SBANE

Hon. Cheryl A. Coakley-Rivera
House Chair

Hon. Daniel A. Wolf
Senate Chair

Joint Committee on Labor and Workforce Development
Massachusetts State House, Room 39
Boston, Mass. 02133

**RE: HO2296: "An Act relative to the prohibition of noncompetition agreements"**
**HO2293: "An Act relative to noncompetition agreements"**

Dear Chairmen:

Attached hereto are the position statements of the Smaller Business Association of New England ("SBANE") relative to the above-referenced proposed legislation currently pending before the Joint Committee on Labor and Workforce Development. As you can see SBANE opposes both bills in their present formulation.

Substantial input from the SBANE community which includes many smaller business owners leads SBANE to conclude that the bills are decidedly "anti-business," and would do nothing to improve the current sluggish economic and regulatory environment in the State of Massachusetts. In fact, there is evidence suggesting that the prohibition or stifling of non-competition agreements would tend to discourage startup companies in the biotech area, a critical segment of the Massachusetts economy (See attached study, "Noncompetition Agreements and Research Productivity in the Biotechnology Industry," Coombs, 2009).

We would greatly appreciate your consideration in being informed well in advance of any public hearings which may be held on these bills. During the last legislative session we were not provided with adequate notice of the public hearing held on the predecessor of HO2293. We feel it would be extremely important for the committee to hear testimony from smaller business owners in the Commonwealth on these two bills.

Very truly yours,

Robert A. Baker, President
**Smaller Business Association of New England**

Andrew P. Botti, Chairman

cc: Joint Committee on Labor and Workforce Development

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**Critique of House Bill 2293, "An Act relative to Non-Competition Agreements" filed on January 20, 2011. Sponsors: Hon. William Brownsberger, Alice Peisch, and Lori Ehrlich**

## Background:

Businesses with 19 or fewer employees constitute 86% of all Massachusetts businesses (Source: Mass Housing and Economic Development statistics 2010).

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Smaller companies tend to be more susceptible to employee theft because of the informality in which they operate and lack of funds available for precautionary measures.

....

Start-ups tend to minimize salaries by offering equity. Thus, salaries tend to be lower in start-up enterprises, often lower than the statewide household median of $60,000 per annum. (Source: MA Dept of Revenue & IRS)

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The statewide unemployment rate in California as of June 2010 was 12.3% and in Silicon Valley 11.8%, much worse than national average of 9.7%. Non-competes are prohibited in CA. In Massachusetts – where non-competes are routinely enforced – the unemployment rate for the same time period was 9.1% statewide. In the Research Triangle (North Carolina) the unemployment rate was 8.0% for the same time period. North Carolina enforces non-competes. (Source: U.S. Bureau of Labor Statistics)

These figures undermine the notion that outlawing non-competes helps create jobs by allowing greater employee mobility.

....

Massachusetts courts already possess equitable powers sufficient to protect all interests in a non-compete battle.

....

With the great advancements in technology, it is easier than ever today to walk off with hundreds or even thousands of pages of a company's documents containing trade secrets and confidential information in the breast pocket of one's shirt!

....

Massachusetts already possesses a negative business climate perception because of such laws as mandatory healthcare, elimination of independent contractor status and the like.

## Major Changes in the new Bill from the Previous Version

- The $75,000 salary threshold has been eliminated.
- Garden Leave provision has been reinserted
- The 10% payment as consideration for non-compete for already employed persons has been eliminated

- Added requirement that court must consider the economic circumstances of employee and economic affect enforcement of on-compete would have on the employee.

## Objections to Specific Sections of the January 20, 2011, Bill:

### Section (1) – "Garden Leave"

The amount is too rich for most companies to pay which effectively puts this provision beyond practical consideration

### Section (b)(iv) – "Goodwill"

Recent case law in Massachusetts has clouded the issue of whether goodwill belongs to the employer or the employee. This is especially true in the sales area where non-compete agreements are routinely used in order to prevent salespeople from taking their employer's customers.

### Section (b)(v) – Duration of Restriction

A one-year maximum with a six-month presumption of validity may be fine in the context of a hair salon, but is not so given Massachusetts "high-tech" business climate. The current law is that "a plaintiff is entitled to have its trade secrets protected at least until others in the trade are likely, through legitimate business procedures, to have become aware of these secrets."

In the case from which this quote is taken, a company developed a data acquisition module over 18 months at a cost of over $100,000. Two employees involved in developing the product resigned and took trade secrets, etc. They developed a competing product in a few months at a cost of $2,500, and proceeded to undersell their former employer.

The new bill ignores the realities of the "head start rule," and the time required to develop technically complex products.

### Section (b)(vii) – "Limited to Specific Types of Services Provided by Employee"

In a famous Massachusetts case involving the theft of a secret cookie recipe, the company janitor stole the recipe from the owner's office and started a competing business. This restriction is too narrow, and does not take into account employment reality, and the ease with which employees can access company information which may not apply to their specific jobs.

### Section (d) - Power to Abrogate Agreement in its Entirety

This section would allow courts to decline to enforce a private non-compete agreement on extremely nebulous grounds. It does not define what the "equitable factors" are, and thereby undermines the legitimate contractual expectations of the private parties. Moreover, the new bill has added a requirement that the court shall consider the "economic circumstances of, and impact upon, the restricted party."

This new section essentially allows a court to do away the contractual rights of private parties, and will make it harder for larger companies to enforce their non-compete agreements. Enforcing courts sit in equity on these matters and this provision essentially allows the court to refuse to enforce the non-compete.

This provision also gives the employee an argument which the court must consider, i.e, the classic David v. Goliath economic situation.

**Section (e) - Mandatory Attorneys Fees Award to Employee**

Many companies that take legal action against dishonest employees often struggle to find the resources to pay their own attorneys, much less the attorneys representing the employee as well. The language of this provision also creates an anomalous result. An employer could win the case at the injunction level, and still have to pay the attorneys fees of the employee.

For example, under the present formulation if a court decides to enforce the agreement but lower the restrictive non-compete period from 12 months to eight months, the employer has won the case, but still has to pay the employee's fees. This is true also if the geographic restriction is cut back by the court, but not limited solely to the employee's former geographic work area. In Massachusetts, it is not unusual for the reviewing courts to "blue pencil" these agreements. Thus, the skewed results are very likely to occur, and discourage enforcement of non-competes.

**Section (e)(2)** - Massachusetts already has a statue which allows the court to award attorneys fees against a party acting in bad faith (G.L. c. 231, s. 6F). Moreover, this section dealing with a declaratory judgment also may result in the same anomalous award of attorneys' fees *to the losing party.*

## CONCLUSIONS

The purpose of non-competes is to reduce or eliminate the actual or possible appropriation of a company's trade secrets and other confidential business information. By allowing a complete yet time-limited ban on competition by former employees, non-competes work more effectively than non-disclosure and non-solicitation agreements in ensuring that proprietary information remains so.

