Non-compete Agreements: Barriers to Entry…and Exit?

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EXECUTIVE SUMMARY

This chapter describes recent research on post-employment covenants not to compete, as well as potential policy implications of such research. We propose that non-competes are an underappreciated lever for policymakers to wield in effecting entrepreneurial outcomes. We review theory and models as well as qualitative and quantitative evidence from ourselves and others, at three levels of analysis. First, how do non-competes impact individual careers? Second, why do firms adopt non-compete agreements, and how do they affect the behavior and performance of firms? Third, what do we know of the regional implications of non-competes for entrepreneurship, productivity, and other measures? We observe that non-competes are generally favorable for established firms though less so for firms that are young, small, or not yet established. These benefits to firms appear to be offset by costs to individual workers, who are often unaware of non-competes when they initially accept an employment offer and end up with reduced opportunities for employment or entrepreneurship going forward. At the regional level, evidence is thin but points again to the tension between the interests of established firms and those that do not yet exist. Ultimately, policymakers' decision regarding whether or not to enforce non-competes should be driven by the extent to which they want to optimize for the preservation of established firms vs. individual career flexibility, and the founding and growth of new startups.

I. INTRODUCTION

Given the central role of entrepreneurs in fostering innovation and productivity growth (Schumpeter 1975; Acs and Audretsch 1988), it is no wonder that policymakers seek to spur the founding and growth of startup companies. Dozens of attempts to recreate the entrepreneurial dynamics of Silicon Valley have failed, in part due to the direct-subsidy model in which politicians attempt to stimulate a particular sector or even "pick winners" within an industry. The ineffectiveness of science parks (Wallsten 2001) and other such measures can be traced in part both to the inefficient allocation of capital in the political process as well as the vagaries of the electoral cycle.

An alternative to the direct-subsidy approach is to instead focus on improving the entrepreneurial climate by removing barriers to the commercialization of technology and the establishment of new firms. Such initiatives typically do not target a particular industry but rather involve policy reforms that facilitate the transfer of technology, streamline the process of incorporation, and make resources available for implementation of the business plan to the population of (would-be) entrepreneurs. For example, several countries have reduced the number of steps required to incorporate. Likewise, the Bayh-Dole Act of 1982 greased the rails for commercializing inventions from U.S. universities, by giving

clear property rights and incentives to commercialize to the universities. This paper explores a policy issue that has the potential to influence the entrepreneurial climate, including the ability of would-be entrepreneurs to leave their jobs, and the capability of small firms to recruit relevant talent.

Once a company is incorporated and the initial opportunity identified, founders must marshal both financial and human resources to grow the business. New ventures rely on an influx of expertise skilled in the art in order to grow (Haveman and Cohen 1994; Klepper 2001; Gompers, Lerner, and Scharfstein 2005); indeed, failed efforts to build biotech clusters can in many cases be traced to the lack of local scientific personnel (Lerner 2009:113-114). But even if skilled talent exists in a region, startups still face challenges in attracting key workers due to their uncertain life chances and limited resources. Unless they are content to recruit talent from universities or from the ranks of the unemployed, startups must attract workers from existing firms. Thus entrepreneurial regions rely heavily on fluid inter-organizational mobility of workers.

If anything, the demise of internal labor markets following the globalization and deregulation of the 1980s would seem to ease the challenge of staffing startups as workers pursue what have been called "boundaryless careers" (Arthur and Rousseau 1994), moving frictionlessly from firm to firm. To the extent that workers are free to circulate among firms, startups may take advantage of the supply of labor with relevant skills. As Nobel prize-winning economist Gary Becker observed, "[y]ou cannot separate a person from his or her knowledge, skills, health, and values the way it is possible to move financial and physical assets while the owner stays put" (1963:16). But it may nonetheless be possible to separate workers from the *use* of their skills. This paper focuses on a legal restriction to inter-organizational mobility: postemployment non-compete agreements (hereafter, "non-competes") and their potential implications at three levels: individual careers, firm performance, and regional economic productivity. The desirability and impact of non-competes differ for actors across these three levels of analysis; consequently, it is not straightforward to pick an optimal policy given competing interests. Instead, policymakers should consider the enforceability of such contracts depending on which constituents they seek to satisfy.

This chapter proceeds as follows. First, in Section II we provide a non-legalistic introduction to and overview of non-compete agreements, pointing out how they differ from other techniques used to protect intellectual property. Next, in Sections III-V we describe how non-competes affect individuals, firms, and regions respectively. In doing so, we review the work of several scholars and offer particular detail regarding our own studies, which exploit an inadvertent reversal of non-compete policy in Michigan during the 1980s to facilitate causal identification of the non-compete effect. Finally, in Section VI we analyze choices facing policymakers. We do not offer a preferred policy prescription but rather propose that the decision regarding whether or not to enforce non-competes should be determined by the desire to optimize for the interests of established firms vs. the founding and growth of new firms as well as individual workers' career flexibility.

II. BACKGROUND ON NON-COMPETES

A non-compete is an employment contract in which an employee pledges not to work for a competitive firm for a period of time after resigning. Firms use non-competes to protect their interests, including confidential information such as trade secrets and customer identities. Hardly new, non-competes have been used since the fifteenth century. Following the decimation of the European labor supply by the Bubonic plague, the Ordinance of Labourers made it unlawful not to work in England. Thus the English judge reviewing the first non-compete infringement *Dyer's Case* of 1414 was less than sympathetic to the plaintiff's request that his former apprentice—a dyer of clothes—be enjoined from setting up shop in the same town (contrary to his non-compete employment contract). In fact, the judge threatened the plaintiff with jail time for having dared to prohibit someone from working (Decker 1993).

The 1711 decision in *Mitchel v. Reynolds* established the initial precedent for non-competes. Although sentiment remained strong against "general" prohibitions on the ability of workers to exercise their expertise, the court allowed that workers should have the right to bargain over "particular" restraints such as restricting the practice of their trade in a certain geographic area or for a given length of time (Blake 1960). As such, non-competes incorporated limitations on their scope of expertise, geographic reach, and duration.

Regarding expertise, non-competes prevent ex-employees from exercising their skills to benefit a competitive firm. The agreement typically either lists a set of companies at which the employee may not work or defines a "field of service" in which the ex-employee may not perform. The disadvantage of the former approach is that firms unknown to the employer may compete with it in the future. The latter approach can be difficult to pin down due to vague definitions of a technical field.

