants not to compete. Application to other impediments to employee mobility awaits further research. The application of these methods to trade secret law will be difficult" (Hyde 2012).

Increases in the trade secrets index were associated with no significant effect on the mobility of bachelor-qualified engineers and scientists or engineering and scientific technicians.

The negative relation between trade secrets law and the mobility of postgraduate-qualified engineers and scientists was weaker to the extent that the state enforced CNCs. In states that fully enforced CNCs (as characterized by Garmaise's (2011) index), trade secrets law had no significant effect on the mobility of postgraduate-qualified engineers and scientists.

Further, drawing on various legal authorities, I characterized the state trade secrets law with regard to the doctrine of "inevitable disclosure". I found that the relation of the doctrine of inevitable disclosure to professional mobility was similar to that of other elements of trade secrets law. The doctrine was negatively related to the mobility of postgraduate-qualified engineers and scientists, and the relation was weaker to the extent that the state enforced CNCs. The doctrine of inevitable disclosure had no significant effect on the mobility of engineers and scientists with bachelor degrees.

My findings have obvious implications for public policy and managerial practice. To the extent that trade secrets law affects the mobility of engineering and scientific professionals, it would affect innovation and economic growth through the rate of spin-offs as well as spillovers of knowledge among established organizations. Further, to the extent that engineering and scientific professionals who move raise their own productivity, the reduction in mobility would further diminish economic growth.

Within organizations, the reduced mobility of engineering and scientific professionals would affect the incentives of the organization and the employees themselves to invest in training and development. Finally, the reduced mobility would also affect compensation policy: to the extent that employees have less opportunity to work elsewhere, organizations might pay them less (because they need not worry so much about retention) or more (because the organization no longer provides a training ground for better opportunities elsewhere).

2. Law

In the United States, trade secrecy and covenants not to compete are matters of state rather than federal jurisdiction. Historically, trade secrets were governed by common law. In 1939, the Restatement (First) of Torts, in its consolidation of the common law of torts, included section 757

on trade secrets, and defined a trade secret to “consist of any formula, pattern, device or compilation of information which is used in one's business, and which gives him an opportunity to obtain an advantage over competitors who do not know or use it”.

Then, in 1979, the National Conference of Commissioners on Uniform State Laws approved and recommended the Uniform Trade Secrets Act to the states for two reasons.³ One reason was that many states did not have extensive case law on trade secrets. The other reason, even for states with substantial case law, was to clarify the parameters of trade secret protection and the appropriate remedies for misappropriation. Substantively, the UTSA expanded the definition of a trade secret. Compared with the Restatement (First) of Torts, the UTSA did not require that the secret be business related or in continuous use. So, the UTSA encompassed negative information, work in progress, and one-off information (Lydon 1987: 430; Samuels and Johnson 1990: 62-63; Pooley 1997- : 2.03[2]). Further, the UTSA clarified injunctive and damages remedies, and the statute of limitations (Samuels and Johnson 1990: 53).

Within the period of my study, 46 states had enacted a trade secrets statute, mostly conforming or similar to the UTSA. Four states -- Massachusetts, New Jersey, New York, and Texas -- had not enacted any trade secrets statute and relied completely on common law.⁴ Obviously, case law was key for states without a trade secrets statute.

Given the differences between the states in their trade secrets case law before enactment of a statute, and differences among the statutes, it is important to account for these differences in any study of the impact of trade secrets law. Motivated by various indexes of state laws (Bebchuk and Cohen (2003) on anti-takeover provisions and Garmaise (2011) on covenants not to compete), I compiled an index to represent the strength of the legal protection of trade secrets under statute and common law in each state over time.

This index built on the characterization of trade secrets law in Png (2012), who identified six particular items to represent the three dimensions of the law – substantive law, procedure, and remedies – that were the focus of the UTSA. (Below, I extend the legal analysis to the doctrine of “inevitable disclosure”, which is beyond the scope of the UTSA but has substantial implications for professional mobility.) The six items were:

³ “Uniform Trade Secrets Act Prefatory Note”, *Uniform Laws Annotated*, Vol. 14.

⁴ New Jersey enacted a trade secrets statute in 2012. Massachusetts enacted a very rudimentary statute (General Laws, Chapter 93, Section 42, and Chapter 266, Section 30(4)). New York and Texas have not enacted any statute.

- Substantive law:
 - Whether a trade secret must be in continuous business use;
 - Whether the owner must take reasonable efforts to protect the secret; and
 - Whether mere acquisition of the secret is misappropriation;
- Civil procedure: The limitation on the time for the owner to take legal action for misappropriation;
- Remedies:
 - Whether an injunction is limited to eliminating the advantage from misappropriation; and
 - The multiple of actual damages available in punitive damages.

I constructed the index of the legal protection of trade secrets as the sum of the scores for each of the six items divided by six, so the index was scaled between 0 and 1. In turn, the score for each item was specified so that a higher score represented laws and legal procedures that favored the plaintiff (owner of the trade secret), while a lower score represented laws and legal procedures that favored the defendant (alleged misappropriator of the trade secret). So, by design, a higher value of the index represented stronger legal protection of trade secrets. Please refer to Table 1 for details of the index.

For each item, I used the American Bar Association’s surveys of state trade secrets law (Pedowitz et al. 1997; Malsberger et al. 2006) and further legal research to identify the relevant milestones and the direction of change of law from 1975 until 2008. It is worth stressing that the legal milestone could be a statute taking effect or a case that set legal precedent.

Figure 1 illustrates the evolution of state trade secrets law as represented by the index in six states between 1976-2008. Generally, trade secrets protection has tended to strengthen over time. Consider, for instance, California. In two cases, decided in 1958 and 1960, the California Court of Appeals decided three aspects of the substantive law of trade secrets – that a trade secret must be in continuous business use, that the owner must take reasonable efforts to protect the secret, and that mere acquisition of the secret does not amount to misappropriation.⁵ Each of these received a score of zero (as they relatively favoured the defendant), so the index for California was zero until 1978, when the Court of Appeals held that an injunction was *not* limited to eliminating the advantage

⁵ By-Buk Co. v. Printed Cellophane Tape Co., 163 Cal.App.2d 157, 329 P.2d 147, 118 USPQ 550, (1958); Ungar Electric Tools, Inc. v. Sid Ungar Co., Inc. 192 Cal. App. 2d 398 (1961).

from misappropriation.⁶ This decision received a score of one (as it relatively favoured the plaintiff), and so the index rose.

