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

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Executive Summary

This chapter describes recent research on postemployment covenants not to compete, as well as potential policy implications of such research. We propose that non-competes are an underappreciated lever for policy makers 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 accept an employment offer and end up with reduced opportunities for employment or entrepreneurship going forward. At the regional level, evidence is thinner but points again to the tension between the interests of established firms and those that do not yet exist. Ultimately, policy makers' decisions 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 versus individual career flexibility and the founding and growth of new start-ups.

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 policy makers seek to spur the founding and growth of start-up companies. Yet dozens of attempts to recreate the entrepreneurial dynamics of Silicon Valley have failed, in part because of 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

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in part both to the inefficient allocation of capital in the political process and to the vagaries of the electoral cycle.

An alternative to the direct-subsidy approach is to 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 universities clear property rights and incentives to commercialize. 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 2009,113–14). But even if skilled talent exists in a region, start-ups 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, start-ups must attract workers from existing firms. Thus entrepreneurial regions rely heavily on fluid interorganizational mobility of workers.

The demise of internal labor markets following the globalization and deregulation of the 1980s would, if anything, seem to ease the challenge of staffing start-ups, as workers pursue what have been called "boundaryless careers" (Arthur and Rousseau 1996), moving without friction from firm to firm. To the extent that workers are free to circulate among firms, start-ups may take advantage of the supply of labor with relevant skills. As Nobel-prize-winning economist Gary Becker observed, "You 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" (1964,16). But it may nonetheless be possible to separate workers from the *use* of their skills. This paper focuses on a legal restriction to interorganizational 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, policy makers 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 nonlegalistic 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 policy makers. 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 over 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 or being terminated. 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 15th 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 typically either list a set of companies at which the employee may not work or define 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 made difficult to pin down by 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, the range 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 2009a).

A. 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 question whether this is not already accomplished by nondisclosure 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 establish 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 an NDA 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. (Firms are of course 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 use of non-competes is not tracked by a central authority such as the U.S. Patent and 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 (2011) 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 Strömberg (2003) found that 90% of venture capital contracts mandated that their portfolio companies use non-competes. Regarding nonexecutives, 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 2011).

B. Enforceability

Firms are free to write any sort of employment contract, but the enforceability of the contract is another matter. In the United States 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, which states: "Except as provided in this chapter, every contract by which anyone is restrained from engaging in a lawful profession, trade, or business of any kind is to that extent void."

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 that was quickly identified by lawyers eager to profit from the now legal enforcement of non-compete litigation. Michigan's inadvertent repeal provides a natural experiment that can be used to establish 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 from prohibiting to allowing enforcement. Without such a natural experiment, observational scientists—in this case, those who cannot run laboratory experiments and must rely on after-the-fact archival data sets—can only report correlations. In the case of non-competes, this limitation 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 before 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 non-compete 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, Fleischman, and Rebitzer 2006, 481).[1] Variation in enforcement across time and space creates 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 findings of 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 (2005) 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.

Others have argued and provided evidence, however, that non-competes do matter. The first evidence regarding mobility was supplied by Fallick et al. (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 (2011) 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 using the "Michigan experiment" proceeded in two steps. 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. To examine 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 before 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 before 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 that had placed restrictions on the enforcement of non-competes (as had Michigan) and moreover 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 to 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, 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," "postemployment restraints," or the like. (Again, the reversal was due to the repeal of a previous prohibition, that was but one section of a larger bill.) An employment lawyer active at the time and author of a *Michigan Bar Journal* article highlighting the mistake, Louis Rabaut (2006), said: "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, e.g., 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. As one of the authors of these *Michigan Bar Journal* articles (Sikkel 2006) said, "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." It is important that the 1987 "clarification" of the non-compete law did not reinstate the prior ban; 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 2011), have shifted their enforcement policies somewhat, but Michigan is the only state we know 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, Diamond, and Hainmueller 2007) to inspect visually whether the rate of job-hopping in Michigan had changed noticeably compared with 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 nonenforcing states mimics Michigan's trend of worker mobility before 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

