

Noncompetes and Employee Mobility*

Evan Starr
University of Maryland
estarr@rhsmith.umd.edu

J.J. Prescott
University of Michigan
jprescott@umich.edu

Norman Bishara
University of Michigan
nbishara@umich.edu

10/17/2016

Preliminary and incomplete. Please do not distribute or cite.

Abstract

We study the relationship between employment noncompetition agreements and employee mobility patterns using novel data from the 2014 Noncompete Survey Project. Specifically, we examine how noncompetes relate to the duration and nature of employee mobility, and we leverage our detailed individual-level survey data to identify and explore the precise mechanisms underlying the relationships we observe. We find that individuals with noncompetes appear to exhibit materially longer tenures and are more likely to depart for new employers that do not “compete” with their prior employers. To account for these patterns, we investigate the role noncompetes may play at each stage of the mobility “process”: job search, employer recruitment, offer receipt, negotiation, offer acceptance, etc. We present evidence that employees bound by noncompetes substitute job search activity and receptivity to recruitment in the direction of noncompetitors and that noncompetes are a factor in the choice to turn down approximately 40 percent of the offers employees receive from competitors.

* We gratefully acknowledge support from the Ewing Marion Kauffman Foundation Grant 20151449 and the William W. Cook Endowment of the University of Michigan. We appreciate helpful comments from Alex Tabbarok, Ryan Nunn, seminar participants at Columbia University, the University of Michigan, the University of Maryland, the Society for Institutional and Organizational Economics, and the American Economic Association. The authors would like to thank the following entities from the University of Michigan for providing the funds to collect the data: the University of Michigan Law School, the Ross School of Business, the Rackham Graduate School, the Department of Economics MITRE, and the Office of the Vice President for Research. We are also grateful to Justin Frake for excellent research assistance. The contents of this work are solely our responsibility.

1. Introduction

The ability of employees to move freely from employer to employer appears to positively influence a variety of economic outcomes: career earnings (Topel and Ward 1992), job displacement recovery (Jacobson, LaLonde, and Sullivan 1993), and the diffusion of knowledge across geographic and firm boundaries (Jaffe et al. 1993, Almeida and Kogut 1999, Moen 2005, Bloom, Schankerman, and Van Reenen 2013) to name a few. Yet when faced with such mobility, employers not only bear the costs of increased turnover, recruiting activity, and replacement training, but suffer the constant threat of losing extremely valuable trade secrets and client lists to their competitors when their employees switch allegiances. Indeed, poaching by competitors or an employee departing to start a competing business may be particularly troublesome as either results both in the loss of valuable human capital and the erosion of any knowledge or client-based competitive advantage (Campbell et al. 2012).

Firms employ many methods to influence the mobility of their employees, including patenting appropriate discoveries to establish intellectual property rights (Ganco et al. 2015), relying on trade secret law (Png 2012), or using vesting-style incentives including deferred compensation, stock options, or a steep wage-tenure profile (Lazear 1981). But most knowledge cannot be patented, the misappropriation of trade secrets can be difficult to prove, and vesting-style incentives may do little to prevent the departure of employees who have had important information and skills shared with them. As a consequence, firms frequently turn to a potentially powerful class of alternative mechanisms: postemployment restrictive covenants, which contractually specify where employees are prohibited from working in the future, what information they are prohibited from disclosing, and which clients and former colleagues they are prohibited from soliciting. Among these contracts, covenants not to compete (noncompetes) appear to offer the most comprehensive protection because they prevent the physical move of a former employee to a competitor in the first place.¹ Recent reports from the White House (White House 2016) and Treasury (Treasury 2016) stress the pervasive use of these contracts—38.1% of

¹ Nondisclosure and non-solicitation contracts, alternatively, allow the movement of the employee but prohibit certain behaviors post-move. These contracts are generally more difficult to enforce in court because the plaintiff must show that the defendant indeed behaved in a manner that was contractually forbidden, which can be difficult since such behavior occurred at the poaching firm.

U.S. labor force participants have signed a noncompete during their lifetime and nearly one in five employees is currently bound (Starr, Bishara, and Prescott 2016)—and highlight their many potential individual and aggregate economic effects.

A growing empirical literature has begun to study the effects of covenants not to compete and their enforceability, but this body of work has three significant limitations:² First, the only evidence on how a noncompete itself (as opposed to a jurisdiction's willingness to enforce a hypothetical noncompete) affects mobility is derived from two studies of high-skilled occupations: one of electronics engineers (Marx 2011) and one of physicians (Lavetti et al. 2015). Recent evidence that noncompetes are common even among unskilled workers who do not possess trade secrets or specialized training (Starr, Bishara, and Prescott 2016) calls into question the generalizability of these studies given their narrow occupational focus. Second, a much larger literature examines how variation in noncompete enforceability affects the retention and redirection of employees,³ but it does so without data regarding who—if anyone—was actually bound by a noncompete. As a result, this work cannot identify the impact that noncompetes may have on behavior independent of their enforceability, which may be sizable given that noncompetes are deployed just as frequently in states that supposedly do not enforce them as in states where they are considered enforceable (Prescott, Bishara, and Starr 2016).⁴ Third, despite its relatively fractured focus, the literature has generally coalesced around two conclusions: the use of noncompetes and noncompete enforceability (1) reduce the overall mobility of employees and (2) redirect departing employees away from competitors toward noncompeting ventures in other industries. Outside of offering evidence on these broad black-box links, however, the literature has done little, both empirically and theoretically, to understand the precise mechanisms that underlie these relationships.

In this paper, we use nationally representative data on noncompete use and enforceability from the 2014 Noncompete Survey Project (Prescott, Bishara, and Starr 2016) and a search-

² See Bishara and Starr (2016) for a recent survey of the empirical noncompete literature.

³ See, for example, Stuart and Sorenson (2003), Marx et al. (2009), Garmaise (2011), Starr (2016), Starr, Ganco, and Campbell (2016), Starr, Balasubramanian, Sakakibara (2016), Balasubramanian et al. (2016).

⁴ See Barnett and Sichelman (2016) for a critique of studies of enforceability.

based framework to rigorously examine the empirical noncompete literature’s mobility claims and to explicitly identify and measure the mechanisms that underlie any observed retention and redirection effects. We begin by presenting results on how noncompetes associate with both retrospective and prospective mobility decisions, finding that the two most prominent effects of noncompetes are that they 1) increase retention and 2) redirect individuals out of their original industries. To understand the mechanisms underpinning these relationships, we adopt a search and matching view of employee mobility in which mobility is contingent on the resolution of two subprocesses:⁵ (1) the acquisition of an offer from an alternative employer, and (2) the employee’s determination to accept that offer.

From the perspective of an employee, a noncompete serves as a legal barrier that must be overcome (or ignored) when the employee considers the costs and benefits of departing to a competitor. We posit that noncompetes necessarily increase the expected cost of moving to a competitor by at least some amount, thereby raising the threshold wage-offer competitors must propose to successfully poach someone bound by a noncompete.⁶ This greater cost not only affects an employee’s willingness to accept an offer but may also produce ripple effects extending over the entire offer generation and acquisition process. For example, because noncompetes reduce the set of job offers an employee would realistically consider, competing firms may be unwilling to recruit employees with noncompetes in the first place. Alternatively, such employees may be unwilling to search for open positions at competitor firms. Employees and poaching firms can redirect search and recruitment efforts toward noncompeting firms and job candidates, respectively, and so one potential reason we might observe non-trivial redirection effects as the result of noncompetes is because of systematic differences in the types of offers that noncompete signers receive in the first place.

Using detailed survey data from over 11,500 U.S. labor force participants, we compare mobility-related outcomes both across and within-individuals to evaluate how noncompetes

⁵ See, for example, the following work from the search and matching literature in economics: Burdett and Mortenson (1998), Manning (2003), Postel-Vinay and Robin (2002), and Postel-Vinay and Robin (2004).

⁶ We call this threshold the “competitor-specific reservation wage.” In general, we use the terms “competitor” and “noncompetitor” to refer to potential alternative employers that fall and that do not fall within the scope of noncompete, respectively.

affect these constituent subprocesses of employee mobility. We find no evidence that noncompetes reduce the overall level of recruiting “attention” an employee experiences, weaken an employee’s on-the-job search effort, or even shrink the number of outside employment offers an employee receives. However, we do find evidence of within-individual substitution away from competitors toward noncompetitors among those respondents who report being bound by noncompetes. This evidence of substitution also includes another pattern we observe in our data: an employee is more likely to make an employer aware of an offer from a noncompetitor than from a competitor when the employee is subject to a noncompetition agreement. Overall, these results provide a new explanation for the redirection effects observed in the literature – namely, rather than competitors giving individuals operating under the constraints of a noncompete the cold shoulder, employees with noncompetes strategically redirect their efforts toward noncompetitors—a finding with rich management and policy implications.

Our research also produces direct evidence on the mechanisms of mobility. Over 40% of our surveyed employees consider a noncompete to have been a factor in their choice to turn down an offer from a competitor. Moreover, more than 50% of employees report that they view their noncompete as an important barrier to employee mobility. These numbers are strikingly consistent across educational categories. When examining why some view their noncompete as a barrier but others do not, we identify the key role played by employee beliefs about enforcement and the even more important role employers play by simply reminding employees of their noncompete obligations. In particular, employees who believe their firm will sue them and that a court will enforce their noncompetes are nearly 60 percentage points more likely to turn down an offer as a consequence of being subject to a noncompete. However, once we control for whether a firm reminds an employee of an existing noncompete, the coefficients on beliefs fall precipitously. The coefficient on our reminder indicator variable is associated with a 39 percentage point increase in the likelihood of turning down an offer.

We also present evidence that, although noncompetes and noncompete enforceability appear to interact to some extent, the explanatory power in our accounting of variation in mobility-related outcomes is due almost entirely to the *actual* use of noncompetes and to *beliefs* about litigation risk and enforceability, as opposed to state-level enforcement intensity. For

example, objective noncompete enforceability measures are unrelated to whether individual employees view their noncompetes as barriers to mobility, while an individual's beliefs and an employer's reminders about an existing noncompete are far stronger predictors.

This paper makes contributions to our understanding of the employment mobility process, to our understanding of how noncompetes help firms manage their workforce (Marx 2011, Bloom and Van Reenen 2007), to the ongoing debate over noncompete policy and the role of labor market frictions in labor markets (Bishara and Starr 2016, Naidu 2010, Naidu and Yuchtman 2013), and to the literature that studies trends in U.S. dynamism (Davis and Haltiwanger 2014). From the perspective of employers, our results intimate that noncompetes do not necessarily deter competitors from trying to poach employees, and that any reduction in mobility appears to derive primarily from an employee's own perceptions of whether his employer will sue to enforce a noncompete and whether a court will enforce it. Employers may be able to manipulate these beliefs by reminding employees of their noncompetes or by visibly pursuing litigation against certain departed employees (Ganco et al. 2015).