Regarding geography, non-competes in fields where competition is circumscribed by distance typically specify the spatial range beyond which competitive activity is sanctioned. In medicine, where competition for clients takes place locally, this is frequently defined as a radius around the practice. In technological fields, however, a looser scope is adopted—often the entire country or even anywhere in the world.

Given the particular importance of protecting trade secrets in high-tech industries, the geographic restriction is less salient than the duration of the agreement. A non-compete must spell out the length of time for which the ex-employee is bound after leaving the firm. Data from a survey of 1,029 members of the Institute of Electrical and Electronics Engineers (IEEE) reveal that the term of a non-compete is typically 1 or 2 years though often longer (Marx 2009).

Comparison with other means of protecting intellectual property

If a chief objective of requiring non-compete agreements is to guard against the leakage of trade secrets, one might reasonably wonder whether this is not already accomplished by non-disclosure agreements (NDAs). Although NDAs are employed widely, it can be difficult if not impossible to know

whether an ex-employee is abiding by the agreement. Moreover, several courts have allowed that ex-employees may "inevitably disclose" proprietary information to their subsequent employer (Whaley 1999). Thus the only way firms can fully protect against the leakage of trade secrets and other proprietary information such as customer lists is to block ex-employees from joining firms where said disclosure could harm the company. It is easier to determine whether an ex-employee is working at a particular company than to determine whether that same employee is misappropriating confidential information.

Non-competes also differ from other forms of intellectual property protection in the way they operate. Patents, trademarks, and trade secret protection effectively enable inventors to set a monopoly price for their intellectual property, which would otherwise be available at near-zero cost to consumers given the ease of duplication. While such protection creates an incentive to invest in innovation, it also creates a "deadweight loss" for consumers whose willingness to pay is greater than marginal cost but lower than the monopoly price and who consequently cannot consume the good (Scotchmer 2004). In the case of drug discovery, for example, many patients might benefit from a particular medication if it were free or less expensive but cannot because firms are able to maintain high(er) prices given their patent portfolio. The deadweight loss is often rationalized ex ante in that the good never would have been invented in the first place if not for promise of monopoly pricing. In the case of non-compete agreements, however, the deadweight loss bears a less direct relationship to the incentive to invest. Most forms of intellectual property protection restrict access to the *output* of the innovative process. For example, employees signing a non-disclosure agreement promise not to divulge specific trade secrets. But by forbidding ex-employees to work in the same field, non-compete agreements deny others use not only of the outputs but the inputs as well: namely, the relevant expertise of those who created the trade secrets. Non-competes essentially enable firms to set a monopoly price on the skills of ex-employees. (Of course, firms are free to set a lower price, as when Nortel paid Motorola $11 million to release its COO from his non-compete so that he could become Nortel's CEO. (McMillan 2006)).

The prevalence of non-competes is not tracked by a central authority such as the U.S. Patent & Trademark Office, as firms are not required to report which employees are subject to non-competes. But multiple surveys suggest that non-competes are quite common. Garmaise (2009) observed that 70.2% of Execucomp firms use non-competes with their senior executives, likely a lower bound as firms are not required to report use of non-competes in public filings. Kaplan and Stromberg (2003) found that 90% of venture-capital contracts mandated that their portfolio companies use non-competes. Regarding non-executives, the first author found that nearly half the respondents in a survey of IEEE members said they had been asked to sign a non-compete (Marx 2011a).

Enforceability

Firms are free to write any sort of employment contract, but the enforceability of the contract is another matter. In the U.S., unlike the patent system there exists no federal law governing the administration of non-competes; instead, policy decisions are left to the states. Most states have

elected to sanction the use of non-competes by firms, provided that they pass a "reasonableness" test primarily with regard to the duration of the agreement. Several states however have passed laws restricting the enforceability of non-competes; most famously, California has strictly prohibited non-competes since its incorporation as a state (Gilson 1999) via its Business and Professions Code Section 16600: "Except as provided in this chapter, every contract by which anyone is restrained from engaging in a lawful profession, trade, or business of any kind is to that extent void."

A select number of states have changed their non-compete policies. Most dramatically, Michigan *inadvertently* reversed its non-compete policy in 1985 by repealing several antitrust statutes, one of which contained a little-noticed provision similar to California's Section 16600 but which was quickly identified by practicing lawyers eager to profit from non-compete litigation. Michigan's inadvertent repeal provides a "natural experiment" that can provide causal evidence of the impact of non-competes. The evidence emerges from estimation of a "difference-in-differences" model, which sets up a baseline comparison with states that never enforce non-competes, and Michigan, which (seemingly) exogenously changes non-compete enforcement. Without such a natural experiment, observational scientists—in this case, those that can't run laboratory experiments, and must rely on after the fact archival datasets—can only report correlations. In the case of non-competes, this presents a problem because it is hard to separate the success of individual states from the non-compete enforcement. For example, do engineers emigrate to California because of non-compete enforcement in their home state? Or are their choices driven by the availability of jobs—or perhaps the weather? Without a natural experiment (or strong instrumental variable, see Samila and Sorenson 2011), it becomes very difficult to isolate causal effects. Research published prior to the discovery of the Michigan policy reversal was appropriately measured regarding causal claims: "We have no direct evidence that the California effect on mobility is due to the absence of enforceable noncompete agreements. As a result we cannot assess the role that other factors (such as local culture) may play in sustaining high rates of employee turnover" (Fallick et al. 2006:481).[1] Variation in enforcement across time and space create an empirical opportunity to assess the impact of non-competes on individuals, firms, and regions. As argued above, however, correlation does not imply causality, and finding variation in policies and outcomes over time must be interpreted with caution.

III. HOW NON-COMPETES AFFECT INDIVIDUAL CAREERS

Perhaps the most robust finding regarding non-competes is that they bind employees to their employers. Although this may seem obvious, skeptics have questioned whether non-competes have any effect at all. Kim and Marschke (1993) cite legal literature stating that courts will be reluctant to enforce non-compete agreements given the potential for hardship on workers. Wood (2000) proposes that regions can develop alternate mechanisms for mobility and spillovers.

[1] Other states that have altered their non-compete policies—albeit deliberately—include Texas (1994), Florida (1996), Louisiana (2001, 2004, and 2008), New York (2008), Idaho (2008), Oregon (2008), and Georgia (2010).