The next milestone was in 1985, when California enacted the Uniform Trade Secrets Act. The Act reversed three of the earlier precedents (by the Act, a trade secret *need not* be in continuous business use, mere acquisition of the secret *is* misappropriation, and an injunction *is* limited to eliminating the advantage from misappropriation) and established the law on limitation on the time for the owner to take legal action and the multiple for punitive damages. From 1985 onward, the index in California remained at 0.611. (Below, I discuss a particularly important development in California law that the index does not cover – the doctrine of “inevitable disclosure”.)

By contrast, the pattern of the indexes for Massachusetts, New York, and Texas was relatively more gradual because the law evolved through case decision without any statute. Pennsylvania presents an interesting contrast. By the time that its Uniform Trade Secrets Act came into effect in 2004, the six items listed above had already been decided in legal cases, so, enactment had no effect on the index of trade secrets law.

In states with a trade secrets statute and those without, the law of trade secrets has continued to evolve. A legal concept of particular importance to professional mobility is the doctrine of “inevitable disclosure”. By this doctrine, an organization can seek an injunction to prohibit a former employee from working for a competitor, on the ground that she would inevitably disclose trade secrets. It is important to stress the scope of this doctrine. The plaintiff need not prove that the former employee had used or disclosed any trade secret. Rather, the plaintiff would simply need to show that the former employee would be employed in such a capacity that they would “inevitably” disclose the trade secrets. In 1964, the Delaware Court of Chancery cited this doctrine in allowing DuPont’s petition for an order restraining its former employee, Donald E. Hirsch, from working for American Potash and Chemical Corporation in any way relating to chloride processes.⁷ The doctrine of inevitable disclosure gained renewed salience in the PepsiCo decision by the U.S. Court of Appeals for the 7th Circuit in 1985.⁸

I drew on the American Bar Association’s survey of state trade secrets law (Malsberger et al. 2006) and two specific studies (Kahnke et al. 2008; Wiesner 2012) to compile the availability of injunctions on the basis of inevitable disclosure in the states over time. As reported in Table 2, by

⁶ Klamath-Orleans Lumber Inc v. Clarence F. Miller, 87 Cal. App. 3d 458, 151 Cal Rptr 118 (1978).

⁷ E.I. DuPont de Nemours & co v. American Potash and Chemical Corp, 200 A. 2d 428 (Del Ch. 1964).

⁸ PepsiCo, Inc. v. Redmond, 54 F.3d 1262, 1272 (7th Cir. 1995).

the year 2008, courts in 22 states had considered on the doctrine, with eight states clearly accepting the doctrine, four states clearly rejecting, and ten states either unclear or changing their position over time.

A covenant not to compete (CNC) may be part of a contract between a business and a shareholder, employee, vendor, distributor, franchisee, or consultant. The CNC serves to protect the employer's interest, which, among other things, could be a trade secret, confidential information, or goodwill. Although CNCs may extend beyond employees, they are generally the subject of employment law. In deciding whether to enforce CNCs, courts balance the employer's interest against an individual person's right to practise her trade or profession. Depending on the employee's work and skills, courts may limit the enforcement of CNCs by geography (to a particular distance or geographical unit such as city or county), and by time (in months or years).

Historically, CNCs were governed by common law. State laws on CNCs vary on multiple dimensions, including the interest that an employer can protect through a CNC, the permitted scope in geography and time, what constitutes sufficient consideration for a CNC, the available injunctive and damages remedies, and procedures for civil action.

Some states have enacted statutes concerning CNCs. For instance, the California Business and Professions Code, Section 16600, provides, "Except as otherwise 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".⁹ However, by contrast with the law of trade secrets, there is no uniform statute on CNCs across the states.

3. Professional Mobility

Both trade secrets and CNC law possibly influence the mobility of professionals between employers. The stronger is the legal protection of trade secrets, the stronger would be the rights of an employer over its proprietary information, including technical knowledge such as designs, formulas, algorithms, and processes. To the extent that an employer has stronger rights over technical knowledge, its engineering and scientific professionals would be more constrained in the

⁹ This law was first enacted in 1872 as California Civil Code section 1673. The California Supreme Court recently affirmed that the law must be construed broadly, to void any noncompetition agreement even it only restrains the employee from practicing part of her profession, trade, or business (Trossen 2009).

information that they can bring to other employers. So, the engineers and scientists would be less attractive to other employers, and fewer of them would move.

Many legal scholars have analyzed how the laws of trade secrets and CNCs inhibit the mobility of workers, and so reduce innovation and entrepreneurship (Gilson 1999; Hyde 2003). They particularly criticized the doctrine of inevitable disclosure in trade secrets law. Graves and DiBoise (2006) argued that the doctrine suppresses worker mobility and innovation, and they exhorted courts to reject the theory out of hand.

However, regardless of the law, the employer and employee could contract around the law to achieve the economically efficient outcome -- whether it be that the employee remain with the current employer or leave to use the current employer's proprietary knowledge elsewhere. Suppose, for instance, that the law strongly protects trade secrets. If the economically efficient outcome is that the employee should leave, then the employee could pay her current employer to use its proprietary knowledge at another organization. With such efficient contracting, the law would only affect the division of profit between employer and inventor.

The law should affect the outcome only to the extent of market imperfections that impede efficient contracting around the law. The possible imperfections include the actions of the employee and/or employer being not contractable (Motta and Ronde 2001; Garmaise 2011), asymmetry of information between employee and employer about the external value of the employee's work (Franco and Mitchell 2008; Shalem and Trajtenberg 2009), and limits on the amount that the employee can borrow (Fosfuri and Ronde 2004).

Thus, to the extent of market imperfections that impede efficient contracting, laws that provide stronger protection of trade secrets would lead to lower professional mobility. Similarly, to the extent of market imperfections that impede efficient contracting, laws that provide stronger enforcement of CNCs would result in lower professional mobility.