For the growing policy debate over noncompetes, our work offers the first direct evidence on the extent to which noncompetes “chill” employee mobility and by which channels these contracts appear to accomplish any such chilling.⁷ While other social benefits may accrue from using and enforcing noncompetes for technical or other highly skilled employees, the fact that 40% of employees without a bachelor's degree, who likely possess no viable trade secrets or commercially valuable information, report their noncompete was a factor in the choice to turn down offers from competitors underscores the potential significance of noncompetes to

⁷ Noncompetes are under intense scrutiny of late: Spurred by the link between California's ban on noncompetes and the growth of Silicon Valley (Saxenian 1994, Gilson 1999, Fallick et al. 2006), studies finding that noncompete enforceability reduces inventor and executive mobility (Marx et al. 2009, Garmaise 2009), entrepreneurship (Starr et al. 2015, Stuart and Sorenson 2003), and innovation (Samila and Sorenson 2011, Lobel 2014, Garmaise 2009), and fresh revelations that many low-wage employees sign onerous noncompetes (Greenhouse 2014), state legislators in Hawaii (Zillman 2015) and Missouri (McGaugh 2015) have recently proposed bans on noncompetes for technology-related employees, state legislators in New Jersey (Mendelson and Milligan 2013) and Maryland (Schaefer 2013) have proposed banning the enforcement of noncompetes for individuals who applied for and received unemployment benefits, Senators Murphy (D-CT) and Franken (D-MN) proposed the first federal ban on noncompetes for employees making less than \$15 per hour (the MOVE Act), and Massachusetts (Atanasov 2015), Michigan (Shinn 2015), and Washington (Stanford 2015) have proposed California-like bans on noncompetes for all employees.

employee mobility. Policymakers must also confront the reality that noncompetes themselves, and not state-level enforceability, appear to produce these chilling effects.⁸ As a result, policymakers wishing to spur employee mobility ought to be more concerned with enacting laws that reduce the *use* of noncompetes, as opposed to supporting policies that limit how enforceable they will be in court. Furthermore, given that employee beliefs play such an important role and that large heterogeneity in the enforceability of noncompetes exists (Starr 2016), many individuals surely hold unfounded beliefs about the enforceability of their noncompete. Accordingly, many employees likely refuse offers they would have otherwise accepted because they fear the enforcement of an unenforceable noncompete.⁹

The paper proceeds as follows: In Section 2, we briefly describe our data and corroborate the main assertions of the noncompete literature. In Section 3, we outline our conceptual framework and, in the process, we detail the specific mechanisms that make up the employee mobility process. In Section 4, we present our empirical framework and results. We conclude in Section 5 with a discussion of the implications of our findings.

2. Corroborating the Redirection and Retention Effects

Our data derive from the 11,505 respondents of the 2014 Noncompetition Agreement Survey Project (Prescott, Bishara, and Starr 2016), which we developed and deployed in mid-2014. Our goal was to collect basic information about workforce experience with and perceptions of noncompetes and noncompete enforcement. The sample population includes all U.S. labor force participants aged 18 to 75 who are employed in either the private sector or in a public healthcare system or are unemployed.¹⁰

⁸ Though, as in Ganco et al. (2015), the “brightest” may still leave.

⁹ With regards to “U.S dynamism,” the facts that noncompetes appear to have profound mobility effects and that noncompete usage has likely been growing over time (though longitudinal data on the use of noncompetes is generally unavailable) hint that such contracts may be partially responsible for the decline in U.S dynamism (Davis and Haltiwanger 2014). Our results also suggest that at least part of the reason noncompetes appear to cause “career detours” (Marx 2011) and brain drain (Marx et al. 2015) is strategic substitution of search and recruitment efforts toward noncompetitors.

¹⁰ A lengthy description of the data, sampling frame, selection issues, weighting methods, and multiple imputation techniques can be found in Prescott, Bishara, and Starr (2016). All results we present here use weights created to match moments in the U.S. labor force in 2014.

One important feature of our data particularly relevant to this study is uncertainty regarding whether an individual has *actually* signed a noncompetition agreement. In response to the survey question asking whether the participant has agreed to a noncompete, respondents were able to respond “yes,” “no,” or “maybe.”¹¹ Despite their lack of awareness, it is probable that at least some fraction of the individuals in the “maybe” category had actually signed noncompetes.¹² To deal with this uncertainty, we use multiple imputation methods (King et al. 2001) to estimate whether individuals in the “maybe” category had likely entered into noncompetes, based on the characteristics of the signers and nonsigners. All of the estimates we present below, except those involving questions that ask a respondent about a particular noncompete, rely on multiple imputation methods.¹³

Using this data, Starr, Bishara, and Prescott (2016) provide the first systematic evidence of the use of noncompetes across the labor force, finding that roughly 1 in 5 U.S. labor force participants are currently bound by noncompetes. In that paper, we report that noncompetes are common for all types of employees, with 13.5% of individuals earning at most \$40,000 and 36.5% of those earning at least \$100,000 subject to one.¹⁴ Table 1 provides further summary statistics comparing mean differences in various outcomes between those respondents who are presently subject to a noncompete and those who are not.

2.1 Retrospective Mobility Experiences

To provide a baseline for understanding how noncompetes may influence mobility, Table 2 reports the results from survey questions that explicitly ask respondents whether and how noncompetes have affected prior individual choices to remain with or leave their employer. We cut the data by educational levels. The results suggests that, consistent with two core conjectures

¹¹ The “maybe” category could include responses like “I have never heard of noncompetes,” or “I don’t know if I’ve signed one in my current job.”

¹² Indeed, 8.8% of those who have ever signed report that at some point they signed unknowingly, only to later become aware that they were working subject to a noncompete.

¹³ Our multiple imputation efforts involve estimating our models on each of 25 sets of imputed data and then calculating an overall estimate and standard errors using the estimates across the imputations. R^2 statistics are typically not presented in such situations because the estimate varies across imputations. The median R^2 for all specifications are shown in Table 8.

¹⁴ For details on the use of noncompetes by employee and firm characteristics, see Starr, Bishara, and Prescott (2016).

of the existing literature (Marx 2011, Marx et al. 2009, Garmaise 2011, Starr, Ganco, and Campbell 2016), at least two principal effects of noncompetes on employee mobility are to keep individuals at firms longer (11.8% of respondents who have signed a noncompete at some point implicate noncompetes in their longer tenures) and to redirect departing employees toward different industries (11.7% report noncompete-based redirection). Interestingly, 67.4% of employees who signed a noncompete at some point in their careers report that noncompetes have never affected their mobility decisions. Or, to put it another way, 30% of those who have signed a noncompete in their lifetime and 40.7% of the same group with more than a bachelor's degree assert that at least one of their mobility decisions was influenced by a noncompete.

In terms of heterogeneity of noncompete experiences and behavior across education levels, it is notable that 9.3% of those with more than a bachelor's degree felt "obligated" not to join a competing firm, compared to only 5.9% of those with less than a bachelor's degree. Relatedly, the most educated signers were more likely to remain with an employer out of fear of subsequently facing litigation, raising the possibility that jilted employers might be more likely to target higher-skilled individuals with enforcement actions.¹⁵ Lastly, the highly educated are more likely to leave and wait for the noncompete to expire before joining a competitor, potentially because they can afford such a choice. They are also the most likely to geographically relocate or go back to school in response to a noncompete's constraints.

2.2 Retention and Redirection in Current Employment

While these numbers provide direct evidence that noncompetes have significantly influenced past mobility decisions, we now provide evidence that similar dynamics are present with respect to an employee's current occupation.¹⁶ In particular, we use ordinary least squares to estimate the following two equations:

¹⁵ Consistent with Starr, Bishara, and Prescott (2016), we find that those who sign noncompetition agreements rarely negotiate over the use or terms of the provision.

¹⁶ We also recognize that prior noncompetes may have affected the existing distribution of occupations and geography of employees. To understand the extent to which this sorting may occur, we asked respondents directly if a prior noncompete was a factor in determining where they currently live or work. Overall, 11% of those who reported ever signing a noncompete report that a prior noncompete was a factor in determining where they currently work, though there exists substantial differences between

$$(1) \quad Y_{iojs} = \beta_0 + \beta_1 \text{Noncompete}_i + \gamma X_{ij} + \omega_{o,j} + \alpha_s S + \varepsilon_{iojs};$$

$$(2) \quad Y_{iojs} = \beta_0 + \beta_1 \text{Noncompete}_i + \beta_2 \text{Noncompete}_i \times \text{Enforceability}_s + \gamma X_{ij} + \omega_{o,j} + \alpha_s S + \varepsilon_{iojs};$$

where Y_{iojs} represents various outcomes including length of tenure, the likelihood of leaving for a competitor or noncompetitor (and later, job search effort, recruitment experience, the receipt of job offers, and counteroffering behavior) for employee i in occupation o , industry j , and state s . Included in $\omega_{o,j}$ are 2-digit industry (NAICS) by 2-digit occupation (SOC) fixed effects, while included in X_{ij} are indicators for gender, education, firm size, multi-state firm status, as well as linear controls for hours worked per week, weeks worked per year, their interaction and a third degree polynomial in age.¹⁷ The standard errors are clustered at the state level to account for state-level correlations in the disturbances, which is appropriate since noncompetes are enforced at the state level (Moulton 1990, Bishara 2011).

The coefficients of interest are β_1 and β_2 , which reflect the conditional change in the outcome associated with signing a noncompete and the differential effect in states that are more likely to enforce noncompetes.¹⁸ The results of these specifications are most safely viewed as descriptive. For example, omitted variables from these regressions may violate the conditions under which β_1 would identify the causal effect of a noncompete.¹⁹ Consider the possibility that high quality firms are more likely to use noncompetes, and that employees might especially

those with a bachelor's degree (13.9%) and those without a bachelor's degree (8.8%). Furthermore, 7.1% of those who have ever signed a noncompete report that a prior noncompete was a factor in determining where they live. These latter effects are relatively constant across education levels (7.8% for those with a bachelor's degree versus 6.6% for those without one).

¹⁷ Notably important variables such as income are omitted from these regressions as control variables because they are also outcomes and may be affected by whether an employee has signed a noncompete. We seek to avoid the “bad control” problem in our work to be sure that we identify the full (and only the full) effect of noncompetes (Angrist and Pischke 2008).

¹⁸ We use the 2009 enforceability measure developed in Starr (2016), which is measured in standard deviations from a mean enforcement score of zero. Note that the main effect of enforceability in equation (2) is subsumed by state fixed effects.

¹⁹ There may be other objections to a causal interpretation. For instance, simultaneity bias or reverse causation might play a role—e.g., in the tenure context, employees who stay longer and rise through the ranks might be asked to sign a noncompete mid-career. With regard to this particular example, any concern should be limited. In our sample, noncompetes are almost uniformly signed at the outset of employment (Starr, Bishara, and Prescott 2016).

enjoy working for these employers relative to other employers. Such a scenario would produce a spurious negative relationship between noncompetes and mobility. On the other hand, selection concerns may push in the opposite direction: if employees vary in their underlying propensity for mobility and firms use noncompetes in an attempt to “root” their most mobile individuals, then we might discover that noncompetes are associated with more rather than less mobility.²⁰

Table 3 corroborates the facts suggested by Table 1 and the prior literature in the context of an employee’s current job.²¹ In our sample, noncompetes are associated with longer tenures, reduced likelihood of departing to a competitor, and a greater wage premium for agreeing to make such a move. Columns (1)-(4) of Panel A examine two potential “wedges” of limited mobility between competitors. Column (1) shows that noncompetes are associated with a 4.9 percentage point increase in the likelihood that an individual reports they will *never* leave their employer for a competitor. Only 8.3% of the sample report that they will never depart for a position with a competitor, so this point estimate reflects a 58% increase in the likelihood that an individual will never leave for a competitor. Column (2) shows that this effect is relatively invariant to the enforceability of the individual’s noncompete.

Among those who do report openness to employment with a competitor, columns (3) and (4) examine the relationship between noncompete status and the log of the required wage premium respondents report would be necessary to obtain their consent to join the ranks of a competitor: noncompetes are associated with a competitor-specific reservation wage that is approximately 20% higher.²² Column (5) of Panel A examines whether an individual who signs noncompetes exhibits longer tenure, which we can think of as a *lack* of prior mobility.²³ These

²⁰ While it is challenging to identify the causal effect of noncompetes on mobility, our primary contributions below rely on within-individual analyses that net out any individual-specific selection effects when comparing between competitor and noncompetitor outcomes. Omitted variable and other endogeneity stories make much less sense in such a framework.

²¹ These mobility outcomes are also analyzed and discussed in Table 4 and 5 of Starr, Bishara, and Prescott (2016).

²² Perhaps surprisingly, this positive relationship appears to be mitigated in states that are more likely to enforce noncompetes (column (4)), though the main effect remains large and statistically significant.

