Why are Low-Wage Workers Signing Noncompete Agreements?

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Policymakers are concerned by evidence that noncompete agreements (NCAs) are widely used in low-wage jobs. We show that firms that would otherwise not use NCAs are induced to use one in the presence of frictions to adjusting wages downward. Using a new survey of salon owners, we find that declines in the terms of trade for employees and increases in the minimum wage lead to higher NCA use, but only at firms for which the employee’s cost of an NCA likely exceeds the employer’s benefit. Furthermore, minimum wage increases have a negative effect on employment only where NCAs are unenforceable.

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I. Introduction

When a new worker receives his or her employment contract, it may include a noncompete agreement (hereafter, NCA). NCAs contractually limit a worker’s ability to enter into a professional position in competition with his or her employer in the event of a job separation. More broadly, NCAs are one example of actions employers take to restrict competition in the labor market (Krueger and Ashenfelter 2018; Manning 2011). Indeed, 18% of the workforce was bound by an NCA in 2014 (Starr, Prescott, and Bishara 2019). NCAs may provide benefits to employers, for example by mitigating hold-up problems that distort investment in assets like general human capital training, trade secrets, or client lists (Grossman and Hart 1986), but they may impose significant costs on workers by limiting their ability to pursue outside employment opportunities. The Coase theorem (Coase 1960) implies that firms will use NCAs when the employer’s net benefit exceeds the employee’s net cost.

Recent evidence suggests that this theory alone cannot fully explain NCA use. NCAs are most prevalent in higher-skill, knowledge intensive industries and occupations in which assets like training and trade secrets are often important in production; in these environments, the Coasian explanation has intuitive appeal due to the high returns from mitigating the hold-up problem. However, NCAs are also frequently used in many traditionally lower-paying, lower-skill occupations,\(^1\) even among fast food workers.\(^2\) The Coasian explanation loses much of its appeal in these settings: many have questioned whether NCAs could possibly bring benefits to these relationships that outweigh the costs to workers. Furthermore, there is anecdotal evidence that use of,\(^3\) and litigation over,\(^4\) NCAs have been growing in recent years which, absent corresponding changes in the importance of training, trade secrets, client lists, or other such assets, is difficult to rationalize by invoking the Coase theorem alone.
Changes in NCA use have captured policymakers’ attention. Members of Congress have introduced recent bills that would prohibit NCAs for workers earning less than $15 per hour, and bills with similar intents have been introduced by several state legislatures. Both the U.S. Treasury and the White House released reports in 2016 on NCAs among low wage workers. Despite this policy interest, there is a surprising dearth of evidence as to why NCAs are used so frequently, and how their use is likely to affect overall welfare in the labor market.

We show that the conditions of the labor market in which firms operate can lead them to use NCAs when they otherwise would not: NCAs arise as a tool to transfer utility from employees to employers when the market-clearing wage is constrained. We first use a simple theoretical motivation to illustrate why, and when, the terms of trade and constraints on the wage dictate that firms use NCAs. In particular, these conditions drive NCA use only among firms for which an NCA benefits the employer less than it costs the employee. This theory yields predictions that we test in two settings: examining the determinants of NCA use in a survey we conducted of hair salon owners, and showing heterogeneous employment effects of the minimum wage depending on the extent to which NCAs are available.

Our first setting, independent hair salons, is a compelling one to test our theory’s predictions for two reasons. First, NCAs bring clear benefits and costs in this industry. Because client attraction and retention, as well as on-the-job training, are essential to production, NCAs provide clear benefits to employers. At the same time, state-level occupational licensing laws that limit workers’ geographic mobility illustrate that NCAs impose potentially high costs on workers. Second, this is a setting that faces clear frictions to adjusting the wage: because a large portion of compensation comes from tips, the minimum wage can be a relevant constraint for what salon owners pay even high-end hair stylists. We find in our survey that NCAs are widely used: 30% of
our sample required their most recently hired stylist to sign an NCA.

We find strong empirical support that limitations on transferability of utility via the wage affect NCA use. First, outward shifts in labor supply and increases to the local unemployment rate (both of which are associated with terms of trade more favorable to employers) lead to higher NCA use. Second, increases in the state minimum wage, which limit transferability of utility, also lead to higher NCA use. Robustness and placebo tests bolster the causal interpretation of these estimates. These results support the prediction that firms use NCAs to transfer utility in the presence of constraints on the wage.