The law in its current formulation will tend to discourage employers from seeking enforcement of non-competition agreement, or from entering into them in the first place. The statute sets up inherent barriers to enforcement such as mandatory awards of attorneys fees even in the case where the employer prevails.

Many company owners are forced to put all their assets – personal and otherwise - on the line to obtain adequate funding for their ventures. They should be allowed some measure of assurance that the fruits of their labors enjoy adequate legal protection.

**Smaller Business Association of New England**

# HOUSE . . . . . No. xxxxx

*[Pin Slip]*

*The Commonwealth of Massachusetts*

**In the Year Two Thousand Eleven**

*An Act relative to noncompetition agreements.*

*Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:*

SECTION 1. Chapter 149 of the General Laws, as appearing in the 2006 Official Edition is hereby amended by inserting after section 24K the following section:-

Section 24L. (a) As used in this section, the following words shall have the following meanings:

"Employee": an individual who is considered an employee under General Laws, chapter 149, section 148B.

"Employee noncompetition agreement": an agreement between an employer and employee, or otherwise arising out of an actual or expected employment relationship, under which the employee or expected employee agrees to any extent that he or she will not engage in activities

directly or indirectly competitive with his or her employer after the employment relationship has been severed. Employee noncompetition agreements include forfeiture for competition agreements, but do not include (i) covenants not to solicit or hire employees of the employer; (ii) covenants not to solicit or transact business with customers of the employer; (iii) noncompetition agreements made in connection with the sale of a business or substantially all of the assets of a business, when the party restricted by the noncompetition agreement is an owner of the business who received consideration for the sale; (iv) noncompetition agreements outside of an employment relationship; (v) forfeiture agreements; or (iii) agreements by which an employee agrees to not reapply for employment to the same employer after termination of the employee.

"Forfeiture agreement": an agreement that imposes adverse financial consequences on a former employee as a result of the termination of an employment relationship, regardless of whether the employee engages in competitive activities following cessation of the employment relationship. Forfeiture agreements do not include forfeiture for competition agreements.

"Forfeiture for competition agreement": an agreement that imposes adverse financial consequences on a former employee as a result of the termination of an employment relationship if the employee engages in competitive activities.

"Garden leave clause": a type of employee noncompetition agreement by which an employer agrees to pay the employee during the restricted period. To constitute a garden leave clause within the meaning of this section, an employee noncompetition agreement must (a) have a restricted period of no more than two years from the date of cessation of employment; (b) for the full restricted period on a pro rated, per annum basis and without offset for any income the employee may receive from other unrestricted activities, the greater of: (i) fifty percent of the

employee's highest annualized base salary paid by the employer within the two years preceding the employee's termination or (ii) $35,000 (together with an additional $700 for each full year from the effective date of this section); (c) require either that the payments are to be made in a lump sum within ten business days following the cessation of the employee's employment or that the payments are to be made on a pro rata basis in equal bi-weekly, or more frequent, payments starting immediately after the cessation of the employee's employment; and (d) not permit an employer to unilaterally discontinue or otherwise fail or refuse to make the payments, even if the employer voluntarily shortens the restricted period.

"Inevitable disclosure doctrine": a doctrine by which, in the absence of an enforceable employee noncompetition agreement, a former employee may be prevented from working at a competitor based on the expectation that the employment would inevitably lead to the disclosure of a trade secret or confidential information of the employer.

"Restricted period": the period of time after employment during which an employee is restricted by an employee noncompetition agreement from engaging in activities competitive with his or her employer.

(b) To be valid and enforceable, an employee noncompetition agreement must meet the minimum requirements of subsections (i) through (iii) hereof and meet or be capable of being reformed to meet the minimum requirements in subsections (iv) through (viii) hereof.

(i) The agreement must be in writing and signed by both the employer and employee.

(ii) If the agreement is a condition of employment, the agreement together with an express statement that the agreement is a condition of employment must, to the extent reasonably feasible, be provided to the employee by the earlier of seven business days before the commencement of the employee's employment or when any written offer of employment is first sent to the employee, provided that if an offer of employment is first communicated orally, the employee also must either (A) simultaneously be informed that an employee noncompetition agreement will be a condition of employment or (B) receive the required written notification prior to tendering resignation from any then-current employment.

(iii) If the agreement is entered into after commencement of employment, it must be supported by fair and reasonable consideration in addition to the continuation of employment, and notice of the agreement must be provided at least two weeks before the agreement is to be effective.

(iv) The agreement must be necessary to protect one or more of the following legitimate business interests of the employer: (A) the employer's trade secrets, as that term in defined in section 30 of chapter 266, to which the employee had access while employed; (B) the employer's confidential information that otherwise would not qualify as a trade secret; and (C) the employer's goodwill.

(v) The agreement must be reasonable in duration in relation to the interests protected and the duration of actual employment, and, with the exception of a garden leave clause, in no event may the stated restricted period exceed one year from the date of cessation of employment. A stated restricted period of no more than six months is presumptively reasonable. An agreement may permit the restricted period to be tolled by a court if the employee's breach of the employee noncompetition agreement was neither known to nor reasonably discoverable by the employer. Such tolling period will not count for purposes of the temporal standards specified herein.

(vi) The agreement must be reasonable in geographic reach in relation to the interests protected. A geographic reach that is limited to only the geographic area in which the employee, during any time within the last two years of employment, provided services or had a material presence or influence is presumptively reasonable.

(vii) The agreement must be reasonable in the scope of proscribed activities in relation to the interests protected. A restriction on activities that protects a legitimate business interest and is limited to only the specific types of services provided by the employee at any time during the last two years of employment is presumptively reasonable.

(viii) The agreement must be consonant with public policy.

(c) Notwithstanding anything to the contrary in this section, a court may, in its discretion, reform an employee noncompetition agreement so as to render it valid and enforceable. If a court shortens the duration of a garden leave clause, the court may, in its discretion, impose a pro rata reduction on the duration or amount of the required payments.

(d) Notwithstanding anything to the contrary in this section, a court may decline to enforce some or all of the restrictions in an otherwise valid and enforceable employee noncompetition agreement (1) in extraordinary circumstances; (2) where otherwise necessary to prevent injustice or an unduly harsh result; or (3) based on any other common law or statutory legal or equitable defense or doctrine, or on other equitable factors that would militate against enforcement. In assessing whether to enforce some or all of the restrictions, the court shall take into account the economic circumstances of, and economic impact on, the restricted party.