²³ Column (6) shows—in what might be another surprise—that the positive relationship between noncompetes and tenure is relatively unchanged in high as opposed to low enforcing states. If anything, the point estimate of -0.186 suggests that in higher enforceability states employees who sign noncompetes are relatively more mobile.

estimates suggest that signing a noncompete is associated with an additional 0.52 years of tenure, which is 7.9% of mean tenure in the sample (6.6 years).²⁴

Panel B establishes a conditional correlation between noncompetes and the direction of mobility. In particular, the dependent variables are respondent answers to the questions: “What is the probability that you will leave for a *competitor* in the next year?” and “What is the probability that you will leave for a *noncompetitor* in the next year?” These perceived probabilities range from 0 to 100. The average probability that a nonsigner reports for moving to a competitor is 12.8%; the average reported likelihood of a nonsigner moving to a noncompetitor is 19.7% (see Table 1). Columns (1) and (2) show that signing a noncompete is associated with a reduction in the perceived probability of leaving for a competitor of approximately 2.5 percentage points (an effect size of 19.5% relative to the mean for nonsigners), and that this difference is invariant to the state’s enforcement intensity.²⁵

Columns (5) and (6) examine within-individual differences in the perceived probability of leaving for a competitor versus a noncompetitor. Respondents are asked to answer the two departure probability questions one after the other, and so this measure captures how respondents view their relative likelihood of departing for a noncompetitor over a competitor. On average, employees who are subject to noncompetes report that they are 3.3 percentage points less likely to leave for a competitor *relative* to a noncompetitor.²⁶

Having established that noncompetes are associated with both increased retention and redirection, both retrospectively and with respect to respondents’ current employment, we now turn to our main task which is to identify the mechanisms that underlie this relationship and assess their relative importance. To guide our empirical analysis, we use insights from the search and matching literature to develop useful interpretive intuition.

²⁴ This percentage effect is relatively low because mean tenure is driven by a few large outliers. Estimating a similar model in which the dependent variable is an indicator for having tenure of at least five years reveals that a noncompete is associated with a 5.6 percentage point increase in the likelihood of having tenure of at least five years, which is 12% of the proportion of respondents who have tenure of at least five years (46.3%).

²⁵ Columns (3) and (4) show that noncompete signers may be slightly more likely to believe they will leave for a noncompetitor (according to Table 3’s point estimate), but the difference between the two groups is not statistically different from zero.

²⁶ Columns (4) and (6), like column (2), show that these relationships are not strongly moderated by noncompete enforceability.

3. Conceptual Framework

In the spirit of search and matching models with endogenous search and recruitment effort (Burdett and Mortensen 1998, Manning 2003, Postel-Vinay and Robin 2002, Postel-Vinay and Robin 2004), we posit that employee mobility is contingent on two outcomes: First, an alternative offer of employment must be generated through either a) on-the-job search by the employee or b) employer recruitment (i.e., identifying and development potential candidates, including those who are not presently engaged in on-the-job search). Second, the terms of the offer must reach some reservation threshold (wages, benefits, etc.) for the employee to accept the offer. By inserting what amounts to a legal barrier between employees and certain alternative employment opportunities, noncompetes influence both the likelihood that an alternative employer makes an offer and whether the employee is likely to accept it.

While we do not develop a formal model for reasons that will soon become clear, we provide some structure on the mobility “process” to shed light on particular mechanisms and to portray how a more comprehensive noncompete literature would characterize the role noncompetes might play in employee mobility. Consider a partial equilibrium search model, summarized by four periods, which are illustrated in Appendix Figure A1:²⁷

Period 0: An individual begins employment with an employer. The employer decides whether to request/demand that the employee agree to a noncompete and the individual decides whether to sign. Perhaps on the basis of the employee’s noncompete status, the employer selects how much training to provide and how much sensitive information to share with the employee.

Period 1: With some probability the employee meets one or more “poaching” firms (either a competitor or noncompetitor with the employee’s current employer). The probability of coming into contact with one or more alternative employers is influenced by the employee’s search effort and the alternative employer’s recruitment intensity. If there is contact, the poaching firm may decide to make the employee an offer.

Period 2: If the employee receives an offer from a poaching firm, then the employee chooses whether to accept, reject, or make her current employer aware of the offer. If the employer is made aware of the offer, the employer can either make a counteroffer or remind the employee of their noncompete or both. After any counteroffer, the employee chooses either to stay or leave.

²⁷ We draw on the theoretical frameworks of Doniger (2015), Postel-Vinay and Robin (2002), and Moscarini (2008).

Period 3: If the employee leaves for a competitor, the employee's former employer chooses among taking no action, threatening the employee or the employee's new employer,²⁸ or pursuing legal action over the former employee's noncompete. When relevant, the employee decides whether to acquiesce or continue working for the competitor. If the latter, the parties either settle out of court or a court chooses whether to enforce the noncompete.

Since a formal model incorporating each of these elements would be a "recipe for indigestion" (Manning 2003), we instead describe the incentives at play within each choice while being agnostic about the exact form of employer and employee heterogeneity, the production function, the wage-setting process, and any informational asymmetries. The benefit of this approach is that we are able to make a wide variety of predictions corresponding to varying reasonable underlying assumptions. This approach is most useful for our purposes because we can exploit our detailed survey data to examine how noncompetes affect the key subprocesses of mobility, ultimately letting the data speak for themselves.

3.1 Offer Refusal

The existing noncompete literature has not cast the process of mobility in such a complicated search and recruitment framework.²⁹ In particular, prior work on noncompetes has neither considered the role noncompetes might play in on-the-job search and recruitment effort (Postel-Vinay and Robin 2004, Manning 2003) nor thoughtfully examined the firm's choice to counteroffer (Barron et al. 2006, Doniger 2015). By ignoring these components, the literature has missed the opportunity to identify and evaluate the precise mechanisms potentially linking noncompetes and mobility. These mechanisms are important both for policymakers weighing noncompete reforms and for managers who must choose whether and how to use restrictive covenants. Nevertheless, it is worth briefly incorporating the intuitions of prior work (Garmaise 2011, Posner et al. 2004) into the search and matching framework we describe above. This framework allows us to make predictions about particular mechanisms and also forms a baseline for thinking about alternative mechanisms that may be at play.

²⁸ Firms can be sued for tortious interference when the poaching firm intentionally damages the plaintiff's contractual or business relationships.

²⁹ Probably the closest is Heggedal, Moen, and Preugschat (2013).

The heart of this analytical framework is the existence of wage-offer distributions from which employees periodically receive draws.³⁰ A wage-offer distribution consists of offers from both competitors and noncompetitors. Employees develop a reservation wage for both competitors and noncompetitors which depends on their current wage, the arrival rate of offers, their discount rate, their risk preferences and moving costs, etc., which in turn determines the threshold wage at which they will agree to join a new firm. Offers above the reservation wage result in departure; employees decline offers below the reservation wage. Noncompetes function to create additional moving costs when the offer is from a competitor—whether in the form of guilt, fear of litigation, or potential delay. As a result, noncompetes increase the threshold wage a competitor must offer to induce movement, reducing the likelihood that the employee will accept any particular random draw from the wage-offer distribution.³¹

If we were to take a very simple model in which take-it-or-leave-it offers are drawn exogenously from a wage-offer distribution, then the fact that noncompetes raise the competitor-specific reservation wage is enough to generate a negative relationship between noncompetes and employee mobility. While this relationship has been considered in the literature (Garmaise 2011, Posner et al. 2004, Starr 2016), we highlight here that the observable mechanism of this theory that links noncompetes to mobility is simply “*offer refusal*”—i.e., those who sign noncompetes simply refuse more offers from competitors, resulting in less mobility.

3.2 Offer Generation and Existence

An employee’s willingness to accept an offer is of first-order importance in any theory of employment mobility, but the availability of an offer to accept is not random. An offer depends on a connection between a potential employer and an employee. The likelihood of this connection, in turn, is systematically related to recruiting activity and search effort. Thus, another set of mechanisms linking noncompetes to mobility involves the *existence* of an offer to reject and the process that generates (or fails to generate) that offer. Given that recruiting activity

³⁰ In this setup, we do not offer an explanation for why there is variation across employees in their wage-offer distributions. We assume at a minimum that along with search frictions there is heterogeneity across employee and firms which generates this variation (Burdett and Mortensen 1998, Manning 2003, Postel-Vinay and Robin 2002).

³¹ See columns (3) and (4) of Panel A in Table 3 for empirical evidence

and generating offers are costly and that noncompete signers have a relatively lower likelihood of accepting an offer from a competitor, one wonders why competing firms would choose to make offers to noncompete signers in the first place?

Indeed, if recruitment efforts are directed and the noncompete increases moving costs significantly, it might not be surprising to discover that competing firms largely avoid recruiting and making offers to noncompete signers. Relatedly, employees considering how much on-the-job search effort to exert may recognize the wedge their noncompete creates and pare back search effort directed toward competitors in light of the lower relative likelihood of receiving and accepting an offer. In sum, any negative relationship between noncompetes and mobility might be explained by reduced employee search effort and/or reduced recruiting attention from competitors, and, consequently, a reduction in the arrival rate of job offers.

The discussion above highlights how noncompetes may deter competitor-specific poaching behavior and on-the-job search directed toward competitors, but ignores the important role of noncompetitors. Competing firms unwilling to bear the costs associated with hiring an employee with a binding noncompete may instead redirect their recruitment efforts toward employees at noncompetitors. While employee skills may not be quite as transferable to noncompetitors as they are to competitors, the firm need not pay a noncompete-based premium to hire the employee nor wait a year or two to onboard her, which increases the viability of searching for appropriate candidates at noncompetitor firms. Likewise, employees who recognize that their noncompete may make it unlikely that a competing firm will make them an acceptable offer may redirect their on-the-job search effort toward noncompetitors.

These substitution mechanisms may largely (or in extreme circumstances, entirely) offset the extent to which noncompetes inhibit mobility toward competitors, and in so doing, they may have important implications for the direction of the employee's career path. In fact, redirection in recruitment and search toward noncompetitors provides an explanation for the "career detours" phenomenon observed by Marx (2011). While Marx (2011) suggests that individuals "involuntarily leave their technical field to avoid a potential lawsuit," our framework suggests that the choice to leave an industry may be voluntary and strategic.

3.3 Three Complications

Three important factors complicate the account we have developed above: First, reservation wages are a function of current wages, and current wages may also be affected by the fact that an employee is bound by a noncompete. Theoretically, if noncompetes cause or are associated with lower wages or fewer benefits (for any of a number of potential reasons), this relative deficit may offset the increase in the reservation wage necessary to cover the moving costs associated with a noncompete. If noncompetes are instead associated with better compensation and benefits (or other amenities), this higher starting point will further increase the reservation wage, making it more difficult for both competitors and noncompetitors to poach affected employees. Starr, Bishara, and Prescott (2016) find that noncompetes are associated with 6.6% higher wages, suggesting the latter possibility may be operative.

Second, noncompetes are also associated with more training (Starr, Bishara, and Prescott 2016), which may affect what poaching firms are willing to offer an employee—especially if the training happens to facilitate the transfer of valuable information to the poaching firm, such as strategic plans, client lists, or even trade secrets. Any resulting rightward shifts in the wage-offer distribution may also offset the increase in the reservation wage due to the noncompete. If the employee receives training that contains industry-specific information, then the competitor-specific wage-offer distribution will shift to the right of the noncompetitor wage-offer distribution, rendering it relatively more likely that competitors (versus noncompetitors) will make the employee an attractive offer. These shifts seem unlikely to fully offset the increase in the reservation wage, however, because in that case a (rational) firm would not want to use the noncompete (or, rather, provide the associated training) in the first place.

Third, an employee may choose to take her offer to her employer and the employer may choose to make a counteroffer (Postel-Vinay and Robin 2002, Postel-Vinay and Robin 2004, Doniger 2015).³² Intuitively, employees who choose whether to notify their current employer of outside job offers trade off the potential benefits of Bertrand-like offer competition with the costs

³² Pinning down the proper assumptions of the typical counteroffering process is difficult. Evidence from Barron, Berger, and Black (2006) suggests that one-third of firms are willing to make matching counteroffers, but we do not know if Bertrand-like competition often or typically results, or if the process is better described as ending at just one, two, three, or more counteroffers.

of perceived disloyalty. If employees with noncompetes believe that their employer is less likely to respond to an offer from a competitor (versus a noncompetitor), then the expected marginal benefit of any such Bertrand-like competition is reduced, providing the employee with further incentive to seek offers from firms outside of the scope of the noncompete.