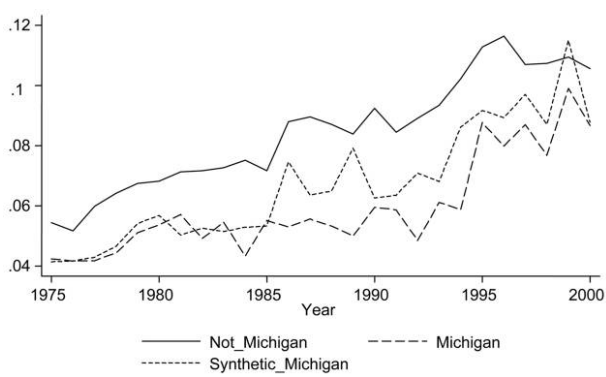

Fig. 1. Annual patenting rates of U.S. inventors with at least one patent before MARA in a nonenforcing state. Yearly moves/patents for Michigan and other non-compete states. Includes all inventors whose first application predates MARA (before 1986). "Synthetic Michigan" represents predictions of patenting in post-MARA Michigan, based on a weighted average of pre-MARA patenting in other nonenforcing states. MARA passed in 1985. Source: Marx et al. (2009), 889.

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 workers with specialized skills experience in finding work within their industry, as opportunities to use those skills 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 2011). 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 cofounder of a speech recognition start-up revealed why he left the industry after being fired by his cofounder (who assumed the CEO role):[2] "I had a very strong anticompetition agreement with [former employer] … so for 2 years I couldn't have gotten involved in another speech recognition company in any case. The employees were very much aware of these noncompetition 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 2 years if I couldn't do speech recognition?' (Marx 2011, 704).

Another engineer who left the industry because of a non-compete said that she "intentionally looked for general-purpose programming, and … took a substantial pay cut to go there" (Marx 2011, 705).

In important ways, non-competes function differently from NDAs, which govern only information transmitted to worker while they are 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 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?" (Marx 2011, 705).

Important to note is that none of the interviewees who took a career detour or other action were actually sued by their ex-employer. Nor did any of them appear in a court of law. Rather, they acted 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 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 by-products of a desire to protect trade secrets; rather, 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. One employee said, "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" (Marx 2011, 706).

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 1 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 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 1 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 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. An engineer who worked at a firm that strictly enforced non-competes against ex-employees said, "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 system – something where you could dial people's names, and we were not in that 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 look at careers inside and outside Michigan, before and after MARA. Individual-level choices could impact regional innovation dynamics; if, for example, highly motivated or specialized expert engineers were more likely to invent and commercialize breakthroughs, then regions with more hard-working experts would be more innovative.

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. Although in the interviews mentioned above 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 the Michigan experiment should be considered in the case of high-technology industries. Non-competes may be used in nontechnical industries—indeed, Garmaise's use of the Execucomp data set indicates that they are—but we have less insight into the dynamics of such employment contracts where technical trade secret protection is of less 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 discussion above 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 proprietary information is not considered). 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 initial public offerings, 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. Younge, Tong, and Fleming (2011) use the Michigan experiment to demonstrate a significant increase in the likelihood that Michigan

firms would be acquired after non-compete enforcement strengthened. 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 intellectual property 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 return on assets. (To date, all the research relying on the Michigan experiment has controlled explicitly for the auto industry, and this control has only strengthened the non-compete results.) Current research aims to understand the influence of non-competes on the prices for these acquisitions.

Moreover, non-competes may favor large firms over smaller ones because of 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 small for a multinational conglomerate, the same (or threat of the same) could substantially deplete the resources of a start-up. Marx (2009b) found that inventors who changed jobs after Michigan began enforcing non-competes were considerably more likely to join larger firms. Thus non-competes not only serve to retain employees; they may tilt the recruiting playing field in favor of larger firms.