(e) A court shall award the employee reasonable attorneys' fees and costs incurred in defending against the enforcement of any employee noncompetition agreement (1) if the court declines to enforce a material restriction or reforms a restriction in a substantial respect, unless (i) the specific rejected or reformed restriction is presumptively reasonable as set forth above; (ii) the employer made objectively reasonable efforts to draft the rejected or reformed restriction so that it would be presumptively reasonable as set forth above; or (iii) the agreement is a garden leave clause; or (2) if the court finds the employer to have acted in bad faith in connection with the enforcement of the employee noncompetition agreement. The entitlement to legal fees shall also apply to an employee who commences a lawsuit challenging his or her employee noncompetition agreement, provided that at least two business days prior to the filing of such lawsuit, the employee provided the former employer with specific measures that the employee would take to protect the employer's legitimate business interests, which measures are

substantially adopted by a court as part of a hearing on preliminary injunctive relief. The entitlement to legal fees shall apply regardless of whether the employee pays the legal fees himself or herself or if the legal fees are paid by another person or entity. A court may award attorneys' fees and costs at any time during the proceedings, including as part of a decision in connection with a preliminary injunction motion. Any such award of fees and costs shall be immediately due and payable to the employee. A court may require the employer, at any point, to post a bond or multiple bonds to cover any anticipated fees and costs.

(f) A court may award the former employer some or all of its reasonable attorneys' fees and costs incurred in connection with the enforcement of the employee noncompetition agreement permitted by contract or statute only if (1) the employee noncompetition agreement was presumptively reasonable in duration, geographic reach, and scope of proscribed activities; (2) the employee noncompetition agreement was enforced by the court without substantial modification; and (3) the court finds that the employee engaged in bad faith conduct.

(g) The substantive, procedural, and remedial rights provided to the employee in this section are not subject to advance waiver.

(h) Except as expressly provided by this section, a person defending against or otherwise opposing the enforcement of an employee noncompetition agreement, including by way of challenging the waiver of a substantive, procedural, or remedial right provided in this section, shall not be subject to any contractual penalty, requirement to indemnify, tender back, or any other similar disadvantage imposed as a consequence of such defense or opposition, and shall continue to be entitled to the rest of the benefits flowing from the contract. Any contractual provision to the contrary is void.

(i) No choice of law provision that would have the effect of avoiding the requirements of this section will be enforceable if the employee is, and has been for at least thirty days, a resident of or employed in Massachusetts at the time of his or her termination of employment. This provision may not be avoided by an involuntary transfer of the employee out of Massachusetts.

(j) Forfeiture agreements otherwise permitted by law are enforceable only if and to the extent that: (1) they comply with subsections (b)(i) through (b)(iii) and (2) the forfeiture is directly and reasonably related to the harm caused to the employer by the employee's departure, provided that such harm threatens the continued viability of the employer. Subparagraph (2) of this paragraph j does not apply to incentive equity compensation plans or agreements. Any harm that may result from increased competition or the replacement of the employee is not considered harm for purposes of this subsection.

(k) This section may expand, but shall not narrow, the prohibitions imposed by: (1) sections 12X, 74D, 129B, or 135C of chapter 112; (2) section 186 of chapter 149; or (3) applicable industry or other regulation or rules.

(l) Nothing in this section shall expand or restrict the right of any person to protect trade secrets or other confidential information by injunction or any other lawful means under other applicable laws or agreements. Notwithstanding the forgoing, the inevitable disclosure doctrine is rejected and shall not be utilized, although an employee who has disclosed, threatens to disclose, or is likely to intentionally disclose trade secrets or other confidential information belonging to his or her prior employer may be enjoined in any respect that a court of competent jurisdiction deems appropriate.

(m) This section shall not apply to or alter existing law concerning: (1) any restrictive covenant other than employee noncompetition agreements and forfeiture agreements; or (2) the payment of wages.

SECTION 2. This act may be referred to as the Noncompetition Agreement Act and shall apply to employee noncompetition agreements entered into on or after January 1, 2012.

## Critique of House Bill 2296, "An act relative to the prohibition of noncompetition agreements." Sponsoring Legislator: Harrington –R (Groton).

This proposed law provides in pertinent part:

**"Except as provided in this section, any contract that serves to restrict an employee or former employee from engaging in a lawful profession, trade, or business of any kind is deemed unlawful."**

The broad language of this proscription would in effect do away with all types of postemployment restrictive covenants, including non-solicitation, anti-piracy and non-compete agreements. It would clearly result in a sea change of the existing Massachusetts law in this area. If enacted as law, this simple sentence would effectively abrogate any post-employment restrictions which an employee may argue tends to hamper his or her ability to work outside the confines of present employment.

The language is broad enough to make unlawful even non-solicitation covenants which are meant to protect a business owner's customers/goodwill from departing salespersons. Thus, salespersons that may have either been handling certain customers for a former employer, or otherwise learned the identities of customers through their previous employment, would be free to solicit said customers after their employment terminates.

One could easily argue that this language also prohibits any type of agreement which would restrict a former employee's pilfering of key employees from his or her former employer. The former employee could argue that he or she could not continue in a certain profession without the assistance of, for example, key personnel that they may have trained at their former employer's place of business.

This language would clearly prohibit any type of post-employment non-competition covenants. As a result, even the protection one would expect to realize from a nondisclosure agreement would be greatly diminished. Employers would simply not be able to prohibit key personnel and/or salespeople and the like from working for direct competitors in the same or very similar positions.

The only exceptions are:

(1) Circumstances involving the selling of the good will or substantially all the operating assets of a company. The seller can agree with the buyer "to refrain from carrying on a similar business within the specified geographic area in which the business is sold," as long as the buyer carries out a similar business within the specified geographic area in which the business is sold.

(2) Dissolution of a partnership or dissociation of a partner from a partnership as long as the remaining partnership is carrying on a like business in the same geographic area.

(3) Dissolution of a limit liability company as long as the former members may be competing in the same geographic area.

The law does not serve to limit the creation or application of nondisclosure agreements.

The exceptions are extremely narrow and clearly indicate an intent to do away with any type of postemployment restrictions *vis-à-vis* ongoing business operations.

This proposed amendment to Chapter 149 of the General Laws would be even more detrimental to business owners or operators then those provisions of HO2293, an Act relative to noncompetition agreements.

Interestingly both bills are currently pending before the same committee i.e. the Joint Committee on Labor and Workforce Development of the Massachusetts House. The text of both bills is attached hereto.

Consideration of both of these bills in essence establishes a "Hobson's choice" of sorts for business interests in the state.