4. Empirical Strategy and Data

To study the impact of trade secrets laws on inventor mobility, I applied an empirical strategy similar to those in recent studies of the impact of enforcement of CNCs on innovation (Garmaise 2011; Samila and Sorensen 2011) and estimated the following model:

$$Q_{ist} = \beta_Y + \beta_M + \beta_E E_i + \beta X_{ist} + \gamma L_{st} + \gamma_E [L_{st} \cdot E_i] + \varepsilon_{ist}. \quad (1)$$

In Model (1), Q_{ist} indicates whether person i in state s changed employer in month t ($= 1$ if they did change employer, and $= 0$ otherwise), L_{st} represents the index of the legal protection of trade secrets, as represented by six items of law and legal procedure, E_i is an indicator of an engineer or scientist ($= 1$ if person i was an engineer or scientist, and $= 0$ otherwise), X_{ist} represents individual, state, and time varying controls, and ε_{ist} is idiosyncratic error. The β_Y, β_M are year and month fixed effects, while β_E and β are the coefficients of the engineer/scientist indicator and the controls, and γ and γ_E are the coefficients of the index of law and its interaction with the engineer/scientist indicator.

In Model (1), the coefficient γ represents the effect of the law on all persons with engineering and scientific occupations, while the coefficient γ_E represents the incremental effect of the law on engineers and scientists as compared with technicians. Engineers and scientists are likely to have more access to their employer's proprietary information (both technical and non-technical) than technologists and technicians. So, changes in trade secrets law should be associated with larger changes in the mobility of engineers and scientists than technicians.

In essence, Model (1) would identify the effect of cross-state differences in trade secrets law by the difference in its impact on engineers and scientists as compared with technicians. Further, during the period of study (1994-2008), the law of trade secrets, as represented by the index of trade secrets law, did change in 11 states.¹⁰ So, in those states, it would be possible also to identify the effect of trade secrets law by changes within states.

To bolster the identification of the effect of trade secrets law, Model (2) included an additional difference (in differences). Specifically, it included the interaction of the index of trade secrets law with an indicator, G_i , of an engineer or scientist with a postgraduate degree.¹¹

$$Q_{ist} = \beta_Y + \beta_M + \beta_E E_i + \beta_G G_i + \beta X_{ist} + \gamma L_{st} + \gamma_E [L_{st} \cdot E_i] + \gamma_G [L_{st} \cdot G_i] + \varepsilon_{ist}. \quad (2)$$

¹⁰ Michigan, Minnesota, Missouri, Nevada, New Jersey, New York, Pennsylvania, Tennessee, Texas, Vermont, and Wyoming.

¹¹ Since all postgraduate-qualified engineers and scientists were also engineers or scientists, $G_i = 1$ would imply that $E_i = 1$, and so, $L_{st} \cdot E_i \cdot G_i = L_{st} \cdot G_i$.

Engineers and scientists with postgraduate degrees are likely to be in more senior positions and doing more advanced work, and so, would have more access to their employer's proprietary information than their counterparts with bachelor degrees. So, employers are more likely to take action under trade secrets law against postgraduate-qualified engineers and scientists. In Model (2), the coefficient, γ_G , of the interaction of the index of trade secrets law with the postgraduate-qualified engineer/scientist indicator, G_i , represents the incremental effect of the law on postgraduate qualified engineers and scientists as compared with bachelor qualified engineers and scientists. In Model (2), β_G is the coefficient of the indicator of a postgraduate-qualified engineer or scientist.

My third identification strategy exploited variation among the states in their enforcement of CNCs. Intuitively, to the extent that a state enforced CNCs, the effect of trade secrets law on professional mobility would be lower. Generally, it would be easier for employers to protect proprietary information through CNCs, which are contractual provisions and the outcome of voluntary agreement between parties, than through trade secrets law. Action under trade secrets law would require the employer to prove that the specified information was a trade secret, that the employer had misappropriated the information, and possibly (depending on the state law) that the employer had made reasonable efforts to safeguard the information. Indeed, legal scholars have worried about trade secrets law substituting for CNCs in states that do not enforce CNCs (Hyde 2003; Graves and DiBoise 2006).

Garmaise (2011) compiled an index of state enforcement of CNCs, based on the sum of a zero-one score for each of twelve items representing various dimensions of the law. The CNC index covered only the period up to 2004 and was constant over time except in Florida, Louisiana, and Texas. For convenience, I rescaled the Garmaise index to the range, [0, 1]. Accordingly, Model (3) included the interaction of the index of trade secrets law with the indicator of engineer/scientist and the CNC index.¹²

$$Q_{ist} = \beta_Y + \beta_M + \beta_E E_i + \beta_G G_i + \beta X_{ist} + \gamma L_{st} + \gamma_E [L_{st} \cdot E_i] + \gamma_G [L_{st} \cdot G_i] + \gamma_E [L_{st} \cdot E_i \cdot CNC_{st}] + \varepsilon_{ist}. \quad (3)$$

For data on the mobility of engineers and scientists, I followed Fallick et al. (2006) and drew on the Current Population Survey (CPS). The CPS is a monthly survey of a sample of 60,000

¹² This model implicitly assumed, as seemed reasonable, that an employer would require CNCs in the employment of engineers and scientists, but not technicians. As Garmaise's (2011) index covered the years up to 2004, estimation of Model (3) was accordingly limited to those years.

households, which provides information on about 120,000 persons. The sample is constructed to be representative of each state. The CPS interviews each household four consecutive months, rests the household for eight months, and then interviews the household again for four consecutive months, making a total of eight interviews over 16 months. The CPS collects personal information including marital status, citizenship, and education, as well as geographic location and employment information.

In its redesign of the CPS in January 1994, the Census Bureau introduced a new question to reduce the burden of collecting information about employment. For respondents who were reported to be employed in the month of interview as well as the previous month, the interviewer asked the respondent whether they worked for the same employer as in the previous month (question PUIODPI). If the respondent answered affirmatively, then the interviewer would carry forward employer information from the previous month's survey, rather than ask for the same information again.

Fallick et al. (2006) used the "same employer" question to identify workers who changed employer between two consecutive months. They assessed the CPS to be a very good source of data for analyses of worker mobility. In particular, the information on change of employer was very precise in time, and it could be linked to personal demographic and employment characteristics to control for potentially confounding influences on mobility.

I extracted the CPS records from 1994 onward of all individuals whose occupations were engineer, mathematical or computer scientist, or natural scientist, engineering technologist, science technician, or computer programmer technician. The major limitation of the CPS for analyses of the impact of trade secrets law on professional mobility is that it covers each person just six times in less than 15 months.¹³ Hence, the data is essentially a pooled cross-section. The other limitation is that the CPS does not follow people as they move house, and so, the CPS cannot be used to study the effect of trade secrets laws on geographical mobility.¹⁴

¹³ In the first month of each four-month interview segment, there is no "previous month", so the interviewer does not pose the "same employer" question. So, although each household is interviewed eight times, they are asked the "same employer" question only six times.