Others have argued and provided evidence, however, that non-competes do matter. The first evidence regarding mobility was supplied by Fallick, Fleischman, and Rebitzer (2006), who analyzed Current Population Survey data. They modeled cross-sectional variation in job-hopping according to regional enforcement of non-competes. They found an effect only in the California computer industry, which they argued resulted from the advantages of job-hopping within a modular industry (an employee's skills are more easily transferred in such an industry). Garmaise (2009) found similar effects among the executives of publicly-held companies; because non-competes restrict the market for the most relevant outside job opportunities, firms are under less pressure to pay competitive wages. Garmaise also finds that executives working under stronger enforcement regimes move less and have longer tenures. They receive less compensation and less increase in compensation when they move.In addition, compensation is more salary based.

Along with our colleague Debbie Strumsky, we took advantage of Michigan's inadvertent policy reversal, and found similar results among patenting inventors (Marx, Strumsky, and Fleming 2009). Our analysis proceeded in two steps using the "Michigan experiment.". The setup of a natural experiment is not unlike a clinical trial, where a "treatment" group of subjects are administered a new drug while a "control" group receives a placebo (i.e., no treatment). Then the results for the two groups are compared. The control group is essential because the treatment group might get better (or worse) for reasons unrelated to the new drug. Thus in our examination of whether the apparently-inadvertent Michigan policy reversal affected outcomes, we also use a treatment and a control group. For example, when assessing whether non-competes impact interorganizational mobility, we specify a "treatment" group of inventors who filed patents in Michigan prior to the reform. (Including those whose first patent was after the reform would not enable us to perform the before-and-after test.) For our control group, we include those who had filed patents outside of Michigan prior to Michigan's reform. Again, if we did not have a control group we might incorrectly attribute rising (or falling) mobility within Michigan to the policy reversal when in fact mobility was rising (falling) everywhere. To ensure that the control group's conditions are as similar as possible to those of the treatment group, we limit the states represented in the control group to those states that had placed restrictions on the enforcement of non-competes (as had Michigan) and moreover which continued not to enforce non-competes (these are Alaska, California, Nevada, Washington, Oklahoma, Montana, North Dakota, Minnesota, West Virginia, and Connecticut). Thus we are able to compare the mobility patterns of two groups of patenting inventors starting in states where non-competes were unenforceable, and then observe whether there is a shift in their relative mobility once Michigan begins to enforce these contracts.

Note that this approach assumes that the policy change was unexpected, which we believe to be true for two reasons. First, dozens of pages of legislative analysis of the Michigan Antitrust Reform Act (hereafter, "MARA") (Bullard 1983a; Bullard 1983b) fail to mention non-competes although they exhaustively document other aspects of the antitrust reform; we could not locate any reference to "non-competes", "non-competition agreements", "post-employment restraints" or the like. (Again, the reversal was due to a previous prohibition having been repealed, where the prohibition was but one section of a larger bill.) Said an employment lawyer active at the time and author of a Michigan Bar

Journal article highlighting the mistake, Louis Rabaut (2006), "There wasn't an effort to repeal non-competes. We backed our way into it. We were not even thinking about non-compete language."

Given the inadvertent nature of the repeal, one might wonder whether and how firms became aware of their newfound capability to enforce non-competes. Multiple articles appeared in the Michigan Bar Journal later in 1985, specifically citing the change in the law and communicating (to practicing lawyers) the possibility of prosecution and other billable legal work (see for example Sikkel and Rabaut 1985). Perhaps it is not surprising that practicing lawyers would scour the text of repealed bills to find any unanticipated consequences of new legislation. Moreover, one of the authors of these Michigan Bar Journal articles (Sikkel 2006) indicated that "*All of a sudden the lawyers saw no proscription of non-competes. We got active and the legislature had to go back and clarify the law."* Importantly, the 1987 "clarification" of the non-compete law did not reinstate the prior ban; rather, it merely (retroactively) stipulated that a "reasonableness test" be applied—a standard common to other states that also allow enforceable non-competes.

For all of these reasons, we believe that the "Michigan experiment" is a useful laboratory for evaluating the impact of non-compete agreements on a variety of outcomes. Other states including Texas, Florida, and Louisiana (Garmaise 2009) have shifted their enforcement policies somewhat, but Michigan is the only state we know of to have inadvertently effected a wholesale change in its enforcement practices. Our first application of the Michigan experiment was to exploit synthetic matching methods pioneered by Alberto Abadie and colleagues (Abadie, Diamdn, and Hainmueller 2007) to inspect visually whether the rate of job-hopping in Michigan had changed noticeably vs. the control group. In this approach, one constructs a "synthetic Michigan" from a weighted average of the control states—again, those that continued not to enforce non-competes. The hope is that, prior to the policy reversal or treatment, the trend of interorganizational mobility in synthetic Michigan approximates that of the actual Michigan reasonably closely. Indeed, Figure 1 shows that a weighted average of the other non-enforcing states mimics Michigan's trend of worker mobility prior to the MARA reform of 1985. If there were no impact of the non-compete policy change, we would expect Michigan's mobility rate to continue to match the weighted average rather closely. Following MARA, however, Michigan's mobility rate drops relative to the "synthetic" Michigan, suggesting that the inadvertent imposition of non-compete enforcement indeed had the effect of binding employees to their employers.

In a second step, we used statistical methods to analyze trends more precisely and also to obtain a sense of the magnitude of the effect of non-competes on job mobility. We found that, relative to workers in states that continued not to enforce non-competes, the mobility of Michigan workers dropped by 8.1% following MARA and the repeal of the non-compete ban. Moreover, Michigan workers with highly specialized skills were twice as likely to remain loyal to their employers following the implementation of non-compete enforceability. This result is likely due to the difficulty of those with specialized skills finding work within their industry, as those opportunities are explicitly foreclosed by non-compete agreements. These results were robust to a wide variety of controls, including working in the auto industry (troubled and a big part of the Michigan economy around MARA).