By contrast, firms facing the choice of whether to counteroffer trade off the marginal value of the increase in the likelihood that the employee will stay (including the value of preventing the leakage of trade secrets and other knowledge) against the marginal cost of expressing a willingness to match offers, which, in addition to the physical outlay, could induce other employees to search for competitive outside offers (Postel-Vinay and Robin 2002) or create issues of fairness in the workplace (Olson 2016).³³ Employees with noncompetes cannot legally leave for competitors (within the scope of the noncompete). Accordingly, firms using noncompetes may be relatively less willing to match counteroffers. Yet attempting to enforce a noncompete is itself costly (e.g., legal fees, workplace discord, and reputational costs). If a noncompete signer is sufficiently valuable, and the wage increase necessary to retain an employee is not too large, firms may find it reasonable to match outside offers even for positions clearly disallowed by a noncompete.

The ability of current employers to counteroffer in response to poaching activity should theoretically reduce employee mobility, but the practical significance of this behavior is difficult to gauge. If noncompete signers join employers for which they are most productive at the outset (or for which they become most productive as a result of firm-specific training), then employers that are willing to make counteroffers to individuals with noncompetes will typically be able to win any Bertrand-like wage competition. The result would be longer tenures.

4. Mechanisms Underlying Mobility

In this section, we estimate variants of equations (1) and (2) as before, now changing the dependent variable to reflect the various components of the mobility process. As we note above, the cross-sectional nature of the survey data raises questions about the interpretation of the coefficients we estimate. For instance, any causal interpretation may be confounded by omitted

³³ Failing to make a counteroffer may also reduce the morale of the employee, and firms may take this into account.

variables reflecting the unobserved systematic use of noncompetes by particular types of employers or employees. We take five approaches to deal with such endogeneity.

First, with regards to redirection effects, we use a within-individual analysis, which nets out any common individual-specific or firm-specific effects. Nevertheless, in estimating across-individual effects (e.g., the competitor and noncompetitor outcomes), omitted variables bias still poses a threat to identification. Second, we conduct robustness checks in which we account for some of the unobservables likely to raise the most concern. Third, given that we can never be certain that we have controlled for all potentially confounding variables, we employ Oster's (2016) method to estimate the extent of selection on unobservables that would be required to reduce the causal effect of noncompete status to zero. Fourth, when we were able to do so in an effective and reliable way, we asked respondents explicitly about the causal effect of noncompetes on mobility outcomes within the survey itself, and are therefore able to offer direct causal evidence in some cases. Lastly, we take the approach of the rest of the literature (Garmaise 2011, Stuart and Sorenson 2003, Samila and Sorenson 2011, Starr 2016, Starr, Balasubramanian, and Sakakibara 2016) and include a state-level enforceability measure interacted with a noncompete indicator in our regressions. This strategy is not so much a robustness check as an examination of how the within-state difference in the outcome variable between noncompete signers and nonsigners changes as enforceability increases, but estimates a similar parameter of interest.

4.1 The Process of Generating Alternative Offers

Table 4 examines the process of employees receiving offers. Panel A examines whether the individual has been recruited in the last year, which we perceive as a precursor to the receipt of an offer. Perhaps unexpectedly, noncompete signers are 6 percentage points (column (1)) more likely to report being recruited by a competitor in the last year, and 11.3 (column (3)) percentage points more likely to report being recruited by a noncompetitor. The difference between the two is 5.3 percentage points (column (5)) and is statistically different from zero.³⁴

³⁴ It appears that the greater recruitment rate among competitors may be moderated by noncompete enforceability, which subsequently reduces the willingness of competing firms to recruit those who sign noncompetes. Enforceability also negatively moderates the relationship between noncompetes and

The results from Panel A do not provide any evidence that noncompetes themselves dissuade competitors recruiting, though greater enforceability may be somewhat associated with reduced recruitment from competitors. Nevertheless, these results offer strong support for the recruitment redirection hypothesis in that noncompete signers are relatively much more likely (economically and statistically) to be recruited by noncompetitors than by competitors.

The results from Panel B of Table 4 for on-the-job search effort largely mirror those of the recruitment analysis above. We estimate that search effort directed toward competitors in the last year, as measured from 0 to 10, is lower for those who sign noncompetes, but not statistically significantly so, while search effort toward noncompetitors is strongly positive and statistically significant, indicating that noncompetes are associated with an additional 0.4 units of effort toward noncompetitors (15% of the mean search effort toward noncompetitors reported by nonsigners). The relationship between noncompetes and the within-individual difference between search toward competitors and noncompetitors is large and negative (-0.51 units), suggesting that noncompete signers are more likely redirect their search effort away from competitors and toward noncompetitors. These main effects do not appear to be moderated in any way by the enforceability of the noncompete.³⁵

Panel C of Table 4 considers the relationship between noncompetes and offers received over the course of the last year. As the recruitment and on-the-job search results suggest, those who sign noncompetes are substantially more likely to report getting an offer in the last year by both competitors (4.3 percentage points) and noncompetitors (4.7 percentage points). Yet, although noncompete signers appear to target their search toward and are recruited significantly more by noncompetitors, the within-individual difference in the offer probabilities is not different from zero at conventional significance levels. If reliable, this null finding might suggest that industry-specific skills may make an individual less productive at a noncompetitor and thus less viable as a job candidate relative to somebody in the industry. Incorporating state-level

recruitment by nonsigners, but the effect is statistically insignificant. These small negative effects of enforceability are similar in the within-individual specification.

³⁵ It is worth noting that the results from the search and recruitment models in Panel A and Panel B may be related. We do not know whether the poaching firm reached out first or whether the individual first reached out to the poaching firm. If workers similarly conflate these two, then recruitment and search results may simply be showing the same set of actual interactions.

enforceability into the analysis, however, casts doubt on the finding in column (5). Noncompete signers are relatively more likely to get offers from noncompetitors (and marginally less likely to get offers from competitors) in higher enforceability states. The within-individual difference is negative and statistically significant, implying that signers are relatively more likely to receive offers from noncompetitors in the last year in higher enforceability states.³⁶

Taking the results of Table 4 together, the bulk of the evidence seems to suggest that noncompete signers substitute search effort toward noncompetitors and are more likely to receive offers from noncompetitors, whether in an average enforcing state or in a high enforcing state relative to a low enforcing state. At the same time, the evidence also tells a story in which employees bound by noncompetes are in high demand: they receive offers from competitors at a substantially higher rate ($0.043/0.092 = 46\%$ higher than the mean of nonsigners). We thus find little evidence to suggest that competing firms are, for the average noncompete signer, dissuaded from pursuing and making offers to those subject to noncompetes.

4.2 Strategic Notification and Counteroffering

In Table 5, we examine whether employees notify their employers about alternative offers from competitors and noncompetitors and, if so, if employers respond by increasing the offeree's compensation. Table 1 shows that nonsigners make their employer aware of an offer from a competitor 37% of the time, compared to 34% of the time for a noncompetitor. Panel A of Table 5 examines how these differences relate to an employee's noncompete status. We estimate that signers are slightly more likely than nonsigners to make their employer aware if an offer from a competitor. This difference is even larger if the offer comes from a noncompetitor (columns (1) and (3)), but neither estimate is statistically significantly different from zero. The within-individual difference between the likelihood the firm is aware of an offer from a competitor and a noncompetitor, however, is negatively associated with a noncompete (-6

³⁶ Panel D expands the possible time frame for offer-receipt to the employee's entire tenure, which has the effect of increasing the fraction of employees who have received at least one offer. These results are certainly confounded with tenure (since individuals who stay longer may be more likely to get more offers), but nevertheless they show similar patterns consistent with the rest of Table 4—namely that noncompete signers are more likely to get offers from noncompetitors, even within an individual. We also observe evidence of a moderating effect of noncompete enforceability which reduces the relative likelihood of receiving an offer from a competitor while employed for noncompete signers.

percentage points), and the effect is even stronger in states that enforce noncompetes more intensively (-2.7 percentage points). Thus it appears that employees are not only strategic in where they seek out alternative employment offers, but also about the types of offers (or rather the origin of the offers) they make known to their employer.

Panel B of Table 5 reports how employers respond when their employees make them aware of an offer of employment from another firm. The point estimates suggest that firms are somewhat less likely to agree to increase compensation in response to an offer from a competitor if the employee is bound by a noncompete, but the difference is not statistically different from zero. By contrast, firms are slightly more likely to respond to offers from noncompetitors, though the within-individual difference is not statistically different from zero. Unfortunately, this is a low-power statistical test. Only 470 individuals received an offer from a competitor and an offer noncompetitor, both of which ultimately become known to their employer.³⁷

4.3 Declining Offers

Up to this point, each of these results points to a larger puzzle. Employees with noncompetes receive offers at higher rates, and yet their employers appear no more likely to match those offers. How can noncompete signers still exhibit reduced mobility (longer tenures)? In this section, we use data from 2014 Noncompete Survey to ascertain directly whether a noncompete influences an employee's decision to decline an offer, and how that decision is affected by employees' beliefs about their employers' likely reaction to their departure.

Panel A of Table 6 presents a simple tabulation in response to the question "Was your noncompete a factor in your choice to turn down the offer from a competitor?" The responses show that 41.4% of respondents indicated that their noncompete was indeed a factor in their decision to decline the offer. This proportion is relatively constant across educational categories. Not all workers received offers from competitors, however, and so to gain power, we evaluate respondent answers to the following question: "If you received an offer from a competitor,

³⁷ Noncompete enforceability, according to the within-individual difference specification results, appears to moderate this relationship in a non-intuitive direction. Greater enforceability raises the relative likelihood that the firm will respond to a competitor relative to a noncompetitor's offer by raising the wage. This effect may be spurious, or may be explained in whole or in part by the fact that employers in higher enforceability states invest more in training (Starr 2016), suggesting that they may have more to lose if they allow the employee to depart for a competitor's distant shores.

would your noncompete be a factor in your choice to reject it.” A roughly comparable 47.7% report that a noncompete would be a factor, with 42.9% of those without a bachelor’s degree so indicating compared with 53.2% of those with a bachelor’s degree. Panel C tabulates evidence on exactly how important a factor noncompetes appear to be, with 55.4% of those who report it would be a factor stating that a noncompete would be somewhat, very, or extremely important in their decision. Taken together, this evidence supports the claim that noncompete signers are declining offers from competitors at significant rates because of their noncompete.

Lastly, we explore why many employees view their noncompete as such an important barrier to their mobility. We begin in Columns (1) and (2) of Table 7 by asking why respondents who indicate that their employer was unaware of a competitor’s offer nevertheless attribute their choice to decline an offer to their noncompete status. The estimates in Column (2) suggest that individuals who know that their employer has sued a former employee over a noncompete are 16 percentage points more likely to report their noncompete as a factor in the decision to turn down a competitor’s offer. Furthermore, the estimates reveal that individuals who believe with certainty that their firm will sue them over their noncompete and that a court will enforce that agreement are 54 percentage points more likely to answer that a noncompete was a factor in the choice to turn down an offer. Importantly, employee beliefs about enforceability and the likelihood of the employee facing a lawsuit are much more predictive of a noncompete being considered a factor in refusing an offer than actual enforceability under state law, which is estimated to play a very small and statistically insignificant role.