¹⁴ Other researchers have used patent records to identify changes of employment among engineers and scientists by differences in assignee between consecutive patents by the same inventor (Almeida and Kogut 1999; Hoisl 2007; Marx et al. 2009; Shalem and Trajtenberg 2009; Agarwal et al. 2009 and 2010; Marx et al. 2010). While patent trails have proved useful in other studies of mobility, they present a particular challenge in analyses of the effect of trade secrets law on mobility. The reason is that changes in trade secrets law might themselves affect patenting. Such an effect is not only intuitive, but has been shown empirically (Png 2012). So, the object of study (trade secrets law) would have a direct first-order effect on the measure of

The CPS data on change of employer began in 1994, while my index of trade secrets law ended in 2008, so, the study was limited to the period, 1994-2008. Table 3 presents summary statistics of the data. The sample comprised 238,312 records of 79,124 individuals. The average monthly rate of change of employer was 2.2%, which is similar to the rate of 2.4% in the sample of workers in the computer industry studied by Fallick et al. (2006). Assuming that the rate is constant over the months, it implies that the probability that a newly hired employee will change employer in a year would be $1 - [1 - 0.022]^{11} = 21.7\%$. While seeming high, Fallick et al. (2006: footnote 17) confirmed that such rates align with the data from the Longitudinal Employer-Household Dynamics program, which is based on tax records and should be very accurate.

5. Trade Secrets Law

I used the linear probability model for estimation, for ease of interpretation and ready implementation of clustered standard errors. Since the treatment variables were state-level, it was important to cluster the estimated standard errors by state (Bertrand et al. 2004). Following Fallick et al. (2006), all estimates included five personal characteristics – marital status, citizenship, postgraduate qualification, full-time work status, and age (in ten-year brackets), and year and month fixed effects as controls. In addition, I included occupational status as an engineer or scientist as an individual control. Further, I included the overall labor mobility in the state and year as a parsimonious control for possible confounding changes over time within and across states in the overall movement of workers between employers.

Table 4, column (1), reports the estimate of a background specification that included only the controls. As intuitively expected, the mobility of engineering and science professionals and technicians increased with overall labor mobility, and was lower if the person was married and if they held a full-time job. Mobility was higher among professionals with postgraduate qualifications, but the effect was not precisely estimated. U.S. citizenship did not have a significant effect. Mobility was apparently lower among engineers and scientists, but the effect was not robust to other specifications as discussed below.

Table 4, column (2), reports an estimate including the index of trade secrets laws. The coefficients of the controls were almost identical to the background estimates. The coefficient of the index of trade secrets laws, $-0.003 (\pm 0.002)$, was negative but not precisely estimated. This

inventor mobility, quite apart from any policy effect. Under such circumstances, statistical inference would be problematic.

coefficient reflects the association between the legal protection of trade secrets and the mobility of all individuals in the sample, including engineers, scientists, as well as engineering and scientific technicians.

The identification strategy in Model (1) was based on distinguishing the effect of trade secrets laws on engineers and scientists as compared with engineering and scientific technicians. Intuitively, engineers and scientists would have access to more proprietary information and information of greater commercial value. As reported in Table 4, column (3), the coefficient of the interaction of the index of trade secrets laws with the indicator of an engineer/scientist, $0.001 (\pm 0.006)$, was not significant. Apparently, there was no significant difference in the effect of trade secrets laws on the mobility of engineers and scientists vis-à-vis technicians. The overall effect of trade secrets laws on the mobility of engineers and scientists was represented by the sum of the coefficients of the index of trade secrets laws and its interaction with the indicator of an engineer/scientist, $-0.002 (\pm 0.003)$, which was not significant.

Model (2) aimed to further distinguish the effect of trade secrets laws on postgraduate-qualified engineers and scientists as compared with bachelor-qualified engineers and scientists. Intuitively, engineers and scientists with postgraduate qualifications would have access to more proprietary information and information of greater commercial value, and so, employers would be more likely to sue them for misappropriation of trade secrets. As reported in Table 4, column (4), the coefficient of the interaction of the index of trade secrets laws with the indicator of a postgraduate-qualified engineer/scientist, $-0.009 (\pm 0.004)$, was negative and significant. This result suggested that trade secrets laws were more strongly associated with the mobility of postgraduate-qualified engineers and scientists as compared with bachelor-qualified professionals.

The net effect of trade secrets laws on the mobility of postgraduate-qualified engineers and scientists was represented by the sum of the coefficients of the index of trade secrets laws and its interactions with the indicators of engineer/scientist and postgraduate-qualified engineer/scientist, $-0.009 (\pm 0.004)$, which was negative and precisely estimated ($p = 0.036$). So, stronger legal protection of trade secrets was associated with lower mobility of postgraduate-qualified engineers and scientists.

By contrast, stronger legal protection of trade secrets was not associated with any significant effect on the mobility of bachelor-qualified engineers and scientists or engineering and scientific technicians. The net effect of trade secrets laws on the mobility of bachelor-qualified engineers and scientists was represented by the sum of the coefficients of the index of trade secrets laws and its interaction with the indicators of engineer/scientist, $-0.0004 (\pm 0.003)$, which was not

significant. The effect of trade secrets laws on the mobility of engineering and scientific technicians was represented by the coefficient of the index of trade secrets laws, which was not significant. So, the evolution of trade secrets law had a nuanced effect on professional mobility, with the impact concentrated among the most highly-qualified engineers and scientists.

I preferred Model (2) over Model (1) as it more precisely identified the relation between the strength of the legal protection of trade secrets and the mobility of engineering and scientific professionals. It revealed clear differences in the impact of the law between professionals of differing educational qualifications and occupational standing.

To appreciate the economic significance of the estimate of Model (2), it is helpful to calculate the impact of the evolution of trade secrets laws in various states. In California, with the enactment of the Uniform Trade Secrets Act, the index of trade secrets law increased from 0.194 to 0.611 between 1984 and 1985. This would have been associated with the mobility of postgraduate-qualified engineers and scientists being lower by $0.009 \times 0.417 = 0.4\%$. In 1996, the Federal District Court for the Southern District of New York awarded a multiple of 2.4 in punitive damages in the case of *Softel v. Dragon Medical*.¹⁵ This raised the index of trade secrets law in New York from 0.300 to 0.467 between 1995 and 1996. The increased legal protection would have been associated with the mobility of postgraduate-qualified engineers and scientists being lower by $0.009 \times 0.157 = 0.1\%$. These effects were small but economically and statistically significant.