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**Bills & Laws**

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## Bill H02296

**Sponsors,** Sheila Harrington

**Bill text**

SECTION 1. Chapter 149 of the General Laws, as appearing in the 2008 Official Edition, is hereby amended by adding, after section 24K, the following new section: " "Section 24I. (a) As used in this section, the following words shall have the following meanings: "Business entity", any (a) partnership, including a limited partnership or a limited liability partnership, (b) limited liability company, or, (c) corporation. "Owner of a business entity", any (a) partner, in the case of a business entity that is a partnership, or, (b) member, in the case of a business entity that is a limited liability company, or, (c) any owner of capital stock, in the case of a business entity that is a corporation. "Ownership interest", a (a) partnership interest, in the case of a business entity that is a partnership, including a limited partnership or a limited liability partnership, or, (b) membership interest, in the case of a business entity that is a limited liability company, or, (c) capital stockholder, in the case of a business entity that is a corporation. "Subsidiary", any business entity over which the selling business entity has voting control, or from which the selling business entity has a right to receive a majority share of distributions upon dissolution or other liquidation of the business entity, or has both voting control and a right to receive these distributions. (b) Except as provided in this section, any contract that serves to restrict an employee or former employee from engaging in a lawful profession, trade, or business of any kind is deemed unlawful. (c) Any person who sells the goodwill of a business, or any owner of a business entity selling or otherwise disposing of all interest in the business entity, or any owner of a business entity that sells (a) all or substantially all of its operating assets together with the goodwill of the business entity, or; (b) all or substantially of the operating assets of a division or a subsidiary of the business entity together with the goodwill of that division or subsidiary, or; (c) all of the ownership interest of any subsidiary, may agree with the buyer to refrain from carrying on a similar business within a specified geographic area in which the business so sold, or that of the business entity, division, or subsidiary has been carried on, so long as the buyer, or person deriving title to the goodwill or ownership interest from the buyer, carries on a like business therein. (d) In the case of a dissolution of partnership or a dissociation of the partner from the partnership, any partner may, upon or in anticipation, agree to refrain from carrying on a similar business within a specified geographic area where the partnership business has been transacted, so long as any other member of the partnership, or any person deriving title to the business or its goodwill from any such other member of the partnership, carries on a like business therein. (e) In the case of a dissolution of a limited liability company, any member may, upon or in anticipation of the termination of his interest in the limited liability company, agree to refrain from carrying on a similar business within a specified geographic area where the limited liability company business has been transacted, so long as any other member of the limited liability company, or any person deriving title to the business or its goodwill from any such other member of the limited liability company, carries on a like business therein. (f) Nothing in this section shall serve to limit the creation or application of non-disclosure agreements intended to prohibit the sharing of certain information, including but not limited to, trade secrets, and proprietary or confidential information. ".

New Search

# NON-COMPETITION AGREEMENTS AND RESEARCH PRODUCTIVITY IN THE BIOTECHNOLOGY INDUSTRY

*Joseph E. Coombs, Texas A&M University*
*Porcher Taylor, University of Richmond*

2009
Boston

## ABSTRACT

This paper examines the impact of the state-level legal structure, namely the legal support for non-competition agreements, on research productivity. Specifically, we study how California's unique lack of non-competition agreement laws influences product develop when controlling for local munificence and firm-level technological capability. Our results indicate that California's unique legal structure is negatively associated with research productivity as measured by the number of products in development at the time a biotechnology firm goes public. Further, firm size moderates this relationship such that the effect is stronger for smaller biotechnology firms.

## INTRODUCTION

For decades, economists have recognized that firms in the same industry tend to cluster geographically. This observation has lead to a stream of research called agglomeration economics. At the core of agglomeration economics is the argument that firms benefit by locating within a geographic center of production. Transportation costs, proximity of raw materials, and access to a labor force with unique skills are examples of benefits accruing to firms because of clustering and are factors thought to explain the agglomeration of firms (Acs, FitzRoy & Smith, 1999). Krugman (1991a, b) and Marshall (1920) suggested that three major factors foster the creation of industry clusters: a pooled market for specialized labor, the development of specialized intermediate goods industries, and knowledge spillovers. Knowledge spillovers are defined as the benefits of knowledge to individuals or firms not responsible for the original creation of the knowledge (Almeida & Kogut, 1999). Knowledge consists of information and know-how (Kogut & Zander, 1992). Self-reinforcing expertise (Arthur, 1990) is a second model of regional development. In this conceptualization, geographic variance in technical progress is argued to exist because regions with innovative activity develop specialized resources critical to the next phase of innovation. Recently, Stuart and Sorenson (2003) provided evidence supporting the role of social capital as a creator of industry clusters. Lastly, Saxenian (1994) provided evidence that a culture of employee mobility supports cluster development. In each of these perspectives, knowledge spillovers play a particularly important role as they create competitive advantages for the firms located in the region through the relatively unimpeded flow of tacit knowledge. Findings that the level of relevant activity occurring within the firm's geographic location complements its ongoing research (Zucker, Darby & Brewer, 1998b), increases its ability to develop new products (Deeds, DeCarolis & Coombs, 1999), and makes the firm more attractive to investors (DeCarolis & Deeds, 1999) (all critical outcomes for technology ventures) support the assertion that knowledge spillovers are especially important factors in industry cluster development. This literature, while highly informative and helpful in explaining why firms are located within a cluster, does little to explain geographically where clustering occurs or how the place where clustering occurs influences firm performance. In this paper, we provide one possible explanation, legal infrastructure, for why firms cluster where they do and test three hypotheses relating legal infrastructure to research performance.

Recent research by Gilson (1999) has examined the role legal infrastructure might play in facilitating the creation of a high technology agglomeration economy. Gilson posited that knowledge is transferred between firms by high employee movement, thus generating continuing innovation. He hypothesized that Silicon Valley's culture was shaped by the underlying legal infrastructure and particularly the state law barring enforcement of employee non-competition agreements in California. A non-competition

agreement is defined here as an employee's contractual promise not to engage in business similar to the employer's and not to work for an employer's competitor (Gabel & Mansfield, 2003) for a particular period of time (usually one or two years) and within a specific geographic region (Gilson, 1999). Many companies use employee non-competition agreements to manifest that management owns human capital. This is especially true in high technology industries where much of a firm's competitive advantage is in the form of tacit knowledge that is developed over time through hands-on experience and interactions with other researchers, customers, and suppliers (Gilson, 1999; Zucker, Darby & Armstrong, 1998a). From the employer's perspective, they have an obvious competitive interest in protecting this tacit knowledge and in keeping it from spilling over to competitors (Gilson, 1999). California is the only state in the nation where these agreements are void on public policy grounds (Gabel & Mansfield, 2003; Gilson, 1999; Kovach, Pruett, Samuels & Duvall, 2004).

If Gilson is correct, then we might expect differences in the enforceability of employee non-competition agreements to lead to differences in the "relative successes" of high technology-based geographic economies. Wood (2000) tested this relationship by comparing the law regarding covenants not to compete in four high technology centers: Silicon Valley, the Route 128 Corridor in Boston, Austin, Texas, and Research Triangle Park in North Carolina. Significantly, employee non-competition agreements are not banned in Massachusetts, Texas or North Carolina. In Massachusetts, courts generally favor enforcement of such agreements. Although the courts in Texas are reluctant to enforce these covenants, Texas "technically" can enforce them. North Carolina's "counter-balancing" peculiarities create a favorable enforcement environment for these agreements. Wood used various economic and financial data to objectively examine the relative recent successes or failures of the four regions, but did not find correlation between high technology success in these clusters and the degree to which these four states enforce employee covenants not to compete (2000). Despite significant legal infrastructure differences between the regions, they all seemed to be experiencing exponential growth and success.