The analysis reported in Columns (3) and (4) of Table 7 evaluates the same set of responses from employees with an employer that knows of the competitor’s job offer. Importantly, once made aware of an offer from a competitor, an employer has the option of intervening and reminding the employee of her obligations under the noncompete. In Column (3), ignoring at first this possibility of strategic “reminders,” we find as before that employees who believe that their employer will sue them and who also believe that a court will enforce their noncompete are more likely to report that their noncompete is a factor in the choice to turn down an offer. However, when we account for the fact that firms often remind employees of their noncompete upon hearing word of the offer (40% of the time), the coefficients on our belief

variables fall substantially while the coefficient on “reminding” is large at 39.1 percentage points (Column (4)). These observed coefficient and their counterparts in Column (3) imply two important conclusions: First, an employer’s simply reminding its employees of their noncompete status has a strong positive association with whether an employee will turn down an offer from a competitor. Second, employees reminded about their noncompete status are far more likely to believe that their employer will sue them or that a state will enforce the noncompete (in unreported analysis, about 28 percentage points higher on average).³⁸

5. Robustness

Although it is difficult to allay all worries about omitted variable bias or endogeneity in many of our regressions given our cross-sectional sample, our within-individual identification strategy as well as our direct evidence on mobility that we obtained through the survey make a strong case that noncompetes (when combined with employee beliefs) have a sizeable effect on mobility/redirection and that noncompetes operate on particular subprocesses or dimensions of mobility. In this section, we further examine the robustness of our analysis by testing the sensitivity of our results to various alternative scenarios.

If noncompete signers are by nature less mobile and hence more willing to sign noncompetition agreements, our analysis would produce a spurious correlation between noncompete status and longer tenures. We address this by incorporating baseline mobility levels as controls in our main specification, including indicator variables that correspond to the number of respondent’s employers in the last five years. A related concern is that noncompete signers may just happen to be at “better” employers (or that better employers are more likely to employ noncompetes) and that it is more difficult for firms to poach employees from good firms. To address this possibility, we control for inflow and outflow poaching rates (as estimated by the

³⁸ Only 21% of our sample reports receiving an offer from a competitor, so we used the same specification to test the robustness of this analysis by analyzing whether an employee’s noncompete would be a factor in a hypothetical case in which the employee received an offer from a competitor (i.e., the answer to question listed in Panel B of Table 6). The sample of respondents answering this question includes all noncompete signers (both reported and imputed). We find results similar to the estimates we report in Column (2) of Table 7 in that beliefs about the likelihood of a lawsuit and a court’s likelihood of enforcing the respondent’s noncompete are strongly positively associated with the choice to report that a noncompete is a factor in the choice to turn down an offer.

individual respondents) within the firm and also within the industry generally. Lastly, because noncompete signers may be more likely to possess trade secrets or have other valuable knowledge and that possession of this intellectual property may be the source of mobility limitations unrelated to noncompetition agreements, we also control for whether the respondent works with trade secrets, has clients, or may retain any client-specific information. Table 8 presents the results of each specification with these additional controls. Although some of our estimates fall in magnitude, the results overall remain remarkably stable.

Another explanation that might account for noncompete signers both staying longer and receiving more attention from poaching firms is that (1) search and recruitment efforts are directed toward the best employees and (2) there exists some degree of positive assortative matching. For example, high quality employers that develop valuable knowledge and attract talented employees are more likely to be targets for poaching and, in response to such poaching, are likely to use noncompetes. If high quality employees are more likely to stay at such firms (i.e., there is positive assortative matching), then our estimates of the impact of noncompetes may be confounded by such sorting. While controlling for firm size and poaching flows assists in controlling for firm quality, based on our observational results alone we cannot be certain that a combination of positive assortative matching and nonrandom search and recruitment explain our results. At the extreme, pure selection may completely explain the retention effect.

It is worth pointing out that our direct evidence on mobility is not subject to the identification concerns described above. Indeed, the most compelling evidence that noncompetes drive the relative lack of mobility, and not some unobserved correlate of noncompetes, is the fact that employees themselves systematically report that noncompetes are an important part of their decision not to accept an outside offer. Again, nearly half of the employees we surveyed indicate that their noncompete has been or would be a factor in declining actual or hypothetical future offers. This direct evidence on retention and offer refusals bolsters the credibility of the causal interpretation of our cross-sectional regression work on mobility mechanisms.

Critically, for these alternative endogeneity accounts to confound specifically our within-individual redirection estimates, very unlikely, but ultimately testable conditions must hold. For instance, if noncompete signers are more likely to work at better firms or better firms are more

likely to use noncompetes (and employees prefer not to leave good firms), it would have to be the case that better firms on average have employees who are relatively more likely to depart for noncompetitors, including firms in other industries, for our within-individual results to be unreliable. This strikes us as not impossible, but very implausible, given the magnitude of our findings. Likewise, if employers decide to ask only their most productive employees to sign noncompetes, and firms tend to treat their best employees well, reducing their mobility, these employees would need to be systematically more likely to depart for noncompetitors relative to the not-quite-so-good employees. As an employee's skillset is partially industry or occupation specific, we would be very surprised to learn that high-quality employees are relatively more likely to leave an occupation or industry when it particularly suits them.

To further establish the robustness of the relationship between noncompetes and employee mobility we identify, we assess the threat of potential selection on unobservables to our conclusions (Oster 2016, Altonji, Elder, and Taber 2005). Specifically, we calculate a term denoted δ that captures the extent of selection on unobservables (relative to the selection on observables) that would be required to drive the coefficient on the noncompete status variable to zero for a given maximum R-squared. A value greater than one (e.g., $\delta > 1$) indicates that selection on unobservables would have to be more important than selection on the observables in order for the treatment effect to disappear. By contrast, a value closer to zero reflects that just a small amount of selection on unobservables could reduce the treatment effect to zero. We include fine-grained controls for trade secrets and client access, poaching flows, prior mobility, and occupation by industry fixed effects, rendering it unlikely that selection on unobservables will be more important than selection on observables (e.g., $\delta < 1$).³⁹

These results are also presented in Table 8.⁴⁰ By and large, we estimate δ terms that are above one, and particularly so for the within-individual results. However, the recruitment and offer δ s are low, which suggests that a small amount of unobserved variation could drive those

³⁹ As suggested by Oster (2016), we set the maximum R-squared to be three times the observed R-squared, and run additional checks with the maximum set at two times the observed R-squared.

⁴⁰ In order to use the Oster's (2016) method with multiply imputed data, we had to use her command `psacalc` in each imputed dataset, giving us 25 different estimates for δ . We show the median of this distribution in Table 8.

effects to zero. This is somewhat reassuring, as it is hard to construct a story in which noncompetes causally drive increased attention from poaching firms. Overall, these results provide relatively strong evidence that noncompetes are exerting powerful effects on the mobility behavior of individuals, and that uncannily strong selection on unobservables (i.e., significant omitted variable bias) would be required to explain away their effects.⁴¹

6. Conclusion

Our empirical results evince a relatively straightforward explanation for why noncompetes are associated with reduced mobility and redirection to noncompetitors. In spite of the fact that noncompete signers receive significantly more recruiting attention and, ultimately, job offers from competitors and noncompetitors alike, employees bound by noncompetes appear more likely to turn down the offers they receive from competitors, in significant part because of their noncompete status. On balance, the consequences appear to be less mobility (longer tenure). We also find that noncompete signers and alternative employers respond to the noncompetes by redirecting their search and recruiting efforts so as to avoid perceived noncompete litigation risk, a behavioral response that results in noncompete signers receiving relatively more offers from noncompetitors.

This body of results has important implications for human resource management, the public policy debate around noncompetes, and even the discussion surrounding the supposed decline in labor market fluidity (Davis and Haltiwanger 2014, Decker et al. 2014). For employers evaluating their use of noncompetes, we find no evidence that noncompetes deter competitors from making offers to noncompete signers. We also find that both employers and poaching firms strategically redirect their search and recruitment efforts toward noncompetitors. Employers should be aware that noncompetes appear to work not because bound employees are isolated

⁴¹ For completeness and because of the policy focus on the effect of noncompetes on low-wage workers and those with fewer skills, we also show all of the main specification results for those without a bachelor's degree in Tables A1 and A2 in the Appendix. In general, those without a bachelor's degree are similarly retained and redirected relative to those with more than a bachelor's degree, yet they do not receive the same attention (i.e., recruitment, offers) from firms. Nevertheless, they report turning down offers because of the noncompete at similar rates and are more likely to report their noncompete was a reason for turning down a job offer from a competitor because of a belief about a lawsuit or a reminder from their employer about a noncompete.

from alternative opportunities, but because they (perhaps irrationally) believe their employer will succeed at enforcing the agreement. Moreover, we show that firms are likely able to affect those beliefs, simply by reminding employees of their noncompete agreement. To this end, they may also pursue strategic litigation (Ganco et al. 2015).

For policymakers, this work provides evidence that noncompete agreements themselves, independent of their enforceability under state law, reduce employee mobility. Given that noncompetes are just as prevalent in states that enforce noncompetes as in states that do not, policymakers contemplating reforming noncompete enforceability as a means to spur employee mobility may want to consider policies that function to limit the use of noncompetes themselves. Furthermore, the redirection of search and recruitment efforts toward noncompetitors also suggests that the “career detours” (Marx 2011) and brain drain (Marx et al. 2015) associated with noncompetes may be driven in part by a conscious reoptimization under the terms of the noncompete. Lastly, a combination of the facts that beliefs about enforceability matter so much for mobility decisions and that true enforceability varies significantly (Bishara 2011) intimates that there is significant scope for misinformation, manipulation, and poor decision making in this context. Employees may frequently decline employment offers they would have otherwise taken because they incorrectly believed their noncompete was enforceable. Indeed, employers have the power to affect these beliefs, simply by reminding employees of their noncompete.

Ultimately, this paper provides direct and substantial evidence that noncompetes reduce employee mobility, a fact which becomes disconcerting for some when one takes into account that noncompete signers – based on the extent to which firms recruit and offer them jobs – are some of the most sought after employees. Firms clearly have an incentive to retain such employees, but on the whole it may not be socially beneficial for courts to allow noncompetes to inhibit the mobility of society’s most valuable employees. Furthermore, truly negotiated noncompete agreements are very rare (Starr, Bishara, and Prescott 2016), suggesting that both negotiation costs are large and that employees are unlikely to carefully consider the terms of any noncompete. To develop a more complete picture of the welfare consequences of noncompetes, future research must better quantify career wage gains and losses associated with the use and enforcement of noncompete agreements.

References

- Altonji, Joseph, Todd Elder, and Chris Taber, 2005, "Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools." *Journal of Political Economy*, 113(1):151-184.
- Angrist, Joshua and Jorn-Steffen Pischke, 2008, *Mostly harmless econometrics: An empiricist's companion*, Princeton University Press.
- Atanasov, George, 2015. "Uncertain Future for Non-Compete Agreements in Massachusetts: Legislators Seek Compromise," *The National Law Review*, accessed at: <http://www.natlawreview.com/article/uncertain-future-non-compete-agreements-massachusetts-legislators-seek-compromise>
- Barnett, Jonathan and Ted Sichelman, "Revisiting Labor Mobility in Innovation Markets," Working paper accessed at <http://ssrn.com/abstract=2758854>.
- Barron, John, Mark Berger, and Dan Black, 2006. "Selective Counteroffers." *Journal of Labor Economics*, 24 (3): 385–409.
- Bishara, Norman, 2011. "Fifty Ways to Leave Your Employer: Relative Enforcement of Noncompete Agreements, Trends, and Implications for Employee Mobility Policy," *University of Pennsylvania Journal of Business Law*, 13, 751–795.
- Bishara, Norman and Evan Starr, 2016. "The Incomplete Noncompete Picture." Working Paper.
- Blake, Harlan, 1960. "Employee Agreements Not to Compete," *Harvard Law Review*, 73: 625.
- Bloom, Nick and John Van Reenen, 2007. "Measuring and Explaining Management Practices Across Firms and Countries." *Quarterly Journal of Economics*, 122(7):1351-1408.
- Bloom Nick, John Schankerman, and John Van Reenen, 2013, "Identifying Technology Spillovers and Product Market Rivalry," *Econometrica*, 81(4):1347–1393
- Burdett, Ken and Mortensen, Dale, 1998. "Wage differentials, employer size, and unemployment." *International Economic Review*, 39(2), pp. 257–73.
- Campbell, Benjamin, Martin Ganco, April Franco, and Rajshree Agarwal, 2012. "Who leaves, where to, and why worry? Employee mobility, entrepreneurship and effects on source firm performance," *Strategic Management Journal*, 33(1):65-87.
- Callahan, Maureen, 1985, "Post-Employment Restraint Agreements: A Reassessment," *The University of Chicago Law Review*, pp. 703–728.
- Davis, Steven and John Haltiwanger, 2014. "Labor Market Fluidity and Economic Performance." Accessed at <http://faculty.chicagobooth.edu/steven.davis/pdf/LaborFluidityandEconomicPerformance26November2014.pdf>.
- Decker, Ryan and John Haltiwanger, Ron Jarmin, and Javier Miranda, 2014. "The Secular Decline in Business Dynamism in the U.S." Working Paper accessed at https://dl.dropboxusercontent.com/u/34885172/website/DHJM_6_2_2014.pdf.
- Depillis, Lydia, 2015. "Can the Senate stop low-wage employers from tying up employees with non-competes?" Washington Post. Accessed at