In follow-on work, the first author conducted 52 interviews randomly sampled from the population of patent holders in the automatic speech recognition industry (Marx 2011a). Whereas previous studies relied on measuring the overall impact of policy changes but without knowing whether individuals signed a non-compete agreement, the interviews from this field study provide a full work history for each informant along with an indicator for whether a particular employer required a non-compete. These data reveal that one-quarter of those who signed non-competes and then changed jobs also changed industries—leaving their field of expertise to take a "career detour." By comparison, those who did not sign non-competes were considerably less likely to change industries when they changed jobs. Those who took career detours reported reduced compensation, atrophy of their skills, and estrangement from their professional networks. One interview with the technical co-founder of a speech recognition startup revealed why he left the industry after being fired by his co-founder (who assumed the CEO role)[2]: *"I had a very strong anti-competition agreement with <former employer>…so for two years I couldn't have gotten involved in another speech recognition company in any case. The employees were very much aware of these non-competition agreements. And many of them, certainly the more sophisticated ones, on a regular basis would sort of do a gut check and say, 'Well, if I'm ever gonna leave, what would I do for two years if I couldn't do speech recognition?'"* Another engineer who left the industry after leaving her job due to a non-compete said that she *"intentionally looked for general-purpose programming, and I took a substantial pay cut to go there."*

Importantly, non-competes function differently from non-disclosure agreements which govern only information transmitted to the worker while employed at the firm. Ex-employees are free to share any industry-related information they had before joining the firm. Non-competes however assume jurisdiction not only over training and skills given the employee while at the firm but also *any prior relevant skills or experience of the worker* whether these were obtained through prior employment or via the worker's own education. This distinction was cast in sharp relief by a speech recognition professional who was reduced to performing data-entry tasks after leaving her job because of the non-compete she had signed*: "I've been in this industry for 20 years. I have a PhD in the field. I walked in the door with an enormous amount of experience, and while I worked there for a year in a half they added maybe, what, 2% to that? And now they want to prevent me from working in speech and using any of what I know?"*

Important to note is that none of the interviewees who took a career detour or other action was actually sued by their ex-employer. Nor did any of them appear in a court of law. Rather, they acted based on the expectation of what might happen if they refused to act in accordance with the employment agreement they had signed. This "chilling effect", independent of what a judge or court might decide, is key to understanding how non-competes affect individual workers' job mobility decisions. This may be

[2] Non-compete agreements are generally written to be enforceable regardless of the reason for separation from the firm. While we do not know of any data that would show how likely a court is to enforce a non-compete for someone who has been involuntarily terminated, the practice is not generally illegal. As one example, when David Neeleman was fired from Southwest Airlines, he abided by the five-year non-compete he had signed as a precondition of Southwest acquiring his prior firm. He worked outside the United States during that time, returning five years later to launch JetBlue (Wells 2002).

one reason why we and other scholars have found non-competes to have such a strong impact, despite the speculation of legal scholars that judges would be reluctant to enforce such contracts.

Moreover, we have some reason to believe that the negative consequences of non-competes for individual careers are not inadvertent byproducts of a desire to protect trade secrets but rather that firms strategically manage the process of obtaining non-compete signatures. This suggests that firms are aware of these deleterious outcomes. In the IEEE survey referenced above, barely 3 in 10 workers reported that they were told about the non-compete in their job offer. In nearly 70% of cases, the worker was asked to sign the non-compete after accepting the offer—and, consequently, after having turned down (all) other offers. Nearly half the time, the non-compete was not presented to employees until or after the first day at work. Related one employee*, "I never received any information ahead of time before showing up to my first day. And then it was the first day when I had all the paperwork in front of me: health insurance, 401(k), and the non-compete. It was either 'sign it and work here or don't sign it and don't work here.'"* An independent contractor who found that the non-competes he was asked to sign routinely ran longer than his consulting engagements related a similar experience*: "In the 11th hour they just try to bully me into signing it."*

While we know a considerable amount about how non-competes affect the careers of individual workers, several open questions remain. Given that firms can price-discriminate, one might imagine that those with greater wealth might be able to "buy out" their non-compete and thus be less affected either in their mobility or wage structure. Moreover, unlike those who rely on steady income to make ends meet, wealthy individuals might be able to "wait out" the duration of a non-compete by placing themselves in effect on an involuntary sabbatical. One interviewee in the above study, although he was eager to start a new company following the acquisition of his former firm—which he had founded—was blocked from doing so for one year. He instead took an unpaid position as a visiting researcher at a local university while waiting for the non-compete to expire; however, he was only able to do so given the liquidity provided him by the recent acquisition. As another example, Microsoft executive Vic Gundotra chose not to contest his non-compete when leaving for Google. Instead, he decided to remain unemployed for one year, as described in Google's official statement: "Mr. Gundotra has resigned from Microsoft and entered into an agreement with Google. Though the financial arrangements are confidential, he will not be a Google employee for one year and intends to spend that time on philanthropic pursuits. We are uncertain what precise role he will play when he begins working for Google, but he has a broad range of skills and experience which we believe will be valuable to Google" (Romano 2006). If so, then non-competes may exacerbate social stratification as those without substantial financial means are limited in their professional mobility.

Further, it is possible that non-compete enforcement influences the wiring of professional social networks. Although large-sample systematic evidence on this point is still to be assembled, accounts from field data indicate that non-competes complicate the maintenance of interorganizational ties. Recounted one engineer who worked at a firm that strictly enforced non-competes against ex-employees*, "People would quit and not say where they were going, so I lost touch with a lot of colleagues in my field."* Indeed, workers reported that they intentionally withdrew from professional contacts in order that they might remain undetected*. "We were hiding very low. [Current employer] had*

an automated – something where you could dial people's names, and we were not in that system because they didn't want [former employer] to find out who was actually working at [current employer]. I think you could dial XXX and then our names, and you could get to us. And if we ran into people we knew who were still at [former employer], we'd like hem and haw and say, 'well, I don't really want to tell you where I'm working right now'."

As workers become more aware of the consequences of non-competes, it is possible that they will be less eager to invest in specialized skills they may not be able to utilize after changing jobs. They may also invest less effort overall, as they see less reward for their effort (see Amir and Lobel 2010 for experimental results on this question). One way to study this would be to study careers inside and outside of Michigan, before and after the MARA legislative change.

A couple of important caveats are in order. First, it is possible that some workers bargain explicitly over the terms of non-compete agreements, perhaps seeking increased compensation in return for entering into a restrictive covenant. While in the aforementioned interviews not one interviewee described such bargaining—instead, they often related having been asked to sign long after they accepted their job offer—it remains an open question whether the signing of non-competes bring bargaining opportunities to workers. Second, the results of the fieldwork and Michigan experiment should be considered in the case of high-technology industries. Non-competes may be used in non-technical industries—indeed, Garmaise's use of the Execucomp dataset indicates that they are—but we have less insight into the dynamics of such employment contracts where technical trade-secret protection is less of a concern.

IV. FIRM-LEVEL EFFECTS OF NON-COMPETES

The canonical motivation for firms to use non-competes is to protect trade secrets. But as is evident from the above discussion regarding their impact on individuals, firms benefit from non-competes in other ways as well. Easier retention of employees not only protects trade secrets but provides other advantages. First, the firm avoids costly turnover and recruiting expenses. Second, competitors are blocked from accessing valuable talent (even when not considering proprietary information). Both of these help to sustain the firm's competitive position.