**Non-Competition Covenants and Research Productivity**

While much has been made of the importance of employee migration as a catalyst for entrepreneurial activity (Almeida & Kogut, 1999; Audretsch & Lehmann, 2005; Saxenian, 1994) and knowledge transfer (Almeida & Kogut, 1999; Rosenkopf & Almeida, 2003; Song, Almeida & Wu, 2003), relatively little mention has been made of the tacit knowledge loss firms sustain when employees leave. According to the resource-based view of the firm (Barney, 1991; Conner, 1991; Wernerfelt, 1984), firms differ in their stocks of resources, resource heterogeneity has a strong influence on performance differentials, and those resources that are valuable and rare, such as tacit knowledge, are associated with superior performance (Berman, Down & Hill, 2002). Resource based scholars suggest that socially complex tacit knowledge, due to its inimitable and non-codifiable nature, is a source of competitive advantage that can sustained for a period of time (Barney, 1991; Kogut & Zander, 1993; Lippman & Rumelt, 1982; Reed & DeFillippi, 1990; Teece, 1982; Teece & Pisano, 1998). It is precisely because tacit knowledge cannot be sold through a market mechanism but instead resides in an individual or group, that it is the basis for sustained competitive advantage.

While tacit knowledge may be viewed as a source of sustainable competitive advantage, how this knowledge comes into being is unclear. Dierickx and Cool (1989) suggest that resources are stocks of assets that have accumulated over time. Berman and colleagues (2002) suggest then that tacit knowledge accumulates over time and with experience. For firm, this suggests that it is advantageous to keep employees as they are a firm's primary source of tacit knowledge. In other words, if employees leave frequently firms are disadvantaged in two ways. First, the employee takes with them any the tacit knowledge they have. Second, firms cannot immediately replace this tacit knowledge because it only develops over time. Even if the firm hires an employee to replace the one lost, it will take some time to develop the group level tacit knowledge that was lost when the employee left. In California, where non-competition agreements are not enforced, employees may and do leave firms regularly, often to start new

firm of their own (Gilson, 1999). While this may positively influence start-up activity in California, we suggest that it is negatively related to firms' research productivity. Thus:

*H1: Being located in California is negatively associated with research productivity.*

**Moderating Role of Firm Age**

The effect of state-level legal structure on research productivity is particularly strong for younger and smaller firms because these firms have not typically developed the qualities associated with legitimate firms (Stuart, 2000; Stuart et al., 1999). Empirically, researchers have shown that a firm's early years of existence are the most tenuous in terms of survival (Henderson, 1999) due to the liability of newness. (Bruderl & Schussler, 1990; Freeman, Carroll & Hannan, 1983; Singh, Tucker & House, 1986). Young firms are more likely to fail because they must divert scarce resources away from operations to attract and train employees, develop routines and develop credible relationships. Further, these firms are more likely to be concerned with resolving important strategic issues such as determining which opportunities to pursue, selecting a competitive strategy, choosing methods of strategy implementation, and establishing strategic control mechanisms (Stinchcombe, 1965) for the first time. At the same time, managers in newer organizations are less likely to engage in formal strategic planning or thorough environmental scanning. As a result, they may have less knowledge of external environmental factors, when compared with executives of older organizations. This is largely due to a lack of managerial and analytical resources available to younger firms (Boeker & Goodstein, 1993). It is noteworthy when young firms are able to maintain operations while also building internal resource and forming credible exchange relationships. Due to the lack of routines and strategic planning as well as the limited time the firm has had to develop tacit knowledge, we suggest that younger firms are more likely to be negatively impacted by the legal structure in California relative to non-competition agreements than are more established firms. Thus, we hypothesize that the relationship between legal structure and research productivity is influenced by firm age.

*H2: Firm age moderates the relationship between being located in California and research productivity such that the relationship is more negative for younger firms.*

**Moderating Role of Firm Size**

Similar to younger firms, smaller firms have also been shown to operate at a relative disadvantage (Aldrich & Auster, 1986). Comparatively little is known about the quality and future performance of small firms (Stuart, 2000). External actors such as customers, suppliers, employees, investors, and research partners tend to prefer interacting with larger established firms because the reliability and ability of larger firms is well known (Hannan & Freeman, 1984; Stinchcombe, 1965; Stuart, 2000). As with young firms, it is noteworthy when small firms are able to maintain operations while also building internal resource and forming credible exchange relationships. Small firms, therefore, typically lack these capabilities and may have limited resources with which to develop tacit knowledge. We therefore hypothesize that the relationship between legal structure and research productivity is influenced by firm size.

*H3: Firm age moderates the relationship between being located in California and research productivity such that the relationship is more negative for smaller firms.*

## METHOD

**Sample**

Because they (1) may suffer from the liabilities of newness and smallness, (2) have difficulty establishing their legitimacy, and (3) must manage relationships with needed external resources to reduce their uncertainty, we chose to study biotechnology firms to test the hypothesized relationships. In slightly different words, we believe that the biotechnology industry provides an appropriate milieu for the study of the relationships among state-level legal structure and research productivity. The primary reason for this is that firms in this industry are relatively young with minimal resources required to support costly and highly uncertain product development efforts.

Our target sample was the population of human therapeutic biotechnology firms that went public between 1982 and 1999. Each firm that went public prior to 1996 was identified using *Bioscan*. Each firm was contacted and a prospectus describing its initial public offering (IPO) of stock was requested. Prospectuses for those firms that went public after 1995 were identified using *Bioscan* and recap.com and were collected from *Edgar*, the Securities and Exchange Commission's publicly available database. One hundred and eighty seven prospectuses were collected. Due to missing data or the inclusion of warrants in a parent firm, twenty firms were excluded from the data set, yielding a final data set of 167 firms.

We collected data from each firm's prospectus for its initial public offering of stock and from Ernst & Young's annual reports on the biotechnology industry. To test for potential biases in the sample collected prior to 1996, we compared the average total assets and total liabilities as reported by Burrill and Lee (1993) for the population of public biotechnology firms. The firms in our sample that went public prior to 1996 had an average of $11,708,000 in total assets and $3,569,000 in total liabilities. Burrill and Lee (1993) reported the average total assets and total liabilities for all 225 public biotechnology firms in 1992 as $11,377,000 and $3,313,000 respectively. Based on this comparison of total assets and total liabilities, the sample of firms included in this study that went public prior to 1995 is not significantly different from the population of publicly traded biotechnology companies prior to 1995. In addition, by selecting firms from a single industry, we controlled for potential industry effects (Dess, Ireland & Hitt, 1990).