Although most of the empirical predictions on non-competes have followed from informal models, Garmaise (2011) 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 predictions from the two models. To test his models, Garmaise uses Execucomp data on the executives of publicly traded firms, an increase in enforcement in Florida in 1996. and a decrease in enforcement in Louisiana in 2002 and Texas in 1994. 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 invest personally. 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 on 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 benefits of non-competes outlined above would lead firms to invest more aggressively in innovation. However, Garmaise (2011) found the opposite: that research and development (R&D) investment within 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 they 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 being able to retain employees more easily is that it becomes more difficult for firms to recruit talent away from competitors. Our sense is that prospect theory (Tversky and Kahneman 1974) applies here: firms think more about the possible losses (of talent or trade secrets) than about the potential for capitalizing on the absence of non-competes. One might consequently speculate that weaker firms rely more heavily on non-competes to retain employees than do more attractive employers. Strong firms might seek to capitalize on this fact, trying to attract the best engineers by not requiring their hires to sign non-competes, even in regions that allow enforcement.

There is likely variation to be explored in the use of non-competes by firms, as most studies have relied on policy changes 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 of prosecution? These questions await the building of a data set 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 directly to 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 before 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 that proscribe enforcement. The results remain robust when Silicon Valley and California are excluded. Samila and Sorenson point out that their study captures only the impact of venture capital, which is but one component 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. Singh and Marx (2011) find that the diffusion of knowledge is muted where non-competes are enforceable (Beleznon and Schankerman 2011 report similar results for the subset of patents granted to universities). 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 strength of positive externalities so important to the emergence of clusters.

Likewise, non-competes discourage Marshall's second mechanism—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 et al. 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 nonenforcing states (Marx, Singh, and Fleming 2011). We establish this result both cross-sectionally for all U.S. states 1975–2005 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 table 1, the brain drain appears to be more pronounced among the most productive and collaborative knowledge workers. (As a baseline, table 2 provides univariate statistics for all inventors.) Those with an above-average number of citations per patent were more likely to emigrate from Michigan than from other nonenforcing states, as compared with those with a fewer citations per patent. Moreover, when looking at "degree" (number of co-inventors) one notices not only that more collaborative inventors are more likely to emigrate from Michigan following the introduction of non-competes, but that the same event actually kept less collaborative inventors in Michigan.

Thus non-competes not only are responsible 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 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 interesting—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 nonenforcing 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

Table 1
Domestic Emigration from Michigan vs. Baseline States Not Enforcing Non-competes: Comparison for Highly Productive and More Collaborative Inventors

	Citations per Patent					
	Median and Below			Above Median		
	Pre-MARA	Post-MARA	Relative Risk	Pre-MARA	Post-MARA	Relative Risk
Michigan	0.30%	0.36%	1.175	0.31%	0.38%	1.221
Non-Michigan	0.27%	0.25%	0.934	0.25%	0.20%	0.787
Michigan % increase over non-Michigan		25.9%			55.1%	
	Degree					
	Not included in LNC			Member of LNC		
	Pre-MARA	Post-MARA	Odds Ratio	Pre-MARA	Post-MARA	Odds Ratio
Michigan	0.39%	0.30%	0.753	0.22%	0.46%	2.059
Non-Michigan	0.28%	0.23%	0.844	0.24%	0.23%	0.958
Michigan % increase over non-Michigan		−10.8%			114.8%	

Note: First, the comparison is done for inventors with an above-median number of citations per patent vs. those at or below the median. Second, the comparison is done for with an above-median number of coauthors vs. those at or below the median. N = 210 and 151, respectively.

relocation of talent, our research suggests that non-competes play an important role.

VI. Implications for Policy

Determining the optimal enforcement policy for non-competes 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

Table 2
Domestic Emigration from Michigan vs. Baseline States Not Enforcing Non-competes: Comparison for All Inventors

	Pre-MARA	Post-MARA	Relative Risk
Michigan	0.31%	0.36%	1.187
Non-Michigan	0.26%	0.23%	0.899
Michigan % increase over non-Michigan		32.0%	