During the period of study, the law of trade secrets, as represented by the index of trade secrets law, did change in 11 states. So, in those states, it would be possible to identify the effect of trade secrets law by changes within states. Table 4, column (4), reports an estimate of the preferred specification, Model (2), including state fixed effects. The state fixed effects would effectively limit the identification of the effect of the index of trade secrets laws to the 11 states in which the law did change during the period of study.¹⁶ The estimates were quite similar to those without state fixed effects, but somewhat less precise. However, the precision of these estimates with state fixed effects should be interpreted with caution as estimation of standard errors with clustering might not be reliable with relatively few clusters (Angrist and Pischke 2008: [..]).

¹⁵ *Softel v. Dragon Medical & Scientific Communications*, 891 F. Supp. 935 (S.D.N.Y. 1995), No. 87 Civ. 0167, 1995 WL 606307 (S.D.N.Y. 1995). While trade secrets law is a state jurisdiction, federal courts do try trade secrets cases when combined with a federal cause of action, such as, in this case, copyright.

¹⁶ The estimation used the observations for the other states, in which the index of trade secrets law did not vary, to contribute to the identification of the effect of overall labor mobility.

Model (3) aimed to identify the effect of trade secrets law by its interaction with the law of CNCs. Table 4, column (6), reports the estimate including the Garmaise (2011) index of state enforcement of CNCs as well as its interaction with the index of trade secrets law and the indicator for an engineer/scientist. For convenience of interpretation, in the interaction variable, the CNC index was measured as its difference from its sample mean. The size of the estimation sample was reduced as the Garmaise index covered only years up to 2004. The coefficient of the CNC index, $-0.009 (\pm 0.002)$, was negative and significant. This result is consistent with previous research into the effect of CNCs on professional mobility (Fallick et al. 2006; Garmaise 2011).

Importantly, the coefficient of the interaction of the index of trade secrets law, the CNC index, and the indicator for an engineer/scientist, $0.014 (\pm 0.003)$, was positive and precisely estimated. This suggested that, consistent with the identification strategy, to the extent that a state enforced CNCs, the negative relation between the legal protection of trade secrets and the mobility of engineers and scientists was attenuated. Indeed, the estimated coefficient implied that, in a state that fully enforced CNCs (CNC index = 1), changes in trade secrets law would have no significant effect on professional mobility.¹⁷

6. Inevitable Disclosure

Intel’s suit against Broadcom and the four individual engineers illustrated the possible impact of the doctrine of “inevitable disclosure” in trade secrets law on the movement of engineering and scientific professionals between employers. Legal scholars have decried the effect of this doctrine on professional mobility, and the consequent implications for innovation and entrepreneurship (Hyde 2003; Graves and DiBoise 2006). So, it is important to investigate empirically the effect of inevitable disclosure. Accordingly, I estimated the following model:

$$Q_{ist} = \beta_Y + \beta_M + \beta_E E_i + \beta_G G_i + \beta X_{ist} + \gamma L_{st} + \eta J_{st} + \eta_E [J_{st} \cdot E_i] + \eta_G [J_{st} \cdot G_i] + \varepsilon_{ist}, \quad (4)$$

where J_{st} represents whether state courts grant injunctions on the basis of preventing inevitable disclosure (= 1 if yes, = 0.5 if unclear, and = 0 if no), and η, η_E, η_G are the coefficients on the measure of inevitable disclosure and its interaction with the indicators of engineers and scientists and postgraduate-qualified engineers and scientists respectively.

¹⁷ In other estimates, unreported for brevity, I checked for but found no differences in the impact of trade secrets laws on engineers and scientists by gender. Fallick et al. (2006) excluded women from their analysis.

In most states, the courts did not change their stance on the doctrine of inevitable disclosure. In states where courts seemed to have taken different positions (including New York and Texas), it was not obvious whether the courts had changed their position over time or had taken conflicting positions in the absence of a clear, binding precedent. So, to be conservative, I estimated Model (4) as being identified by the difference in the impact of cross-sectional differences among the states by educational qualification and occupational status.

Table 5, column (1), reports an estimate of the background specification comprising the same controls as in the preceding analysis of trade secrets law. As many states had not decided on inevitable disclosure, the sample size was about half of that in the preceding analysis of trade secrets law (Table 4). Nevertheless, the coefficients of the background controls were similar, in magnitude and significance.

Table 5, column (2), reports an estimate including the index of trade secrets law as an additional control and the measure of inevitable disclosure. Interestingly, the coefficient of the index of trade secrets law, $-0.008 (\pm 0.002)$, was itself negative and significant, while the coefficient of the measure of inevitable disclosure, $-0.004 (\pm 0.001)$, was also negative and precisely estimated.

Table 5, column (3), reports an estimate that distinguished the impact of the doctrine of inevitable disclosure on engineers and scientists as compared with engineering and scientific technicians. The coefficient of the interaction of the measure of inevitable disclosure with the engineer/scientist indicator, $-0.004 (\pm 0.002)$, was negative and significant. While these results are interesting, I worry that they confound the impact of the doctrine on engineers and scientists with different levels of educational qualification.

Table 5, column (4), report estimates that distinguished the impact of the doctrine of inevitable disclosure on postgraduate- vis-à-vis bachelor-qualified engineers and scientists. The coefficient of the interaction of the measure of inevitable disclosure with the indicator of a postgraduate-qualified engineer/scientist, $-0.009 (\pm 0.002)$, was negative and precisely estimated. The net effect of the doctrine of inevitable disclosure on the mobility of postgraduate-qualified engineers and scientists was represented by the sum of the coefficients of the measure of inevitable disclosure and its interactions with the indicators of an engineer/scientist and postgraduate-qualified engineer/scientist. Referring to Table 5, column (4), the estimated impact was $-0.009 (\pm 0.002)$, which was precisely estimated ($p < 0.001$). So, the doctrine of inevitable disclosure was associated with lower mobility of postgraduate-qualified engineers and scientists.