Non-competes assist in preserving the firm's competitive position by discouraging entry. As Stuart and Sorenson (2003) showed in the biotech industry, the enforcement of non-competes discouraged the founding of new firms following liquidity events such as acquisitions or IPOs, which should enable senior executives and key technical personnel to leave and start a new company. Given that the most important assets of technology companies can be their employees, it follows that acquisitions are more likely to occur when non-compete agreements are sanctioned. The second author, in collaboration with Ken Younge and Tony Tong, uses the Michigan experiment to demonstrate a significant increase in the likelihood of Michigan firms being acquired after non-compete enforcement strengthened (Younge, Tong, and Fleming 2011). Consistent with a model where acquiring firms hope to retain human capital following acquisition, they demonstrate positive interactions for firms in industries with greater human capital and competition and a negative interaction for firms in industries with strong IP protection (the

latter argument depending on the availability of other mechanisms to protect the firm's intellectual capital). Also consistent with this model, and against concerns that the failing Michigan economy drives the results, they also find a positive interaction with positive return on assets. (To date, all of the research relying on the Michigan experiment has controlled explicitly for the auto industry, and this control has only strengthened the non-compete results.)

Moreover, non-competes may favor large firms over smaller ones due to the asymmetric costs of the legal system. Lerner (1995) documents that smaller firms file patents "in the shadow" of competitors, likely due to the threat of expensive litigation. While a $500,000 lawsuit might be a small amount for a multinational conglomerate, the same (or threat of the same) could substantially deplete the resources of a startup. The first author found that inventors who changed jobs after Michigan began enforcing non-competes were considerably more likely to join larger firms (Marx 2011b). Thus non-competes not only serve to retain employees; they may unlevel the recruiting playing field between firms of different sizes.

Although most of the empirical predictions on non-competes have followed from informal models, Garmaise (2009) develops two formal (and competing) models of firm and manager interaction. In the first, firms can invest in the human capital of their employees. In the second, managers can also invest in their own human capital. Garmaise then models a variety of outcomes under weak or strong non-compete enforcement regimes, and derives sometimes conflicting propositions. His evidence draws upon an increase in enforcement in Florida in 1996 and a decrease in enforcement in Louisiana in 2002 and Texas in 1994. He uses Execucomp data on the executives of publicly traded firms to test his models. While his data are time-series and cross-sectional variation, he finds a consistent interaction effect between the strength of enforcement and the amount of industry competition in a state. His (to us quite convincing) argument is that non-competes will matter more in states with greater competition.

Garmaise's second model, where both firms and employees can invest in human capital development, is more successful in predicting a variety of outcomes. His empirical work confirms, not surprisingly, that firms are more likely to invest in the human capital of their employees under strong enforcement, and as also might be expected, managers are less likely to personally invest. Stronger enforcement also leads to lower compensation and less mobility. Correspondingly, executive tenure is longer and increases in compensation and rank are less within strong enforcement regions. Executives in enforcing regions receive a greater portion of their compensation in salary, and they are less likely to move up in rank when they change firms. There is no significant effect either way for the impact of non-compete enforcement upon profitability, but firms within regions that do not enforce appear to benefit more from the arrival of a new CEO.

One might imagine that the above benefits of non-competes would lead firms to invest more aggressively in innovation. However, Garmaise (2009) found the opposite: that R&D investment among publicly-traded firms was lower, not higher, where non-competes are enforceable. His explanation was that employees have less personal incentive to invest in their human capital in regions that enforce non-competes. In turn, firms were less likely to invest in high skill production processes, of which R&D and heavy capital expenditure investments are prime examples. This puzzling result raises a number of

unanswered questions regarding firm-level outcomes of non-competes. Do non-competes discourage employee effort, as Motta and Roende's (2002) model suggests? Do non-competes affect the risk-aversion of the firm, and if so, how? Moreover, is collaboration within the firm – and even across firms - shaped by the use of such contracts (Fleming, King, and Juda 2007)?

Of course, the flip side of more easily being able to retain employees is that it becomes more difficult for firms to recruit talent away from competitors. Our sense is that prospect theory (Tversky and Kahneman) applies here: firms think more about the possible losses (of talent or trade secrets) than they do about the potential for capitalizing on the absence of non-competes. One might consequently speculate that weaker firms may rely more heavily upon non-competes to retain employees than do more attractive employers.

There is likely variation to be explored in the use of non-competes by firms, as most studies have relied on policy but lack data regarding which firms use non-competes and which do not. Given that non-competes favor large firms, is it the case that large firms use them more often? Even if small firms use non-competes, are there differences in the likelihood to prosecute? These questions await the building of a dataset that records individual firms' usage of non-competes and other related human resource policies. Of course, firms may be less than forthcoming regarding their use of non-competes, so it is unclear what the response rate or reliability of such a survey might be.

V. REGIONAL IMPLICATIONS OF NON-COMPETE ENFORCEMENT

Gilson (1999) was the first to suggest that California's long-standing ban on non-competes as a "causal antecedent" for Silicon Valley's rise to entrepreneurial prominence. Subsequent work has identified regional implications of the above findings. Samila and Sorenson (2011) are the first to directly measure regional outcome variables. They measure the effect of a marginal dollar of venture capital investment on patent filings, new business establishments, and job creation. They address endogeneity concerns by instrumenting with national average university endowment returns, multiplied by the number of limited partners in a region prior to the study period. Their argument for the validity of the instrument is that for a fixed allocation of investments across asset classes, the amount of capital available to invest should change exogenously to the region. Their results indicate that states that enforce non-competes experience a lower return on venture capital investment than states which proscribe enforcement. The results remain robust when excluding Silicon Valley and California. Samila and Sorenson point out that their study only captures the impact of venture capital, which is but one measure of R&D investment. Moreover, venture capital may seem less concerned with creating large numbers of jobs and firms and more with creating wealth in a small number of firms. That said, these "early indicators" regarding regional productivity do not appear to support the enforcement of non-competes. But other measures including total factor productivity have yet to be examined.