- <http://www.washingtonpost.com/blogs/wonkblog/wp/2015/06/02/can-the-senate-stop-low-wage-employers-from-tying-up-their-employees-with-non-competes/>.
- Doniger, Cynthia, 2015. "Wage dispersion with heterogeneous wage contracts," Working paper, accessed at <https://sites.google.com/site/donigerc/research>.
- Fallick, Bruce, Charles Fleischman, and James Rebitzer, 2006. "Job-Hopping in Silicon Valley: Some Evidence Concerning the Microfoundations of a High-Technology Cluster." *The Review of Economics and Statistics* 88(3): 472-481.
- Ganco, Martin, Rosemarie Ziedonis, and Rajshree Agarwal, 2015. "More Stars Stay, But the Brightest Ones Still Leave: Job Hopping in the Shadow of Patent Enforcement." *Strategic Management Journal*, 36(5):659-685.
- Garmaise, Mark, 2011. "Ties that Truly Bind: Noncompete Agreements, Executive Compensation, and Firm Investment." *Journal of Law, Economics, and Organization* 27(2): 376-425.
- Gilson, Ronald, 1999. "The Legal Infrastructure of High Technology Industrial Districts: Silicon Valley, Route 128, and Covenants Not to Compete." *New York University Law Review* 74:575-629.
- Greenhouse, Steven, 2014. "Noncompete Clauses Increasingly Pop Up in Array of Jobs", New York Times. Accessed at http://www.nytimes.com/2014/06/09/business/noncompete-clauses-increasingly-pop-up-in-array-of-jobs.html?_r=0.
- Heggedal, Tom-Reiel, Espen Moen, Edgar Preugschat, 2013. "Productivity Spillovers Through Labor Mobility," Working Paper.
- Hsu, David, Iwan Barankay, and Andrea Contigiani, 2015. "The Inevitable Disclosure Doctrine and Innovation," Working paper.
- Jacobson, Louis, Robert LaLonde, and Daniel Sullivan, 1993. "Earnings Losses of Displaced Workers." *The American Economic Review*, 83(4): 685-709.
- Jaffe, Adam, Manuel Trajtenberg, and Rebecca Henderson, 1993. "Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations," *The Quarterly Journal of Economics*, 108(3):577-598.
- King, Gary, James Honaker, Anne Joseph, and Kenneth Scheve, 2001. "Analyzing Incomplete Political Science Data: An Alternative Algorithm for Multiple Imputation." *American Political Science Review*, 95(1).
- Lazear, Edward, 1981. "Agency, Earnings Profiles, Productivity, and Hours Restrictions." *The American Economic Review*, Vol. 71(4):606-620.
- Lavetti, Kurt, Carol Simon and William White, 2015. "Buying Loyalty: Theory and Evidence from Physicians." Working paper.
- Lobel, Orly, 2014. *Talent Wants to Be Free*. Yale University Press, New Haven and London.
- Manning, Alan, *Monopsony in Motion*, Princeton University Press Princeton, 2003.
- Marx, Matt, 2011. "The Firm Strikes Back: Non-compete Agreements and the Mobility of Technical Professionals." *American Sociological Review* 76(5): 695-712.

- Marx, Matt, Deborah Strumsky and Lee Fleming, 2009. "Mobility, Skills, and the Michigan Noncompete Experiment." *Management Science* 55(6):875-889.
- Marx, Matt, Jasjit Singh and Lee Fleming, 2015. "Regional disadvantage? Employee non-compete agreements and brain drain." *Research Policy* 44: 394-404.
- McGaugh, Joe, 2015. "HB 597: Prohibits covenants not to compete for STEM employees in STEM jobs," Accessed at <http://house.mo.gov/billtracking/bills151/billpdf/intro/HB0597I.PDF> .
- Mendelson, Jessica and Robert Milligan, 2013. "New Jersey legislators propose banning non-compete agreements with employees who can claim unemployment." Accessed at <http://www.lexology.com/library/detail.aspx?g=1431bba7-5e40-4863-8a12-d4b7c554a130>
- Moen, Jarle, 2005. "Is Mobility of Technical Personnel a Source of R&D Spillovers?" *Journal of Labor Economics*, 23(1):81-114.
- Moscarini, Giuseppe, 2008. "Job-to-Job Quits and Corporate Culture," Working paper accessed at <http://www.econ.yale.edu/~gm76/quits.pdf>.
- Naidu, Suresh, 2010. "Recruitment Restrictions and Labor Markets: Evidence from the Post-Bellum U.S. South," *Journal of Labor Economics*. Vol. 28 (2): 413-445.
- Naidu, Suresh and Noam Yuchtman, 2013. "Coercive Contract Enforcement: Law and the Labor Market in 19th Century Industrial Britain" *American Economic Review* 103(1):107-144
- Olson, Daniel, 2016, "Compensation diffusion through multi-location firms," Working paper accessed at <http://www.danielolson.info/>.
- Oster, Emily, 2016. "Unobservable Selection and Coefficient Stability: Theory and Evidence." Forthcoming at *Journal of Business Economics and Statistics*.
- Png, Ivan, 2012. "Trade Secrets, Non-Competes, and Inventor Mobility: Empirical Evidence," Working paper accessed at https://www.researchgate.net/publication/228133023_Trade_Secrets_Non-Competes_and_Mobility_of_Engineers_and_Scientists_Empirical_Evidence .
- Png, Ivan, 2015. "Law and Innovation: Evidence from State Trade Secrets Laws," Working paper accessed at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1755284 .
- Png, Ivan and Sampsa Samila, 2015. "Trade Secrets Law and Mobility: Evidence from 'Inevitable Disclosure'," Working paper accessed at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1986775 .
- Postel-Vinay, Fabien, and Jean-Marc Robin, 2002. "Equilibrium Wage Dispersion with Worker and Employer Heterogeneity". *Econometrica*, 70(6): 2295–2350.
- Postel-Vinay, F. and J.-M. Robin, 2004, "To Match Or Not To Match? Optimal Wage Policy with Endogenous Worker Search Intensity," *Review of Economic Dynamics*, 7(2), 297-331.
- Prescott, J.J., Norman Bishara and Evan Starr, 2016, "Understanding Noncompetition Agreements: The 2014 Noncompete Survey Project." *Michigan State Law Review*, p. 369-464.

- Rogerson, Richard, Robert Shimer, and Randall Wright, 2005. "Search-Theoretic Models of the Labor Market: A Survey." *Journal of Economic Literature* 43: 959-988.
- Samila, Sampsa and Olav Sorenson, 2011. "Noncompete Covenants: Incentives to Innovate or Impediments to Growth." *Management Science* 57(3):425-438.
- Saxenian, Annalee, 1994. *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Harvard University Press.
- Schaefer, Scott, 2013, "To Work or Not to Work – Maryland’s Senate Considers Changes To Non-Compete Law for Those on Unemployment" *Trading Secrets Blog*, Accessed at <http://www.tradesecretslaw.com/2013/01/articles/restrictive-covenants/to-work-or-not-to-work-marylands-senate-considers-changes-to-non-compete-law-for-those-on-unemployment/>
- Shinn, Jason, 2015. "Proposal Would Significantly Limit Use of Noncompete Agreements in Michigan." *Michigan Employment Law Advisor*, accessed at: <http://www.michiganemploymentlawadvisor.com/employment-agreements/noncompete-agreements/proposal-would-significantly-limit-use-of-noncompete-agreements-in-michigan/>
- Stanford, Derek, 2015. "Restricting noncompetition agreements." *Washington State Legislature*, accessed at <http://app.leg.wa.gov/billinfo/summary.aspx?bill=1926&year=2015>
- Starr, Evan, 2016. "Consider This: Firm-Sponsored Training and the Enforceability of Covenants Not to Compete." Working Paper accessed at <https://sites.google.com/site/starrevan/research>.
- Starr, Evan, Martin Ganco, and Benjamin Campbell, 2016. "Redirect and Retain: How Firms Capitalize on Noncompete Enforceability in Business and Technical Occupations," Working paper accessed at <https://sites.google.com/site/starrevan/research>.
- Starr, Evan and Norman Bishara, 2016. "The Incomplete Noncompete Picture." *Lewis and Clark Law Review*, 20:497–546. Accessed at <https://sites.google.com/site/starrevan/research>.
- Starr, Evan, Natarajan Balasubramanian, Mariko Sakakibara, 2016. "Screening Spinouts? How Noncompete Enforceability Affects the Creation, Growth, and Survival of New Firms." *Management Science* (Forthcoming). Accessed at <https://sites.google.com/site/starrevan/research>.
- Starr, Evan, Norman Bishara, and James Prescott, 2016. "Noncompetes in the U.S. Labor Force." Working paper accessed at <https://sites.google.com/site/starrevan/research>.
- Sterk, Stewart, 1993, "Restraints on Alienation of Human Capital," *Virginia Law Review*, pp. 383–460.
- Stuart, Toby and Olav Sorenson, 2003. "Liquidity Events and the Geographic Distribution of Entrepreneurial Activity." *Administrative Science Quarterly*, 48: 175-201.
(Enforceability reduces startup behavior following liquidity events).
- Topel, Robert and Michael Ward, 1992. "Job Mobility and the Careers of Young Men." *Quarterly Journal of Economics*, 107(2):439-479.

- Treasury, U.S. Department of the, 2016. “Non-compete Contracts: Economic Effects and Policy Implications.” Accessed at <https://www.treasury.gov/resource-center/economic-policy/Documents/UST%20Non-competes%20Report.pdf>.
- White House, 2016. “Non-Compete Agreements: Analysis of the Usage, Potential Issues, and State Responses.” Accessed at https://www.whitehouse.gov/sites/default/files/non-competes_report_final2.pdf.
- Younge, Kenneth, Tony Tong and Lee Fleming, 2014. “How anticipated employee mobility affects acquisition likelihood: Evidence from a natural experiment.” *Strategic Management Journal* 36(5): 686-708.
- Younge, Kenneth and Matt Marx, Forthcoming, 2013. “The Value of Employee Retention: Evidence from a Natural Experiment.” Working Paper.
- Zillman, Claire, 2015, “Hawaii ban on noncompetes leaves out a huge chunk of employees.” *Fortune*, accessed at: <http://fortune.com/2015/07/08/hawaii-noncompete-ban/> .