**Dependent Variable**

Research productivity is a count variable representing a limited range of positive integer variables including multiple zero values, and is not normally distributed. Ordinary least squares regression techniques are inappropriate for this type of data. Poisson and negative binomial regression handle this type of data well. The presence of overdispersion in this type of data supports the use of negative binomial regression while the lack of overdispersion favors poisson regression (Hausman, Hall, & Griliches, 1984; Welbourne & Trevor, 2000). Comparing the likelihood ratios of the two models at one degree of freedom indicates that the poisson model is appropriate for our data (Cameron & Trevedi, 1986; Welbourne & Trevor, 2000). The prospectus of each firm lists those products in clinical trials and those that have been approved for sale. The measure we used included products in pre-clinical trials, those in formal FDA clinical trials, and those approved for sale. This measure is thus the most comprehensive measure of research productivity as applied to products available. Multiple applications of the same product were not included.

**Independent Variable**

The state-level legal structure examined in this study is the legal support for employee non-competition agreements. As a matter of law, *California* is the only state in the United States that does not recognize the legality of employee non-competition agreements. The remaining 49 states vary with the degree to which courts support these agreements, however, in general these remaining state courts do recognize these agreements as legal (Gilson, 1999). Our independent variable then is a dichotomous variable where 1 is coded as the firm is headquartered in California and 0 if the firm is headquartered elsewhere.

**Control Variables**

We considered including a number of control variables. Based on the literature, we chose to control for firm size and age, scientific competency, alliance activity, firm location, firm location squared, and research connectedness. *Firm age* is defined as the age of the firm in years from founding to the firm's IPO. Age serves as a proxy for uncertainty because younger firms have had limited time to develop tacit knowledge (Stuart, Hoang & Hybels, 1999). Following Deeds, Mang and Frandsen (2004), the number of employees is used to control for the effect of *firm size* on research productivity. *Patents* are considered indicators of important technology positions and innovative activity and can also be considered as inputs in the new product development process (Mansfield, 1977; Pakes, 1985). From the offering firm's prospectus, a count of the patents both granted directly to the firm and patents in which the firm is the sole licensee is taken. A raw count of patents provides a reasonable alternative to a quality adjusted measure of patents by citations since prior research has shown that a firm's raw patent count is highly correlated with the quality of its patents (Stuart, 2000). Moreover, in the biotechnology industry, patent counts as a proxy for innovativeness may actually be preferred over patent citation measures since citations occur over time and thus, are biased towards older patents. Firm R&D represents both knowledge that is available only to the organization that produced it and knowledge accrued from spillovers from R&D expenditures other firms in the same or related industries have made (Acs & Audretsch, 1989; Jaffe, 1986; Ziegler, 1985). R&D intensity is measured as R&D expenditures during the year prior to each firm's IPO as a percentage of total firm expenditures (Deeds et al., 1997). Traditionally, *R&D intensity* is measured as R&D expenditures as a percentage of sales (Hansen & Hill, 1991). However, given the early stage of development of the firms in this industry, and their lack of revenues, total expenditures are used in place of sales. Data were collected from firm prospectuses. Recent research has investigated the role of *alliances* in knowledge transfer (Inkpen, 2001; Mowery, Oxley & Silverman, 1996; Powell, Koput & Smith-Doerr, 1996) and has noted that alliances may be appropriate conduits for the transfer and development of knowledge (Hagedoorn & Narula, 1996) especially when firms are geographically proximate (Rosenkopf & Almeida, 2003). We control for this potential source of knowledge transfer by including the total number of alliances each firm has been involved in from founding to IPO as listed in the prospectus.

A *firm location* factor was developed based on prior research (DeCarolis & Deeds, 1999; Zucker et al., 1998b) to capture a number of location measures important to biotechnology firms' research productivity. The factor included the following variables: Department Rank, Medical Schools, Venture Capital, and Biotech Firms. Department rank is coded as the number of universities with top quality biotech-relevant departments in each firm's SMA during the year the firm went public. The data for this variable come from two National Research Council surveys (completed in 1982 and 1993) of doctorate granting science departments. The sample was split into those firms going public up to and including 1988 and those firms going public after 1988. Thus, we used the survey results that were reported closest to the year of each firm's IPO. We also analyzed the data using only the 1982 survey and then analyzed the data using only the 1993 survey. The department rank variable's results were not significantly altered using either data source. This variable is coded as the number of universities within each firm's SMA that is rated at 4.0 or higher in at least one biotech-relevant department in a given year. Medical schools is coded as the number of top ten medical schools in each firm's SMA. Data were collected from annual issues of the Gourman Report. Venture capital is coded as the number of venture capital firms in each biotechnology firm's SMA having a stated industry preference in biotechnology as reported in annual issues of Pratt's Guide to Venture Capital. The biotech firm variable equals the percentage of the total industry's biotechnology firms located in each biotechnology firm's SMA. This data was collected from Ernst & Young's annual reports on the biotechnology industry.

The *connectedness* measure was adopted from Cockburn and Henderson's (1998) work. Publication information was collected for each firm for the period from firm incorporation to the IPO date. Publications included those indexed in the Institute for Scientific Information's *Science Citation Index*. Consistent with Cockburn and Henderson (1998), authors' mailing addresses were used to identify institutions involved in collaborations. Multiple addresses from the same institution were collapsed into one instance of

collaboration. For example, a record with three authors and two Harvard University addresses was classified as one instance of university collaboration. The connectedness measure was developed by first classifying each publication's addresses into one of the following classes: self, university, NIH, public, private, nonprofit, hospital, and unclassified. Self refers to papers where only addresses of the focal firm (or its divisions and subsidiaries) are listed. University includes university and medical school addresses. NIH includes any NIH or affiliated (e.g., National Institute on Aging) addresses. Public addresses include those associated with National Laboratories, Departments of Public Health, and other government departments. The hospital category includes hospitals, clinics, and community health centers. Nonprofit addresses are those associated with research centers and institutes, foundations, and other non-profit but not government affiliated offices. The private category includes for-profit private organizations such as pharmaceutical and biotechnology firms. Unclassified includes any organization we were unable to classify. This data set included two unclassified addresses, each of which was an individual's private address. For the purposes of this study, each classification was divided into its local (at the SMA level), domestic non-local, and international components. Thus, the measures used in this research represent firm connectedness at the local, domestic, and international levels.

## RESULTS

The average firm in our sample had 3.28 products, was 6.18 years old, and had 87.70 employees. Our firms were located in SMAs with an average location factor score of 0.00. For comparison, firms in our sample located in San Francisco, Boston, Atlanta, and Philadelphia had average location factor scores of 8.24, 4.68, -3.83, and –1.44, respectively. The average location squared score was 13.11. The average firm in our sample had 6.70 patents, spent 66% of their expenditures on R&D activities, and had been involved in 5.34 alliances. Firms in the sample had an average of 4.14 local connections.