Another regional measure of interest addresses the canonical reason for using non-competes: to counter the diffusion of knowledge. In joint work with Jasjit Singh, the first author finds that the diffusion of knowledge is muted where non-competes are enforceable (Singh and Marx 2011; Beleznon

and Schankerman 2010 report similar results for the subset of university patents). Given that technological spillovers are one of Marshall's (1920) three preconditions for agglomeration economies, this result suggests that regions where non-competes are allowed may not experience the same strength of positive externalities so important to building clusters.

Likewise, regarding the second of Marshall's mechanisms, labor pooling, non-competes discourage labor pooling in two ways. First, as described above, by tying workers to their firms non-competes attenuate the availability of relevant skilled labor (Marx, Strumsky, and Fleming 2009). Second, given the career hazards imposed by non-competes, with our colleague Jasjit Singh we find evidence of a "brain drain" from enforcing states to non-enforcing states (Marx, Singh, and Fleming 2011). We establish this result both cross-sectionally and using the Michigan experiment. There is a net migration from states that enforce non-competes to those that do not, and we see increased emigration from Michigan to other states that continued not to enforce non-competes following the MARA reform. Of course one might wonder whether the exodus from Michigan is due to the troubles of the auto industry, or the growth of Silicon Valley, but the effect is robust to controlling for automotive patents or excluding moves to California. Moreover, we do not see the same migration pattern for employees who are transferred to a new state but keep the same job (as we would not expect these moves to be governed by non-competes). Performing a "placebo test" by pretending that the Michigan reform happened in other states such as Ohio and Pennsylvania fails to recreate the result as well.

Moreover, and as depicted in Panel B of Table 1, the brain drain appears to be more pronounced among the most productive and collaborative knowledge workers. (As a baseline, Panel A provides univariate statistics for all inventors.) Those with an above-average number of patents were more likely to emigrate from Michigan than from other non-enforcing states, as were highly-connected inventors who were members of the largest connected component of U.S. inventors who can be linked through co-invention. Thus non-competes are responsible not only for a general exodus of talent but are driving away some of the best and brightest—understandable given their higher opportunity cost of being captive to a single firm. To the extent that these effects play out over time, the "brain drain" effects may rebalance the distribution of technical talent across regions. Indeed, Figure 2 shows that the proportion of patenting inventors in states that do not enforce non-competes has grown steadily since 1975. Even more interestingly—since the number of inventors is surely a function of industrial shifts over the time period studied--the extent of redistribution is increasing in the productivity of the inventor. As in our statistical analysis, those with above-median productivity are more likely to be found in non-enforcing states, and the effect is amplified further for those in the top 10% and top 5% of the distribution. Although many factors may contribute to this relocation of talent, our research suggests that non-competes play an important role.

VI. IMPLICATIONS FOR POLICY

Determining the optimal enforcement policy is far from a simple matter. Were it so, state statutes would long since have converged. Even as recently as 2008, various states have taken conflicting paths

regarding the enforceability of non-compete agreements. Idaho (Id. SB1393) and Louisiana (La. R.S. 23:921) extended the ability of firms to enforce non-competes, while Oregon (Or. SB248) and New York (Ny. S02393) restricted their ability to do so. To be sure, the deliberation of these reforms preceded much of the recently-published work on non-competes and thus could not be informed by all of the above findings. But even given robust research results, policy determination is far from straightforward.

It is perhaps best to start by stating what we do *not* know. Neither we nor other scholars purport to have performed a full welfare analysis that yields a definitive answer regarding whether non-compete enforcement is a net positive or negative. Rather, our aim in this section is to summarize tensions and considerations for policymakers who are evaluating how to handle non-competes within their jurisdiction. Important to keep in mind is that a one-size-fits-all approach need not be required; rather, different policies may be adopted for different industries. For example, most lawyers are exempt from non-competes. Some states including Arizona and Illinois exempt broadcasters from postemployment restraints; several states exempt physicians.

Intellectual Property Protection Alternatives. Non-competes are ostensibly designed to protect against the misappropriation of trade secrets, an aim likely to be supported by many policymakers. While non-disclosure agreements are widely used, it can be difficult if not impossible to know whether an ex-employee is complying with the NDA. A non-compete gives the ex-employer at least some peace of mind that the ex-employee is not working somewhere that said disclosure would be damaging to the firm. Yet, as illuminated by the work of several scholars, non-competes carry several externalities including the restriction of career flexibility for workers and are thus in some sense a "blunt instrument" for accomplishing the goal of protecting trade secrets. Hence, deciding to allow non-competes in order to afford firms greater protection over confidential information must be viewed in light of the full set of costs and benefits. In industries where intellectual property protection via the patent or trademark system is less reliable (for example, software), trade secrets may be more valuable and non-competes may consequently be more important.[3]

Incumbents vs. Entrants. A fundamental tension exists between firms that already exist and those that do not. Established firms understandably seek enforceable non-compete agreements in order to protect their interests: guarding trade secrets, retaining employees, paying lower wages, and stalling new entrants. Moreover, large firms may be able to sidestep non-compete infringement when hiring from within the industry by placing such employees in a "holding tank"—giving them a job in a different division for the term of the contract. Sustaining existing firms—whether via subsidy or by legal protection—may have the unattractive externality of discouraging entrepreneurial activity. Entry is less likely to occur given non-competes because would-be founders find it more difficult to start companies

[3] Although beyond the scope of this article, policymakers may also want to explore mechanisms for protecting trade secrets that are at once more reliable than non-disclosure agreements and less impactful on workers than are non-competes. One possibility is that adopted in the settlement of IBM's lawsuit to block ex-employee Mark Papermaster from joining Apple. The term of Papermaster's non-compete was reduced in exchange for his agreement to certify in writing at three-month intervals that he had abided by his non-disclosure agreement. In this way, IBM's trade secrets were protected without blocking Papermaster from taking a new job (Elmer-Dewitt 2009).

in the same industry. Moreover, even once founded it is more difficult for nascent ventures to attract talent from companies that use non-competes because they are less able to reliably promise to mount a defense against a lawsuit from the former employer. Thus policymakers whose aim is a robust entrepreneurial ecosystem may be less sympathetic to non-competes, whereas those interested in sustaining existing firms in their region will likely look upon such contracts more favorably.