Table 1: Summary Statistics

Sample Statistic	All Mean	All SD	NC Mean	No NC Mean	Difference Mean
Tenure (Years)	6.56	7.26	7.00	6.48	0.52
1(Would never leave employer)	0.08	0.28	0.11	0.08	0.04**
Ln (Required Competitor Wage Premium)	2.92	0.94	3.07	2.89	0.18***
P(Leave for a competitor)	12.70	21.94	12.05	12.84	-0.79
P(Leave for a noncompetitor)	19.96	29.11	20.96	19.74	1.22
Search effort towards competitor (0-10)	2.69	3.05	2.76	2.67	0.09
Search effort towards noncompetitor (0-10)	3.34	3.33	3.73	3.26	2.67***
1(Recruited by competitor in last year)	0.21	0.40	0.29	0.19	0.10***
1(Recruited by noncompetitor in last year)	0.25	0.43	0.38	0.22	0.15***
1(Competitor offer in last year)	0.10	0.30	0.15	0.09	0.06***
1(Noncompetitor offer in last year)	0.12	0.32	0.17	0.10	0.06***
1(Competitor offer while employed)	0.21	0.41	0.28	0.19	0.09***
1(Noncompetitor offer while employed)	0.25	0.44	0.36	0.23	0.13***
1(Firm aware of competitor offer)	0.37	0.48	0.36	0.38	-0.02
1(Firm aware of noncompetitor offer)	0.34	0.48	0.38	0.33	0.04
1(Firm raises wage responding to competitor offer)	0.47	0.50	0.52	0.46	0.06
1(Firm raises wage responding to noncompetitor offer)	0.34	0.47	0.43	0.31	0.12**
P(Firm will sue if leave for competitor)	38.44	35.83	37.88	38.57	-0.69
P(Court would enforce noncompete)	42.94	37.48	41.01	43.37	-2.36
1(Knows firm sued others re: noncompete)	0.06	0.24	0.20	0.03	0.16***

Note: 'NC' stands for noncompete. Standard errors for the differences between the noncompete signing group (NC) and the no noncompete group (No NC) are clustered at the state level. 18.1% of the sample has currently signed a noncompete, and 38.1% have ever signed one. See Starr, Bishara, and Prescott (2016) for more details on who signs noncompetes.

Table 2: How Has a Noncompete Affected Your Choice to Stay at or Leave an Employer?

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A: Noncompetes and the Choice to Stay</i>							
	Delayed Leaving	Stayed out of fear of lawsuit	Companies wouldn't hire due to noncompete	Stayed b/c felt obligated not to compete	Paid more money to stay	Negotiated scope or waiver	
< Bachelor's	11.7%	5.3%	6.1%	5.9%	3.9%	1.2%	
Bachelor's	11.8%	6.3%	6.3%	8.8%	7.6%	4.0%	
>Bachelor's	12.4%	7.2%	6.5%	9.3%	8.6%	5.1%	
Overall	11.8%	5.9%	6.2%	7.3%	5.7%	2.6%	
<i>Panel B: Noncompetes and the Choice to Leave</i>							
	Left the industry	Left, waited for expiration, then joined competitor	Joined competitor who could protect from lawsuit	Tried to prevent prior employer from learning	Moved locations	Went to School	Never Been a Factor in Choice to Leave
< Bachelor's	11.6%	5.4%	2.6%	2.1%	1.8%	2.0%	69.8%
Bachelor's	12.2%	7.6%	3.3%	2.2%	2.6%	2.3%	67.1%
>Bachelor's	11.0%	10.2%	4.7%	3.0%	4.4%	4.8%	59.3%
Overall	11.7%	6.8%	3.1%	2.3%	2.4%	2.6%	67.4%

Note: Numbers are percentages conditional on education category. Responses are only for those who report ever signing a noncompete (not including those who were imputed to have ever signed).

Table 3: Redirection and Retention

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A: Competitor-Specific Wedges and Tenure</i>						
<i>Dependent Variable</i>	<i>1 (Will Never Move to a Competitor)</i>		<i>Ln (Required Competitor Wage Premium)</i>		<i>Tenure</i>	
Noncompete (NC)	0.049*** (0.017)	0.052*** (0.017)	0.186*** (0.050)	0.171*** (0.042)	0.518** (0.248)	0.473** (0.221)
NC*Enforceability		0.012 (0.009)		-0.053*** (0.017)		-0.186 (0.145)
Observations	11,505	11,505	10,689	10,689	11,505	11,505
<i>Panel B: Subjective Probability of Leaving in the Next Year</i>						
<i>Dependent Variable</i>	<i>P(Leave Competitor)</i>		<i>P(Leave Noncompetitor)</i>		<i>P(Leave Competitor)- P(Leave Noncompetitor)</i>	
Noncompete (NC)	-2.568*** (0.848)	-2.540*** (0.830)	0.705 (1.369)	0.828 (1.363)	-3.273** (1.339)	-3.368** (1.390)
NC*Enforceability		0.124 (0.498)		0.518 (0.862)		-0.394 (0.647)
Observations	11,505	11,505	11,505	11,505	11,505	11,505
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the state level. Independent variables include a dummy for gender, education, occupation (2 digit SOC) by industry (2 digit NAICS) fixed effects, firm-size and multi-state firm dummies, hours worked per week, weeks worked per year, their interaction, a third degree polynomial in age and state fixed effects (which subsume the main effect of noncompete enforceability).

Table 4: Process of Receiving an Offer

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A: Recruitment</i>						
<i>Dependent Variable</i>	<i>1 (Recruited by a competitor in last year)</i>		<i>1 (Recruited by noncompetitor in last year)</i>		<i>Recruited(Competitor)-Recruited(Noncompetitor)</i>	
Noncompete (NC)	0.060*** (0.016)	0.057*** (0.016)	0.113*** (0.018)	0.111*** (0.019)	-0.053*** (0.016)	-0.054*** (0.016)
NC*Enforceability		-0.012* (0.006)		-0.008 (0.009)		-0.004 (0.008)
<i>Panel B: On-the-job search</i>						
<i>Dependent Variable</i>	<i>Competitor search effort (0-10) in last year</i>		<i>Noncompetitor search effort in last year (0-10)</i>		<i>Search (competitor) - Search (noncompetitor)</i>	
Noncompete (NC)	-0.111 (0.119)	-0.124 (0.121)	0.399*** (0.125)	0.407*** (0.127)	-0.509*** (0.120)	-0.531*** (0.116)
NC*Enforceability		-0.056 (0.064)		0.034 (0.059)		-0.089 (0.054)
<i>Panel C: Offers in the last year</i>						
<i>Dependent Variable</i>	<i>1 (Offer from competitor in last year)</i>		<i>1 (Offer from noncompetitor in last year)</i>		<i>Offer(competitor) - Offer(noncompetitor)</i>	
Noncompete (NC)	0.043*** (0.013)	0.043*** (0.013)	0.047** (0.019)	0.051*** (0.017)	-0.004 (0.018)	-0.008 (0.016)
NC*Enforceability		-0.001 (0.005)		0.016** (0.006)		-0.017** (0.007)
<i>Panel D: Offers while employed</i>						
<i>Dependent Variable</i>	<i>1 (Competitor offer while employed)</i>		<i>1 (Noncompetitor offer while employed)</i>		<i>Offer(competitor) - Offer(noncompetitor)</i>	
Noncompete (NC)	0.060*** (0.016)	0.057*** (0.016)	0.096*** (0.020)	0.095*** (0.021)	-0.035* (0.020)	-0.037* (0.021)
NC*Enforceability		-0.013* (0.007)		-0.004 (0.011)		-0.010 (0.009)
Observations	11,505	11,505	11,505	11,505	11,505	11,505
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the state level. Independent variables include a dummy for gender, education, occupation (2 digit SOC) by industry (2 digit NAICS) fixed effects, firm-size and multi-state firm dummies, hours worked per week, weeks worked per year, their interaction, a third degree polynomial in age and state fixed effects (which subsume the main effect of noncompete enforceability).

Table 5: Awareness and Counteroffering

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A: Employer is aware of the offer</i>						
<i>Dependent Variable</i>	<i>1 (Employer aware of offer from competitor)</i>		<i>1 (Employer aware of offer from noncompetitor)</i>		<i>Aware (Competitor) - Aware (Noncompetitor)</i>	
Noncompete (NC)	0.006 (0.034)	0.005 (0.034)	0.051 (0.031)	0.051 (0.032)	-0.052 (0.034)	-0.061* (0.035)
NC*Enforceability		-0.003 (0.015)		0.001 (0.013)		-0.027** (0.012)
Observations	2,575	2,575	3,077	3,077	1,639	1,639

Panel B: Employer responds to offer by raising wage

<i>Dependent Variable</i>	<i>1 (Raise wages in response to competitor offer)</i>		<i>1 (Raise wages in response to noncompetitor offer)</i>		<i>Raise wage(competitor) - Raise wage(noncompetitor)</i>	
Noncompete (NC)	-0.015 (0.064)	-0.021 (0.067)	0.068 (0.053)	0.052 (0.052)	-0.065 (0.120)	-0.055 (0.106)
NC*Enforceability		-0.025 (0.027)		-0.046** (0.020)		0.073* (0.039)
Observations	915	915	1,024	1,024	470	470
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the state level. Independent variables include a dummy for gender, education, occupation (2 digit SOC), industry (2 digit NAICS), firm-size, multi-state firm, hours worked per week, weeks worked per year, their interaction, a third degree polynomial in age and state fixed effects (which subsume the main effect of noncompete enforceability).

Table 6: Turning Down Job Offers

<i>Sample</i>	(1) All	(2) Without a BA	(3) With a BA
<i>Panel A: Was your noncompete a factor in your choice to turn down your offer from a competitor?</i>			
Yes	41.4%	40.0%	42.5%
<i>Panel B: If you received an offer from a competitor, would your noncompete be a factor in your choice to accept it?</i>			
Yes	47.7%	42.9%	53.2%
<i>Panel C: How important is your noncompete in determining if you leave for a competitor?</i>			
Not at all important	9.3%	9.8%	8.8%
Very Unimportant	6.3%	6.1%	6.5%
Somewhat unimportant	6.4%	6.2%	6.6%
Neither important nor unimportant	22.7%	25.7%	19.9%
Somewhat important	20.9%	18.5%	23.2%
Very important	17.3%	15.1%	19.4%
Extremely important	17.1%	18.7%	15.7%
Somewhat or Very or Extremely Important	55.4%	52.3%	58.2%

Note: Panel A includes individuals who report signing a noncompete and received an offer from a competitor while employed. Panel B is a hypothetical question and includes all individuals who have either reported signing or been imputed to have signed. Panel C, like Panel B, includes all individuals who either reported signing or were imputed to sign.

Table 7: Why do some turn down offers because of the noncompete but not others?*Dependent Variable: 1 (Noncompete a factor in turning down actual/hypothetical offer from competitor)*

<i>Condition of offer:</i>	(1) <i>Employer is unaware of offer from competitor</i>	(2) <i>Employer is aware of offer from competitor</i>	(3) <i>Employer is aware of offer from competitor</i>	(4) <i>Employer is aware of offer from competitor</i>	(5) <i>Hypothetical offer from competitor</i>	(6) <i>Hypothetical offer from competitor</i>
Reminded of noncompete				0.391*** (0.073)		
Employer Sued	0.159* (0.091)	0.157* (0.092)	0.204** (0.091)	0.146* (0.083)	0.075 (0.046)	0.075 (0.046)
P(Sued)	0.256* (0.133)	0.265** (0.129)	0.289** (0.120)	0.176* (0.092)	0.241*** (0.072)	0.238*** (0.072)
P(Enforced)	0.289** (0.131)	0.283** (0.127)	0.310** (0.146)	0.156 (0.147)	0.355*** (0.092)	0.357*** (0.091)
Enforceability		-0.010 (0.017)	-0.050** (0.023)	-0.040* (0.021)		0.007 (0.009)
Observations	205	205	363	363	2261	2261
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: *** p<0.01, ** p<0.05, * p<0.1. Results are from a linear probability model. Standard errors are clustered at the state level. Independent variables include a dummy for gender, education, occupation (2 digit SOC), industry (2 digit NAICS), firm-size, multi-state firm, hours worked per week, weeks worked per year, their interaction, a third degree polynomial in age.