Table 1 presents the results of the poisson regression analyses with research productivity as the dependent variable. Three different models were run. Model 1 presents the base case controlling for firm age, firm size, patents, R&D intensity, total alliances, firm location, location squared, and local connectedness. The results indicate that firm size is negatively associated with research productivity ($p<.01$). The results also show that patents held by the firm ($p<.01$), location ($p<.05$), and local connectedness ($p<.001$) were all positively associated with research productivity. Location squared was negative and significant ($p<.001$). The second model incorporates the state-level legal structure variable (California). As predicted in hypothesis 1, California was negatively and significantly ($p<.001$) associated with research productivity. Thus, hypothesis one was supported. Hypotheses 2 and 3 were tested in Model 3 by introducing the interactions between California and firm age as well as California and firm size. The interaction of California and firm age, although in the predicted direction, was not significant and thus failed to support hypothesis 2. Lastly, the interaction between California and firm size was examined. The interaction is negative and significant ($p<.05$) and therefore provides support for hypothesis 3. The main effects for California remained negative and significant ($p<.001$) when the interaction terms were added to the regression equation. Our results are consistent with prior findings of a non-linear relationship between the amount of activity in a local area and a firm's research productivity. In reviewing the results, we find strong support for both Hypotheses 1 and 3, but no support for Hypotheses 2. This indicates that state-level legal structure has a significant impact on firm-level research productivity by providing firms outside of California a means to protect the tacit knowledge held by their employees. Our results also indicate that firms in clusters and firms connected to their local scientific community through article co-authorship are significantly more research productive.

## DISCUSSION

Schumpeter (1942) observed the importance of understanding conditions that create opportunities for, support, or impede entrepreneurial activity. For economies, understanding these conditions is an important policy issue while for individual firms, having this understanding is critical to efforts to achieve competitive

success. Our results shed light on these important issues by contributing to the burgeoning stream of research on firm-level research productivity.

Building on prior legal research (Gabel & Mansfield, 2003; Gilson, 1999; Kovach et al., 2004; Wood, 2000), we argued that state-level legal structure relating to employee non-competition agreements would impact firm-level research productivity by either allowing employees to leave firms with no restrictions on their post-employment activities or by restricting employee actions during a period of time and/or within a geographic region. Our results suggest that the legal structure in California that places no restrictions on post-employment activities hinders firm's research and development activities. We believe this occurs because firms cannot protect the tacit knowledge held by employees. We also considered the issues of whether legal structure was more important to younger and smaller firms. Our results here suggest that smaller firms are particularly affected by the legal structure in California. The results clearly highlight the importance of legal structure when firms are particularly reliant upon competitive advantages based upon tacit knowledge. We also provided support for prior research that has shown a non-linear relationship between firm location munificence and firm performance. Firm location is positively associated with research productivity up to a point. At that point, the increased competition for resources negatively impacts a firm's research and product development efforts. We also support prior research by Zucker and Darby (1998a) and Cockburn and Henderson (1998) that suggests the importance of being connected to local knowledge sources rather than simply waiting for knowledge to spill over from other firms.

While highlighting the influence state-level legal structure has on research productivity, this study's results are limited by a focus on the biotechnology industry. While there are methodological advantages to studying a single industry (Dess et al., 1990), the results must be viewed conservatively. We also use a limited number of variables in our location construct. Other variables such as biotechnology employment would be welcome additions to the measure. Finding this data at the SMA level, however, has proved difficult. Lastly, there are certainly other ways to keep employees from leaving and taking their tacit knowledge with them including compensation structure and job design. Ideally, these could be controlled for but, again, data availability is problematic.

Finally, we would like to add some suggestions for future research. In this paper we do not control for other state-level legal issues that may have a bearing on employee migration. Our focus here is on research productivity. Future research may be directed at relating legal structure to other performance measure such as survival, time to IPO, and patent development. For entrepreneurs, this research suggests that state-level legal issues should be considered when deciding where to locate their firms if knowledge protection is central to competitive advantage.

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## REFERENCES

Acs, Z.J., & D.B. Audretsch. (1989) "Patents as a Measure of Innovative Activity." *Kyklos* 42: 171-180.

Acs, Z.J., F.R. FitzRoy, & I. Smith. (1999) "High-Technology Employment, Wages and University R&D Spillovers: Evidence from U.S. Cities." *Economics of Innovation and New Technology* 8(1-2): 57-78.

Almeida, P., & B. Kogut. (1999) "Localization of Knowledge and the Mobility of Engineers in Regional Networks." *Management Science* 45:905-918.

Arthur, B. W. (1990) "Positive Feedbacks in the Economy." *Scientific American* February: 92-99.

Audretsch, D.B., & E.E. Lehmann. (2005) "Does the Knowledge Spillover Theory of Entrepreneurship Hold for Regions?" *Research Policy* 34: 1191-1202.

Barney, J. (1991) "Fir Resources and Sustained Competitive Advantage." *Journal of Management* 17: 99-120.

Berman, S.L., J. Down, C.W.L. Hill. (2002) "Tacit Knowledge as a Source of Competitive Advantage in the National Basketball Association." *Academy of Management Journal* 45: 13-31.

Burrill, S.G., & K.B. Lee. (1993) *Biotech 93: Accelerating Commercialization*. San Francisco: Ernst & Young.

Cameron, A., & P. Trevedi. (1986) "Econometric Models Based on Count Data: Comparisons and Applications of Some Estimators and Tests." *Journal of Applied Econometrics* 1: 29-53.

Cockburn, I.M., & R.M. Henderson. (1998) "Absorptive Capacity, Coauthoring Behavior, and the Organization of Research in Drug Discovery." *Journal of Industrial Economics* 46: 157-182.

Conner, K.R. (1991) "A Historical Comparison of Resource Based Theory and Five Schools of Theory Within Industrial Organization Economics: Do We Have a New Theory of the Firm?" *Journal of Management* 17: 121-154.

DeCarolis, D., & D.L. Deeds. (1999) "The Impact of Stocks and Flows of Organizational Knowledge on Firm Performance: An Empirical Investigation of the Biotechnology Industry." *Strategic Management Journal* 20: 953-968.

Deeds, D.L., D. DeCarolis, & J.E. Coombs. (1999) "Dynamic Capabilities and New Product Development in High Technology Ventures: An Empirical Analysis of New Biotechnology Firms." *Journal of Business Venturing* 15: 211-229.

Deeds, D.L., P.Y. Mang, & M.L. Frandsen. (2004) "The Influence of Firms' and Industries' Legitimacy on the Flow of Capital Into High-Technology Ventures." *Strategic Organization* 2: 9-34.