Local circulation of talent and ideas. In his seminal work, Hirschman (1970) observed that customers generally have three options when they are dissatisfied with the output of a firm. First, they may simply exit. Second, they may voice their objections in hopes of effecting change. Third, they may remain loyal despite their dissatisfaction. Employees of a firm have an analogous set of options. But as this article describes, non-compete agreements make the exit option less attractive because outside employment or entrepreneurial opportunities are constrained to those that are not competitive with the current employer. (Moreover, as highlighted above, the inability to reallocate to local opportunities may lead workers to relocate outside the region.[4]) The performance of any economy relies in part on its ability to reallocate factors of production according to supply and demand; arguably, non-competes introduce friction into the reallocation process *across firms*. Hence, the value of non-compete enforcement for a particular region or industry may depend critically on whether economic experimentation generally occurs within firms vs. across firms. In industries with large capital requirements and long development cycles, it may be efficient to allow firms more control over human capital so that the firm can take greater risks without worrying about employees leaving following failed initiatives. Conversely, in settings where a single firm more often represents a single experiment, it may be advantageous to promote greater mobility so that workers can reallocate themselves to more promising firms (as founders/entrepreneurs may have non-pecuniary reasons to perpetuate a failing firm). Although research has not established this point definitively, it may be the case that unrestrained mobility of workers accelerates the "weeding out" of weak firms as talent is reallocated to stronger ones.

Bargaining and consideration. In theory, the option to include a non-compete as part of an employment contract should expand the space of possible contracting outcomes. Bargaining over non-compete terms should result in the employee being compensated for accepting a limit on future employment or entrepreneurship opportunities. As indicated by the IEEE survey, however, it is the exception not the rule that potential hires learn of the request for a non-compete before accepting their job offer. Thus it appears that a minority of workers are able to engage in such bargaining. Indeed, fewer than one in ten IEEE survey respondents who signed a non-compete reviewed the contract with a lawyer, nearly half of them reporting that they were placed under time pressure to agree or told that the non-compete was non-negotiable. Oregon recently stipulated that non-compete agreements must be presented with the job offer (Or. SB248), but it is the only U.S. state to have such a requirement. When policymakers adopt such provisions, they help to ensure that bargaining takes place and ameliorate the aforementioned negative consequences for workers.

[4] We should note that anecdotes abound of headhunters and hiring managers specifically telling potential hires in enforcing states that joining this company will bring them to a state where they no longer have to worry about non-competes.

We anticipate that non-competes will continue to be a controversial issue. The several benefits to incumbents seem in opposition to the interests of new entrants and, to a large extent, workers (although measures that promote open bargaining may help to ameliorate such concerns). Ultimately, the optimal non-compete policy will involve a delicate balance among these interests according to the needs of a particular region or industry.

For those who seek to spur entrepreneurial activity, restricting the use of non-competes may be a lever to that end. Without the fear of being sued by an ex-employer simply for founding or joining a startup in a similar field, executives and engineers seeking to commercialize ideas rejected by their firms (Klepper and Thompson 2010) may be more willing to strike out on their own given the more favorable entrepreneurial climate. That said, an effort toward looser non-compete enforcement may result in objections from established firms (whether large or small), which may prove adept at organizing to lobby policymakers and influence voters.[5] It is less clear who might advocate for "unborn" firms—perhaps venture capital associations.

More broadly, the question of non-compete enforcement raises the larger issue regarding the proper limits of intellectual property enforcement and balancing the incentives for inventors against the benefits of cumulative innovation and rapid diffusion. As one example, the American Industrial Revolution arguably would have been delayed if Samuel Slater had not violated what amounted to a "national non-compete" when he illegally departed England with his knowledge of the Arkwright spinning machine. England coupled an aggressive policy of recruiting skilled labor—by granting national monopolies to the introducers of pirated technology—with strict restrictions that forbade skilled artisans from leaving the country (Ben-Atar 2004). Slater disguised himself as an unskilled farm boy and slipped past emigration controllers in 1789 on his voyage to Pawtucket RI, where he would found the Slater Mill along the Blackstone River.

Although we do not intend to imply that entrepreneurship is merely a zero-sum game versus the interests of incumbents, myriad studies document that founders typically exploit ideas they came across in their previous employer (Anton and Yao 1995; Bhide 2000; Klepper and Thompson 2010). Consequently, many entrepreneurs start firms in similar fields to those of their ex-employer, whether or not their activity is officially sanctioned. To the extent that non-competes are enforced strictly, the bulk of entrepreneurial activity will likely be composed of three types: 1) university spinouts, where non-competes are not used 2) ex-employees working in very different fields that do not infringe upon their non-competes 3) sanctioned, (perhaps) partially-owned subsidiaries of incumbent firms. Thus the non-compete enforcement decision faced by policymakers can affect not only the rate but also the nature of entrepreneurial activity. Local policymakers are in the best position to judge the level of non-compete enforcement to address the economic objectives suitable for their region.

[5] In the summer of 2010, Georgia employers pooled funds and hired a public relations firm to urge passage of a constitutional amendment worded as follows: "Shall the Constitution of Georgia be amended so as to make Georgia more economically competitive by authorizing legislation to uphold reasonable competitive agreements?" (Jones 2010). Despite the several deleterious consequences of non-competes for individual workers detailed above, the amendment passed with 68% of the popular vote.

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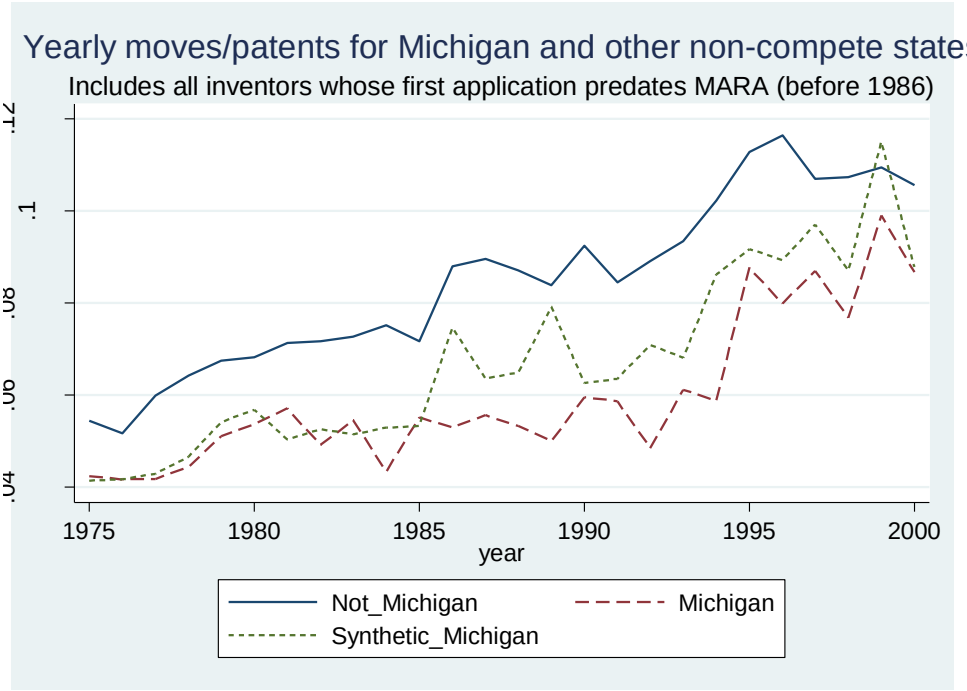
Figure 1: Annual Patenting Rates of U.S. Inventors with at Least One Patent Prior to MARA in a Non-enforcing State.