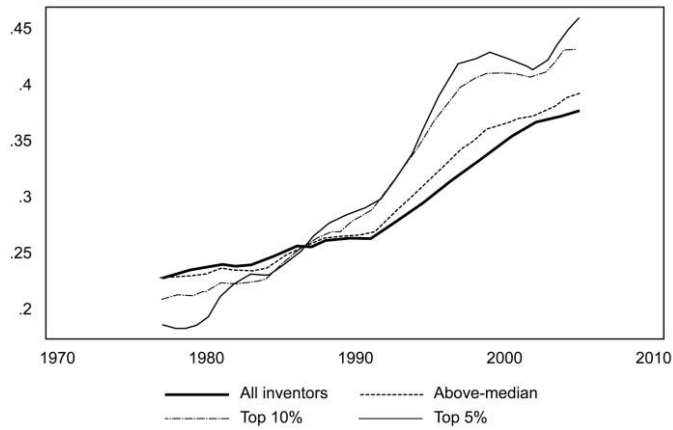

Fig. 2. Percentage of U.S. inventors residing in a state that does not enforce non-compete agreements. The thick line represents all inventors. The dashed line represents inventors with an above-average number of citations. The dotted-dashed line and the thin line represent inventors in the top 10% and top 5% of patenting, respectively.

(S.B. 1393 [Idaho 2008]) and Louisiana (La. Rev. Stat. Ann. sec. 23:921) extended the ability of firms to enforce non-competes, while Oregon (S.B. 248 [Or. 2007]) and New York (S.B. S02393 [N.Y. 2008]) 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 policy makers who are evaluating how to handle non-competes within their jurisdiction. Important to keep in mind is that a one-size-fits-all approach is not required; 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, and several states exempt physicians.

A. Incumbents versus 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 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 a robust defense against a lawsuit from the former employer. Thus policy makers whose aim is a dynamic entrepreneurial ecosystem may be less sympathetic to non-competes, whereas those interested in sustaining existing firms in their region will likely look on such contracts more favorably.

B. Locus of Economic Experimentation

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.[3]) 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 or 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 that employees will leave 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 nonpecuniary 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.

C. 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 employees' 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 a job offer. Thus it appears that only a minority of workers are able to engage in such bargaining. Indeed, fewer than 1 in 10 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 nonnegotiable. Oregon recently stipulated that non-compete agreements must be presented with the job offer (S.B. 248 [Or. 2007]), but it is the only U.S. state to have such a requirement. When policy makers adopt such provisions, they help to ensure that bargaining takes place and ameliorates the aforementioned negative consequences for workers.

D. 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 policy makers. Although NDAs are widely used, it can be difficult if not impossible to know whether an ex-employee is complying. A non-compete gives the ex-employer at least some assurance that the ex-employee is not working where 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 to afford firms greater protection of confidential information must be viewed in the light of the full set of costs and benefits. In industries where intellectual property protection via the patent or trademark system is less reliable (e.g., software), trade secrets may be more valuable and non-competes may consequently be more important.[4]

We anticipate that non-competes will continue to be controversial. The several benefits to incumbents seem opposed to the interests of new entrants and, to a large extent, of 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 start-up 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 policy makers 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, Rhode Island, where he would found the Slater Mill along the Blackstone River.

Although we do not wish 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 employment (Anton and Yao 1995; Bhide 2000; Klepper and Thompson 2010). Consequently, many entrepreneurs start firms in fields similar to those of their ex-employers, 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 on their non-competes; (3) and sanctioned, (perhaps) partially owned subsidiaries

of incumbent firms. Thus the non-compete enforcement decision faced by policy makers can affect not only the rate but also the direction of entrepreneurial activity. Local policy makers are in the best position to judge the level of non-compete enforcement to address the economic objectives suitable for their region.

Endnotes

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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). China recently added a requirement (PRC Labor Contract Law of 1 January 2008, article 23) that firms enforcing non-competes against ex-employees compensate them during the term of the agreement.

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 against someone who has been involuntarily terminated, the practice is not generally illegal. When David Neeleman was fired from Southwest Airlines, e.g., he abided by the 5-year non-compete he had signed as a precondition of Southwest's acquiring his prior firm. He worked outside the United States during that time, returning exactly 5 years later to launch JetBlue (Wells 2002).

3. 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.

4. Although beyond the scope of this article, policy makers may also want to explore mechanisms for protecting trade secrets that are at once more reliable than NDAs and less impactful on workers than 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 3-month intervals that he had abided by his NDA. In this way, IBM's trade secrets were protected without blocking Papermaster from taking a new job (Elmer-Dewitt 2009).

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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