Dess, G.G., R.D. Ireland, & M.A. Hitt. (1990) "Industry Effects and Strategic Management Research." *Journal of Management* 16: 7-27.

Dierickx, I., & K. Cool. (1989) "Asset Stock Accumulation and Sustainability of Competitive Advantage." *Management Science* 35: 1504-1514.

Gabel, J.T.A., & N.R. Mansfield. (2003) "The Information Revolution and its Impact on the Employment Relationship: An Analysis of the Cyberspace Workplace." *American Business Law Journal* 40: 301-353.

Gilson, R.J. (1999) "The Legal Infrastructure of High Technology industrial Districts: Silicon Valley, Route 128, and Covenants Not to Compete." *New York University Law Review* 74: 575-629.

Hagedoorn, J., & R. Narula. (1996) "Choosing Organizational Modes of Strategic Technology Partnering: International Costs and Sectoral Differences." *Journal of International Business Studies* 27: 265-284.

Hansen, G.S., & C.W.L. Hill. (1991) "Are Institutional Investors Myopic? A Time-Series Study of Four Technology Driven Industries." *Strategic Management Journal* 12: 1-16.

Hausman, J., B.H. Hall., & Z. Griliches. (1984) "Econometric Models for Count Data with an Application to the Patents-R&D Relationship." *Econometrics* 52: 909-938.

Inkpen, A.C. (2001) "Strategic Alliances." In *Blackwell Handbook of Strategic Management*, eds. M.A. Hitt, R.E. Freeman & J.S. Harrison, 409-432. Oxford, UK: Blackwell Publishers.

Jaffe, A.B. (1986) "Technological Opportunity and Spillovers of R&D: Evidence from Firms' Patents, Profits, and Market Value." *American Economic Review* 76: 984-1001.

Kogut, B., & U. Zander. (1993) "Knowledge of the Firm and the Evolutionary Theory of the Multinational Corporation." *Journal of International Business Studies* 24: 625-646.

Kogut, B., & U. Zander. (1992) "Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology." *Organization Science* 3: 383-397.

Kovach, K.A., M. Pruett, L.B. Samuels, & C.F. Duvall. (2004) "Protecting Trade Secrets During Employee Migration: What You Don't Know Can hurt You." *Labor Law Journal* 55: 69-84.

Krugman, P. (1991a) *Geography and Trade*. Cambridge, MA: MIT Press.

Krugman, P. (1991b) "Increasing Returns and Economic Geography." *Journal of Political Economy* 99: 483-499.

Lippman, S.A., & R.P. Rumelt. (1982) Uncertain Inimitability: An Analysis of Interfirm differences in Efficiency Under Competition." *Bell Journal of Economics* 13: 418-438.

Mansfield, E. (1977) *Research and Innovation in the Modern Corporation*. New York: W.W. Norton.

Marshall, A. (1920) *Industry and Trade*. London: MacMillan.

Mowery, D.C., J.E. Oxley, & B.S. Silverman. (1996) "Strategic Alliances and Interfirm Knowledge

Transfer." *Strategic Management Journal* 17: 77-91.
Pakes, A. (1985) "Patents, R&D, and the Stock Market Rate of Return." *Journal of Political Economy* 93: 390-409.
Powell, W.W., K.W. Koput, & L. Smith-Doerr. (1996) "Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology." *Administrative Science Quarterly* 41: 116-145.
Reed, R., & R.J. DeFillippi. (1990) "Causal Ambiguity, Barriers to Imitation, and Sustainable Competitive Advantage." *Academy of Management Review* 15: 88-102.
Rosenkopf, L., & P. Almeida. (2003) "Overcoming Local Search Through Alliances and Mobility." *Management Science* 49: 751-766.
Saxenian, A. (1994) *Culture and Competition in Silicon Valley and Route 128*. Cambridge, MA: Harvard University Press.
Schumpeter, J.A. (1942) *Capitalism, Socialism, and Democracy*. New York: Harper & Row.
Song, J., P. Almeida, & G. Woo. (2003) "Learning-By-Hiring: When is Mobility More Likely to Facilitate Interfirm Knowledge Transfer?" *Management Science* 49: 351-365.
Stuart, T.E., H. Hoang, & R.C. Hybels. (1999) "Interorganizational Endorsements and the Performance of Entrepreneurial Ventures." *Administrative Science Quarterly* 44: 315-349.
Stuart, T., & O. Sorenson. (2003) "The Geography of Opportunity: Spatial Heterogeneity in Founding Rates and the Performance of Biotechnology Firms." *Research Policy* 32: 229-253.
Teece, D.J. (1982) "Towards an Economic Theory of the Multiproduct Firm." *Journal of Economic Behavior and Organization* 3: 39-63.
Teece, D.J., & G. Pisano. (1998) "The Dynamic Capabilities of Firms." In *Technology, Organization and Competitiveness*, eds. G. Dosi et al, Oxford, England: Oxford University Press.
Welbourne, T.M., & C.O. Trevor. (2000) "The Roles of Departmental and Position Power in Job Evaluation." *Academy of Management Journal* 43: 761-771.
Wernerfelt, B. (1984) "A Resource Based View of the Firm." *Strategic Management Journal* 5: 171-180.
Wood, J.S. (2000) "A Comparison of the Enforceability of Covenants Not to Compete and Recent Economic Histories of Four High Technology Regions." *Virginia Journal of Law & Technology* 14(Fall).
Ziegler, C.A. (1985) "Innovation and the Imitative Entrepreneur." *Journal of Economic Behavior and Organization* 7: 103-121.
Zucker, L.G., M.R. Darby, & J. Armstrong. (1998a) "Geographically Localized Knowledge: Spillovers or Markets?" *Economic Inquiry* 36: 65-86.
Zucker, L.G., M.R. Darby, & M.B. Brewer. (1998b) "Intellectual Human Capital and the Birth of U.S. Biotechnology Enterprises." *American Economic Review* 88: 290-306.

Table 1
Poisson Regression Results for Research Productivity

| Variables | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| Firm Age | -0.013 | -0.018 | -0.017 |
| Firm Size | -0.003** | -0.003** | -0.002* |
| Patents | 0.007** | 0.007** | 0.006** |
| R&D Intensity | -0.107 | -0.126 | -0.127 |
| Total Alliances | -0.014 | -0.016† | -0.015† |
| Location | 0.029* | 0.033* | 0.030* |
| Location Squared | -0.024*** | -0.014* | -0.014* |
| Local Connectedness | 0.021*** | 0.021*** | 0.022*** |
| California | | -0.174*** | -0.216*** |
| California x Age | | | -0.007 |
| California x Size | | | -0.002* |
| Pearson Ch-Square | 755.73 | 669.83 | 653.19 |
| Log Likelihood | 138.96 | 158.87 | 161.64 |
| N | 167 | 161 | 159 |

†p<.10, *p<.05, **p<.01, ***p<.001