Notes: "Synthetic Michigan" represents predictions of patenting in post-MARA Michigan, based on a weighted average of pre-MARA patenting in other non-enforcing states. MARA passed in 1985.

Table 1: Domestic emigration from Michigan vs. baseline states that do not enforce non-competes.

Panel A: Comparison for all inventors.

	pre-MARA	post-MARA	relative risk
Michigan	0.96%	1.66%	1.719
non-Michigan	0.73%	1.06%	1.447
Michigan % increase over non-Michigan			*18.8%*

Panel B: Comparison for highly productive and more collaborative inventors.

PATENTS (median=3)

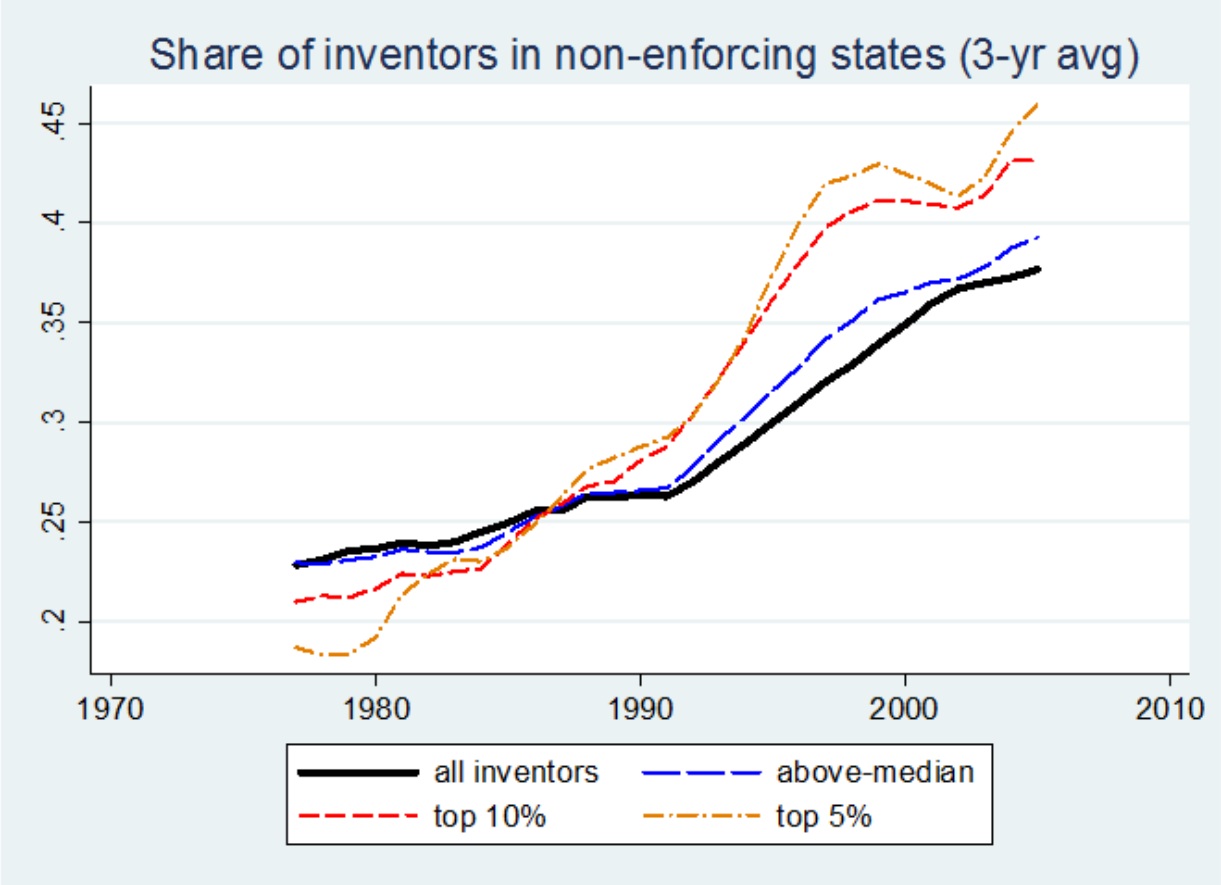
	median and below				above median		
	pre-MARA	post-MARA	relative risk		pre-MARA	post-MARA	relative risk
Michigan	0.97%	1.18%	1.217	Michigan	0.95%	2.36%	2.488
non-Michigan	0.67%	1.02%	1.527	non-Michigan	0.94%	1.12%	1.198
Michigan % increase over non-Michigan			*-20.3%*	*Michigan % increase over non-Michigan*			*107.8%*

LARGEST NATIONAL COMPONENT (LNC)

	not included in LNC				member of LNC		
	pre-MARA	post-MARA	odds ratio		pre-MARA	post-MARA	odds ratio
Michigan	0.89%	1.04%	1.174	Michigan	1.21%	3.31%	2.731
non-Michigan	0.62%	1.03%	1.653	non-Michigan	1.06%	1.14%	1.076
Michigan % increase over non-Michigan			*-29.0%*	*Michigan % increase over non-Michigan*			*153.8%*

Notes: First, the comparison is done for inventors with an above-median number of patents vs. those at or below the median. Second, the comparison is done for those in the largest connected "national component" (LNC) vs. those not in the component. The LNC is calculated by the co-authorship relationships of patent holders and includes almost half of the inventors during the 1975-1985 time period. N= 210,151 (includes data not matched by coarsened exact matching; matched data analysis returns stronger results).

Figure 2: Percentage of U.S. inventors residing in a state that does not enforce non-compete agreements.



Notes: The solid black line represents all inventors. The dashed blue line represents inventors with an above-average number of patents. The dashed red line and dot-dashed yellow line represent inventors in the top 10% and top 5% of patenting, respectively.