By contrast, the doctrine was not associated with any significant impact on the mobility among bachelor-qualified engineers or scientists (the sum of the coefficients of the measure of inevitable disclosure and its interaction with the indicators of engineer/scientist, $-0.0004 (\pm 0.0009)$, was small and not significant). I conclude that the impact of the doctrine of inevitable disclosure on professional mobility was focused on engineers and scientists with postgraduate qualifications.

To further identify the impact of the doctrine of inevitable disclosure, Table 5, column (5), reports an estimate including the Garmaise (2011) index of CNC law and its interaction with the measure of inevitable disclosure. The coefficient of the CNC index was negative but not significant. More importantly, the coefficient of the interaction, $0.009 (\pm 0.004)$, was positive and precisely estimated. This implied that, to the extent that a state enforced CNCs, the negative impact of the doctrine of inevitable disclosure was diminished. Indeed, a simple counterfactual exercise would show that, if a state enforced CNCs to the fullest (CNC index = 1), then the impact of the doctrine of inevitable disclosure would be about half of that in a state enforced CNCs to the extent of the sample mean. These empirical findings are consistent with legal scholarship on the doctrine of inevitable disclosure as possibly substituting for CNCs (Hyde 2003; Graves and DiBoise 2006).

Finally, given the considerable policy interest in the role of professional mobility in the economic development of high-tech industries in California, a state that famously does not enforce CNCs, I checked the sensitivity of the findings to the exclusion of that state. As Table 5, column (6), reports, the estimates were quite similar to those including all states (Table 5, column (4)). So, the empirical results were robust to the exclusion of California.

7. Discussion

By combining analyses of state-level trade secrets statutes and cases with records of changes of employers from the Current Population Survey, I analysed the effect of changes and differences in trade secrets law on the mobility of people in engineering and scientific occupations. I found that the effect of stronger legal protection of trade secrets was nuanced, being concentrated among the most skilled engineers and scientists (those with postgraduate qualifications). The effect was attenuated to the extent that the state enforced covenants not to compete.

I also found that trade secrets law, particularly the doctrine of inevitable disclosure, served as a substitute for covenants not to compete in negatively influencing professional mobility. This

finding sheds some light on the economic development of high-tech industries in California. Previous scholarship (Gilson 1999; Fallick et al. 2006) attributed the mobility of engineers and scientists in California to the state not enforcing covenants not to compete. By contrast, my findings suggest that attention ought to be given to California's avowed rejection of the doctrine of inevitable disclosure in trade secrets law. This implication is consistent with legal scholarship on the impact of the doctrine of inevitable disclosure on professional mobility (Hyde 2003; Graves and DiBoise 2006).

An obvious implication of the effect of trade secrets law on professional mobility could be slower diffusion of technical knowledge. Technical knowledge that is explicit can be shared through joint ownership and licensing. However, the spread of technical knowledge of a tacit nature depends relatively more on the movement of scientists and engineers. With less mobility, communication and spillovers of knowledge among innovative businesses would be reduced. The effect of reduced mobility on productivity and economic growth would be amplified to the extent that technical professionals increase productivity when they change employers (Hoisl 2007; Trajtenberg 2005; Shalem and Trajtenberg 2009).

Another implication would be fewer spin-offs and start-ups. A key advantage for employees leaving established organizations to start new businesses is the knowledge that they acquired in their previous employment. To the extent that they are more constrained in using such knowledge, their expected profit from starting a new businesses would be lower. So, trade secrets law would result in fewer spin-offs and start-ups.¹⁸

These implications should be balanced against the effect on longer-term incentives. If employees are less likely to quit for other opportunities, employers would realize a greater return on investment in overall R&D and, specifically, the development of their employees. So, stronger trade secrets protection might foster more employer investment in R&D (as found by Png (2012)) and their employees' human capital.

An interesting related question is how the trade secrets protection would affect the employees' own incentive to invest in their human capital. They might be induced to invest more in themselves, since their external market value would depend more on their own capabilities and less on knowledge that they bring from previous employers. On the other hand, they might be induced to invest less since they would have fewer external opportunities to realize the return on that investment.

¹⁸ Applying the Garmaise (2011) index, Samila and Sorensen (2011) found a lower rate of startups to the extent that a state enforced CNCs.

Another related issue is the impact on compensation policies. In the short term, employers might pay their employees less, as their outside opportunities would be less attractive. On the other hand, in the long term, the reduction in outside opportunities may imply that their employers must pay more to attract talent. With weaker trade secrets protection, employees might be willing to trade off lower salaries for the opportunity to acquire knowledge and then capitalize on that knowledge with another employer or a start-up.¹⁹ By reducing such outside opportunities, trade secrets law might force employers to increase compensation.

Finally, it would be interesting and important to study the effect of trade secrets protection on professional interaction among scientists and engineers. Here, I have shown that the evolution of trade secrets law served to inhibit professional mobility across employers. Trade secrets protection would also inhibit professional interaction at meetings, conferences, and trade shows. Of course, the challenge to studying these effects would be to procure information on such interaction.

¹⁹ Moen (2005) studied the careers of technical workers in the Norwegian machinery and equipment industries during the period, 1986-95. Early in their careers, workers accepted lower earnings while they accumulated knowledge. Later in their careers, they received higher earnings which compensated them for their earlier investment.

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Figure 1. Index of trade secrets law



Table 1. Index of trade secrets law

Dimension	Item	Score	Sources
Scope of trade secret	Must information be used in business to qualify as trade secret?	= 0 if yes; = 1 if no	Malsberger et al. (2006); Citizen Media Law Project (2012)
Scope of trade secret	Must owner make reasonable efforts to protect the information to qualify for trade secret protection?	= 0 if yes; = 1 if no	Malsberger et al. (2006); Citizen Media Law Project (2012)
Scope of trade secret	Must person use or disclose the information to be liable for misappropriation?	= 0 if yes; = 1 if no	Malsberger et al. (2006); Citizen Media Law Project (2012)
Procedure	How long after misappropriation can the owner take legal action?	Years divided by 3	Malsberger et al. (2006); Citizen Media Law Project (2012)
Remedies	Are injunctions limited in time to the owner's head start?	= 0 if yes; = 1 if no	Malsberger et al. (2006); Citizen Media Law Project (2012)
Remedies	What is the maximum punitive damages allowed (as a multiple of actual damages)?	Multiple divided by 3	Malsberger et al. (2006); Citizen Media Law Project (2012)