Table 8: Robustness Checks

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A:</i>	<i>Search Effort (0-10) last year towards</i>			<i>I (Recruited in the last year by)</i>		
	<i>Competitor</i>	<i>Noncompetitor</i>	Δ	<i>Competitor</i>	<i>Noncompetitor</i>	Δ
Noncompete (NC)	-0.105 (0.119)	0.419*** (0.119)	-0.524*** (0.114)	0.031** (0.015)	0.085*** (0.018)	-0.054*** (0.017)
NC*Enforceability	-0.039 (0.064)	0.038 (0.057)	-0.076 (0.057)	-0.013** (0.006)	-0.010 (0.008)	-0.003 (0.008)
Median R^2	0.166	0.179	0.140	0.189	0.170	0.101
$\delta_{NC}(R^2_{\max} = \min\{1, 2*R^2\})$	[0.46]	[4.90]	[2.76]	[0.45]	[1.14]	[6.69]
$\delta_{NC}(R^2_{\max} = \min\{1, 3*R^2\})$	[0.23]	[2.52]	[1.51]	[0.23]	[0.62]	[3.47]
<i>Panel B:</i>	<i>I (Offer in the last year from)</i>			<i>I (Offer while employed from)</i>		
	<i>Competitor</i>	<i>Noncompetitor</i>	Δ	<i>Competitor</i>	<i>Noncompetitor</i>	Δ
Noncompete (NC)	0.025* (0.013)	0.037** (0.017)	-0.012 (0.016)	0.030** (0.015)	0.069*** (0.021)	-0.038* (0.021)
NC*Enforceability	-0.001 (0.006)	0.015** (0.006)	-0.016** (0.007)	-0.015** (0.007)	-0.007 (0.010)	-0.008 (0.009)
Median R^2	0.148	0.136	0.091	0.173	0.132	0.101
$\delta_{NC}(R^2_{\max} = \min\{1, 2*R^2\})$	[0.78]	[1.39]	[1.30]	[0.51]	[1.04]	[20.80]
$\delta_{NC}(R^2_{\max} = \min\{1, 3*R^2\})$	[0.40]	[0.72]	[0.65]	[0.26]	[0.56]	[10.81]
<i>Panel C:</i>	<i>I (Employer aware of offer from)</i>			<i>I (Raise wage in response to offer from)</i>		
	<i>Competitor</i>	<i>Noncompetitor</i>	Δ	<i>Competitor</i>	<i>Noncompetitor</i>	Δ
Noncompete (NC)	0.001 (0.033)	0.046 (0.031)	-0.064* (0.035)	-0.024 (0.064)	0.073 (0.052)	-0.113 (0.090)
NC*Enforceability	-0.002 (0.016)	0.003 (0.013)	-0.033** (0.012)	-0.036 (0.028)	-0.049** (0.019)	0.044 (0.038)
Median R^2	0.263	0.254	0.386	0.501	0.537	0.634
$\delta_{NC}(R^2_{\max} = \min\{1, 2*R^2\})$	[0.35]	[9.87]	[1.65]	[0.28]	[0.73]	[16.64]
$\delta_{NC}(R^2_{\max} = \min\{1, 3*R^2\})$	[0.40]	[5.09]	[1.07]	[0.28]	[0.73]	[16.64]
Original controls	Yes	Yes	Yes	Yes	Yes	Yes
No. employers last 5 yrs	Yes	Yes	Yes	Yes	Yes	Yes
Confidential info FE	Yes	Yes	Yes	Yes	Yes	Yes
Poaching in/outflow	Yes	Yes	Yes	Yes	Yes	Yes
Industry poach freq.	Yes	Yes	Yes	Yes	Yes	Yes

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors clustered at state level. All specifications include the original controls, plus controls for trade secrets, clients, and client info; the number of prior employees in the last five years; how frequently individuals move across the industry to competitors, an employer hires from a competitor, and people leave to competitors. The δ term captures the proportion of selection on unobservables relative to the selection on observables necessary to reduce the main noncompete effect to zero, given the maximum R^2 provided in parentheses (Oster 2016), and is calculated for each imputed dataset, with the median absolute value reported.

Appendix

Figure A1: The Process of Employee Mobility

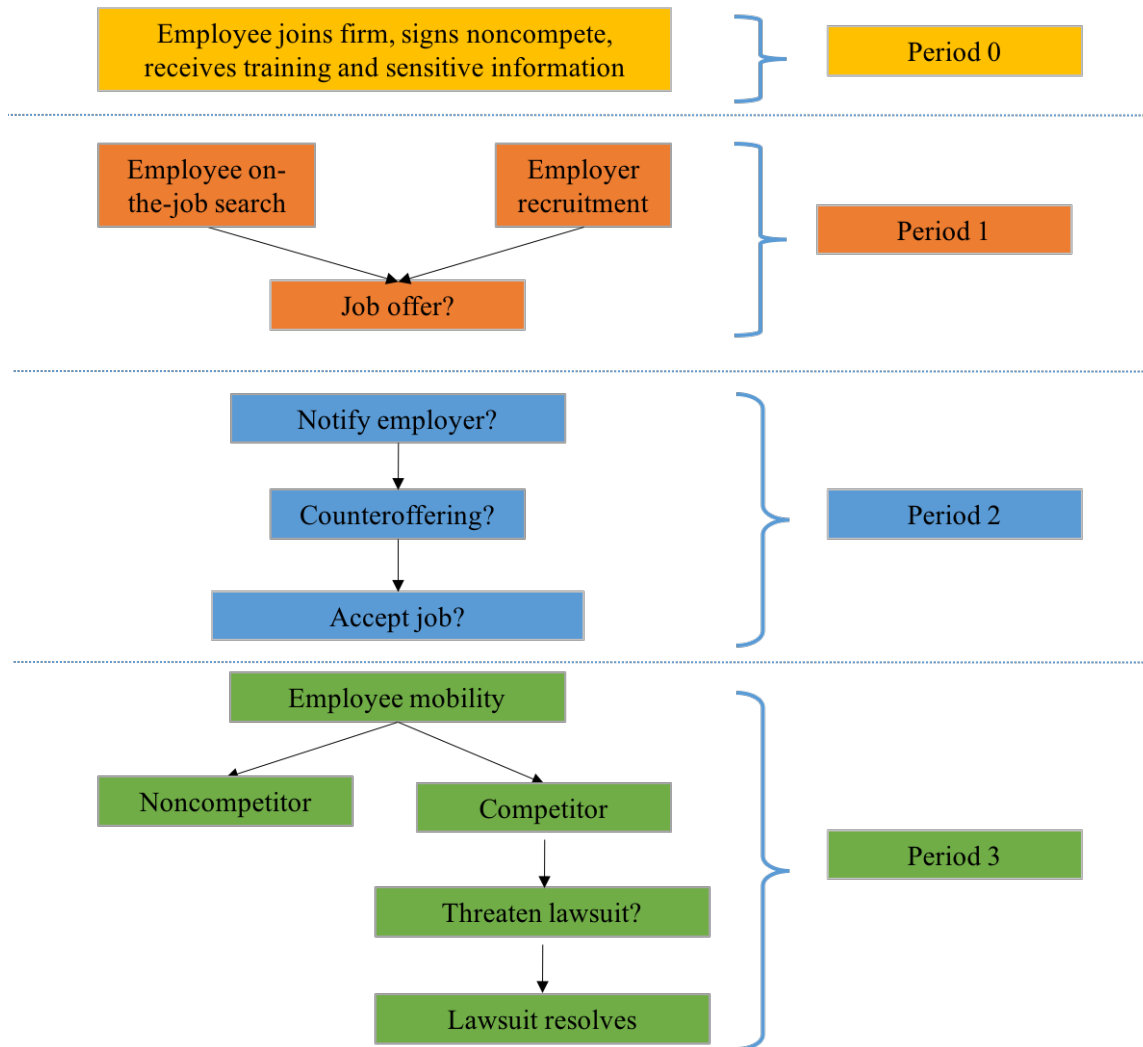


Table A1: Results for those without a Bachelor's Degree

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A</i>	<i>Search Effort (0-10) last year towards:</i>			<i>I (Recruited in the last year by)</i>		
	<i>Competitor</i>	<i>Noncompetitor</i>	Δ	<i>Competitor</i>	<i>Noncompetitor</i>	Δ
Noncompete (NC)	-0.145 (0.184)	0.400* (0.205)	-0.545** (0.205)	0.022 (0.023)	0.111*** (0.025)	-0.089*** (0.028)
NC*Enforceability	0.043 (0.108)	0.056 (0.122)	-0.012 (0.112)	0.003 (0.014)	-0.013 (0.014)	0.016 (0.016)
Observations	5,487	5,487	5,487	5,487	5,487	5,487
<i>Panel B</i>	<i>I (Offer in the last year from)</i>			<i>I (Offer while employed from)</i>		
	<i>Competitor</i>	<i>Noncompetitor</i>	Δ	<i>Competitor</i>	<i>Noncompetitor</i>	Δ
Noncompete (NC)	0.011 (0.019)	0.033 (0.023)	-0.022 (0.024)	0.016 (0.023)	0.074** (0.029)	-0.057* (0.031)
NC*Enforceability	0.014 (0.009)	0.026** (0.010)	-0.012 (0.013)	-0.014 (0.019)	-0.010 (0.017)	-0.003 (0.019)
Observations	5,487	5,487	5,487	5,487	5,487	5,487
<i>Panel C</i>	<i>I (Employer aware of offer from)</i>			<i>I (Raise wage in response to offer from)</i>		
	<i>Competitor</i>	<i>Noncompetitor</i>	Δ	<i>Competitor</i>	<i>Noncompetitor</i>	Δ
Noncompete (NC)	0.056 (0.053)	0.067 (0.053)	-0.113* (0.062)	-0.156 (0.119)	0.029 (0.093)	0.024 (0.268)
NC*Enforceability	0.017 (0.044)	-0.006 (0.028)	-0.003 (0.035)	-0.090 (0.067)	-0.063 (0.047)	-0.308 (0.212)
Observations	1,117	1,366	671	405	479	200
Original controls	Yes	Yes	Yes	Yes	Yes	Yes
No. employers last 5 yrs	Yes	Yes	Yes	Yes	Yes	Yes
Confidential info FE	Yes	Yes	Yes	Yes	Yes	Yes
Poaching in/outflow	Yes	Yes	Yes	Yes	Yes	Yes
Industry poach freq.	Yes	Yes	Yes	Yes	Yes	Yes

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the state level. Independent variables include the initial controls: a dummy for gender, education, occupation (2 digit SOC), industry (2 digit NAICS), firm-size, multi-state firm, hours worked per week, weeks worked per year, their interaction, a third degree polynomial in age and state fixed effects (which subsume the main effect of noncompete enforceability). All models also include controls for trade secrets, clients, and client info, controls for the number of prior employees in the last five years, controls for how frequently individuals move across the industry to competitors, how frequently their employer hires from a competitor, and how frequently people leave to competitors.

Table A2: Why do some turn down offers because of the noncompete but not others?*Dependent Variable: 1 (Noncompete a factor in turning down actual or hypothetical offer from competitor)**Sample: Those without a Bachelor's degree*

<i>Condition of offer:</i>	(1) <i>Employer is unaware of offer from competitor</i>	(2) <i>Employer is unaware of offer from competitor</i>	(3) <i>Employer is aware of offer from competitor</i>	(4) <i>Employer is aware of offer from competitor</i>	(5) <i>Hypothetical offer from competitor</i>	(6) <i>Hypothetical offer from competitor</i>
Reminded of noncompete				0.421* (0.219)		
Employer Sued	0.117 (0.222)	0.118 (0.224)	0.372 (0.257)	0.410* (0.216)	0.050 (0.082)	0.047 (0.081)
P(Sued)	0.683** (0.258)	0.760** (0.280)	0.170 (0.261)	-0.018 (0.322)	0.221** (0.106)	0.202** (0.101)
P(Enforced)	-0.214 (0.189)	-0.258 (0.199)	0.320* (0.166)	0.033 (0.164)	0.384*** (0.103)	0.395*** (0.101)
Enforceability		-0.054 (0.044)	-0.052 (0.107)	-0.111 (0.092)		0.028* (0.016)
Observations	103	103	68	68	804	804

Notes: *** p<0.01, ** p<0.05, * p<0.1. Results are from a linear probability model. Standard errors are clustered at the state level. Independent variables include a dummy for gender, education, occupation (2 digit SOC), industry (2 digit NAICS), firm-size, multi-state firm, hours worked per week, weeks worked per year, their interaction, a third degree polynomial in age.