Table 2. Inevitable disclosure

State	Year	Case	Status	Score
Arkansas	1997	Southwestern Energy v. Eickenhorst, 955 F. Supp. 1078 (1997).	Yes	1
California	1999	Bayer Corp. v. Roche Molecular Systems, Inc, 72 F. Supp. 2d 1111, 1112 (N.D. Cal 1999). Electro Optical Indus., Inc. v. Stephen White, 90 Cal.Rptr.2d 680 (1999) 76 Cal.App. 4th 653	No Yes, then overruled by Supreme Court.	0
Connecticut	1996	Branson Ultrasonics Corp. v. Stratman, 921 F. Supp. 909 (D. Conn. 1996)	Yes where employee bound by CNC; Not clear otherwise.	0.5
Delaware	1964	E.I. DuPont de Nemours & co v. American Potash and Chemical Corp, 200 A. 2d 428 (Del Ch. 1964)	Yes	1
Florida	1960	Fountain v. Hudson Cush-N-Foam Corp., 122 So. 2d 232, 234 (Fla. Dist. Ct. App. 1960)	Yes	1
	2001	Del Monte Fresh Produce Co. v. Dole	No	0.5

		Food Co., 148 F. Supp. 2d 1326 (S.D. Fla. 2001)		
Illinois	1995	PepsiCo, Inc. v. Redmond, 54 F.3d 1262, 1272 (7th Cir. 1995)	Yes	1
Indiana	1995	Ackerman v. Kimball Int'l, Inc., 652 N.E.2d 507, 510-11 (Ind. 1995).	Yes	1
	1998	Bridgestone/Firestone, Inc. v. Lockhart, 5 F. Supp. 2d 667 (S.D. Ind. 1998)	No	0.5
Iowa	2002	Barilla Am., Inc. v. Wright, No. 4-02-CV-90267, 2002 U.S. Dist. Lexis 12773 (S.D. Iowa 2002)	Yes	1
Kansas	2006	Bradbury Co. v. Teissier-Ducros, 413 F. Supp. 2d 1203, 1209 (D. Kan. 2006)	Court acknowledged doctrine but did not apply because time limit had expired.	0.5
Louisiana	1967	Standard Brands, Inc. V. Zumpe, 264 F. Supp. 254 (E.D. La. 1967).	No	0
Maryland	2004	LeJeune v. Coin Acceptors, Inc., 849 A.2d 451, 471 (Md. 2004)	No	0
Massachusetts	1995	Campbell Soup Co. v. Giles 47 F.3d 467, 472 (1st Cir. 1995)	No	0.5
		Marcam Corp. v. Orchard, 885 F. Supp. 294, 298-300 (D. Mass. 1995)	Yes	
Michigan	1966	Allis-Chalmers Manufacturing Co. v. Continental Aviation & Engineering Corp., 255 F. Supp. 645, 654 (E.D. Mich. 1966)	Yes	1
	2002	CMI International Inc. v. Internet Inter. Corp., 649 N.W.2d 808 (Mich. Ct. App. 2002)	No	0.5
Minnesota	1986	Surgidev Corp. v. Eye Tech., Inc., 648 F. Supp. 661 (D. Minn. 1986)	Yes	1
	1992	IBM Corp. v. Seagate Tech., Inc., 941 F. Supp. 98 (D. Minn. 1992)	No	0.5
	1996	La Calhene, Inc. v. Spolyar, 938 F. Supp. 523 (W.D. Wis. 1996)	Yes	1
Missouri	2000	Conseco Finance Servicing Corp. v. North American Mortgage Co., No. 00CV1776, 2000 WL 33739340 (E.D. Mo. Dec. 6, 2000).	No	0.5
	2000	H&R Block Eastern Tax Services, Inc. v. Enchura, 122 F.Supp. 2d 1067 (W.D. Mo. 2000).	Court acknowledged doctrine but did not apply it.	
New Jersey	1980	Continental Group, Inc. v. Amoco	No	0

	1987	Chem. Corp., 614 F.2d 351, 359 (3d Cir. 1980). National Starch & Chemical Corp. v. Parker Chemical Corp., 530 A.2d 31 (N.J. Super. Ct. App. Div. 1987)	Yes	0.5
New York	1997	DoubleClick, Inc. v. Henderson, No. 116914/97, 1997 N.Y. Misc. Lexis 577 (Sup. Ct. N.Y. Co. Nov. 7, 1997)	Yes	1
	2003	Marietta Corp. v. Fairhurst, 301 A.D.2d 734 (N.Y. App. Div. 2003)	Court cautioned against applying inevitable disclosure.	0.5
	2006	Estee Lauder Co. v. Batra, No. 06 Civ.2035 (RWS), 2006 WL 1188183 (S.D.N.Y. May 4, 2006)	Yes	1
North Carolina	1976	Travenol Labs., Inc. v. Turner, 228 S.E.2d 478, 483 (N.C. Ct. App. 1976)	Court acknowledged doctrine but did not apply it.	0.5
	1996	Merck & Co. v. Lyon, 941 F. Supp. 1443 (M.D.N.C. 1996)	Yes	1
Ohio	2000	Procter & Gamble Co., v. Stoneham, 747 N.E.2d 268 (Ohio Ct. App. 2000)	Yes	1
Pennsylvania	1982	Air Products & Chemical, Inc. v. Johnson, 442 A.2d 1114 (Pennsylvania Superior Ct. 1982)	Yes	1
Texas	1993	Rugen v. Interactive Bus. Sys., Inc., 864 S.W.2d 548, 551 (Tex. App. 1993)	Yes	1
	2003	Fox v. Tropical Warehouses Inc, 121 S.W. 3d 853, 861 (Tex Ct App, Ft Worth 2003) Cardinal Health Staffing Network, Inc. v. Bowen, 106 S.W.3d 230, 242 (Tex. App. 2003)	Court acknowledged doctrine but did not apply it.	0.5
Utah	1998	Novell, Inc. v. Timpanogos Research Group, Inc., 46 U.S.P.Q.2d 1197 (Utah Dist. Ct. 1998).	Yes	1
Virginia	1999	Government Technology Services, Inc. v. Intellisys Technology Corp., 51 Va. Cir. 55 (Va. Cir. Ct. Oct. 20, 1999).	No	0
Washington	1997	Solutech Corp, Inc. v. Agnew, 1997 WL 794496, 8 (Wash. Ct. App.)	Yes	1

Table 3. Summary statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Employer change	238312	0.022	0.146	0	1
Full-time	238312	0.841	0.366	0	1
Citizen	238312	0.937	0.243	0	1
Married	238312	0.676	0.468	0	1
Postgraduate degree	238312	0.195	0.397	0	1
Age	238312	39.847	10.756	15	90
Labor mobility (state)	238312	0.029	0.004	0.014	0.043
Index of trade secrets law	228571	0.577	0.176	0	0.889
Measure of inevitable disclosure	117424	0.768	0.358	0	1
CNC index (Garmaise 2011)	215514	0.456	0.225	0	1

Table 4. Trade secrets law and engineer/scientist mobility

VARIABLES	(1) Back- ground	(2) Index	(3) Engineer/ scientist	(4) Postgrad degree	(5) State fixed effects	(6) CNC
Full time	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.005*** (0.001)
U.S. citizen	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)	0.000 (0.001)	-0.000 (0.001)
Married	-0.005*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)	-0.004*** (0.001)	-0.005*** (0.001)
Engineer/ scientist	-0.003*** (0.001)	-0.003*** (0.001)	-0.004 (0.004)	-0.005 (0.004)	-0.005 (0.004)	-0.004 (0.004)
Postgrad degree	0.002 (0.001)	0.002 (0.001)	0.002 (0.001)	0.006** (0.003)	0.006** (0.002)	0.006** (0.003)
Labor mobility (state)	0.791*** (0.100)	0.793*** (0.097)	0.792*** (0.097)	0.795*** (0.098)	0.677*** (0.148)	0.779*** (0.115)
Secrecy index		-0.003 (0.002)	-0.004 (0.005)	-0.004 (0.005)	-0.001 (0.006)	-0.005 (0.004)
Index x engineer/ scientist			0.001 (0.006)	0.003 (0.006)	0.004 (0.006)	0.003 (0.006)
Index x postgrad				-0.009** (0.004)	-0.009** (0.004)	-0.009** (0.004)
Index x engineer/ scientist x CNC CNC index						0.014*** (0.003) -0.009*** (0.002)
Constant	0.003 (0.006)	0.005 (0.006)	0.005 (0.006)	0.005 (0.006)	0.001 (0.007)	0.010 (0.007)
Year & mth f.e.	Yes	Yes	Yes	Yes	Yes	Yes
State f.e.					Yes	
Observations	238,312	228,571	228,571	228,571	228,571	215,514
R-squared	0.0032	0.0032	0.0032	0.0033	0.0036	0.0033
Engr/scientist, $\gamma + \gamma_E$			-0.002 (0.003)	-0.0004 (0.003)	0.003 (0.004)	-0.001 (0.004)
Postgrad, $\gamma + \gamma_E + \gamma_P$				-0.009** (0.004)	-0.005 (0.004)	-0.011** (0.005)

Notes: Estimated by linear probability model, with the dependent variable being change of employer in the previous month. (1) Regression on background factors; (2) Regression including index of trade secrets law; (3) Regression including interaction of index of trade secrets law with indicator of engineer/scientist; (4) Regression including interaction of index of trade secrets law with indicator of postgraduate-qualified engineer/scientist; (5) Regression including state fixed effects; (6) Regression including interaction of index of trade secrets law, indicator of engineer/scientist, and CNC index (Garmaise 2011). Standard errors clustered by state in parentheses (***) $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

Table 5. Inevitable disclosure and engineer/scientist mobility

VARIABLES	(1) Back- ground	(2) Inevitable disclosure	(3) Engineer/ scientist	(4) Postgrad degree	(5) CNC	(6) Excl CA
Full time	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.005*** (0.002)	-0.004** (0.002)
U.S. citizen	-0.002 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.002 (0.002)	-0.001 (0.002)
Married	-0.005*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)
Engineer/ scientist	-0.002 (0.001)	-0.002 (0.001)	-0.005*** (0.001)	-0.006*** (0.001)	-0.006*** (0.001)	-0.004* (0.002)
Postgrad degree	0.002 (0.001)	0.002 (0.001)	0.002 (0.001)	0.008*** (0.002)	0.008*** (0.002)	0.009*** (0.002)
Labor mobility (state)	0.684*** (0.127)	0.699*** (0.114)	0.704*** (0.114)	0.703*** (0.117)	0.725*** (0.128)	0.730*** (0.124)
Secrecy index		-0.008*** (0.002)	-0.008*** (0.002)	-0.009*** (0.002)	-0.009*** (0.002)	-0.009*** (0.002)
Inevitable disclosure		-0.004*** (0.001)	-0.007*** (0.001)	-0.006*** (0.001)	-0.006*** (0.002)	-0.006** (0.002)
Inevitable disc x engineer/scientist			0.004** (0.002)	0.006*** (0.002)	0.006*** (0.002)	0.004 (0.003)
Inevitable disc x postgrad				-0.009*** (0.002)	-0.009*** (0.002)	-0.011*** (0.002)
Inevitable disc x enr/scientist x CNC CNC index					0.009** (0.004)	-0.001 (0.002)
Constant	0.008 (0.007)	0.014** (0.006)	0.016** (0.006)	0.015** (0.007)	0.017** (0.007)	0.012* (0.007)
Year & month f.e.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117,424	117,424	117,424	117,424	108,902	107,142
R-squared	0.0033	0.0035	0.0035	0.0036	0.0037	0.0035
Engr/scientist $\gamma + \gamma_E$			-0.003** (0.001)	-0.0004 (0.0009)	-0.001 (0.001)	-0.001 (0.002)
Postgrad $\gamma + \gamma_E + \gamma_P$				-0.009*** (0.002)	-0.009*** (0.002)	-0.012*** (0.002)

Notes: Estimated by linear probability model, with the dependent variable being change of employer in the previous month. (1) Regression on background factors; (2) Regression including measure of inevitable disclosure; (3) Regression including interaction of measure of inevitable disclosure with indicator of engineer/scientist; (4) Regression including interaction of index of measure of inevitable disclosure with indicator of postgraduate-qualified engineer/scientist; (5) Regression including interaction of measure of inevitable disclosure, indicator of engineer/scientist, with CNC index (Garmaise 2011); (6) Regression excluding California. Standard errors clustered by state in parentheses (***) $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).