Our theoretical framework, however, reveals that constraints on the market-clearing wage only affect NCA use if the employee’s cost of an NCA exceeds the employer’s benefit. After identifying a measure of firm owners’ capacity to invest in production assets—which NCAs make more valuable to employers—we find that the effects of terms of trade and transferability constraints on NCA use are entirely driven by firms with low capacity for investment; owners with high capacity for investment, on the other hand, use NCAs at a high rate, regardless of whether the market-clearing wage is likely constrained. Thus, constraints on the wage only affect NCA use among firms in which it is most likely that the cost of NCAs to employees outweighs the benefit to employers.

Finally, we test a related prediction from our theoretical framework: that the availability of NCAs will dampen the extent to which a friction like the minimum wage reduces employment. This occurs because NCAs provide firms an additional way to divide surplus without using the employee’s wage. We revisit findings from two recent studies (Dube, Lester, and Reich 2016; Meer and West 2016) that estimate the effect of the minimum wage on employment. We find heterogeneous effects of the minimum wage depending on states’ enforceability of NCAs. In states
with low NCA enforceability (where NCAs are a less potent tool to transfer utility in firms), a minimum wage increase leads to a decrease in employment; in states with higher enforceability, the effect is essentially zero.

Overall, our results highlight a potential explanation for the growing awareness of NCA use among lower-wage occupations and industries in recent years. Between 2007 and 2009, the federal minimum wage rose from $5.15 per hour to $7.25 per hour, and several states have recently increased their minimum wage. Furthermore, in the wake of the Great Recession, there is a consensus that the labor market has deteriorated, especially for low-wage workers.

We note that, while we motivate our analysis with NCA use among low-wage workers, our theoretical and empirical findings generalize to workers who would not be considered “low-wage.” Our framework broadly reveals that firms’ external environment (manifested in their labor market) can lead them to use NCAs when they would not in a situation of frictionless Coasian bargaining. This insight applies to any firm for which an NCA yields a benefit to the employer that is smaller than the cost to the employee. This is especially likely to be true for lower-wage jobs, but our framework could easily be applied to study the reasons for, and effects of, NCA use in other segments of the labor market.

Our findings yield nuanced implications for policy. On the one hand, our results imply that employers leverage weak labor markets to use NCAs to extract additional utility from workers, even if workers incur a cost greater than the benefit that accrues to the employer. At the same time, even within a narrowly defined industry, we find NCAs are actually beneficial contracts for a subset of firms. Furthermore, our analysis suggests that making NCAs available can mitigate the extent to which a minimum wage reduces employment.

This paper contributes to multiple literatures. First, a growing literature has investigated
the effects of NCA use as well as laws that determine their enforceability. Higher NCA enforceability has been found to increase firm-sponsored training (Starr 2019), increase firm shareholder value (Younge and Marx 2015), decrease employee mobility (Fallick, Fleischman, and Rebitzer 2006; Lipsitz and Starr 2019; Marx, Strumsky, and Fleming 2009), slow the rate of within-industry spinouts (Starr, Balasubramanian, and Sakakibara 2017), and increase pursuit of risky R&D projects (Conti 2014), among other findings. Two papers prior to ours use individual-level data on NCA use to study their effects on tenure and the returns to tenure among physicians (Lavetti, Simon, and White 2019), and among a nationally representative survey (Starr, Prescott, and Bishara 2019). From a theoretical perspective, our paper is most similar to Rubin and Shedd (1981) and Wickelgren (2017), both of which discuss the role that liquidity constraints play in the decision of a firm to use NCAs.

We contribute to this literature by empirically demonstrating how forces external to the firm influence the decision to use NCAs. We also conduct the first survey on NCA use with information on firm owners, allowing us to explore determinants of NCA use not available through worker surveys or variation in enforceability. These findings also complement studies examining other types of contracts firms use to limit their workers’ mobility, such as training contracts (Hoffman and Burks 2017).

This paper also contributes to a literature that addresses how nontransferability of utility affects a firm’s internal decisions. Other studies have investigated the effect of the minimum wage on the provision of nonwage compensation, such as on-the-job training (Acemoglu and Pischke 2003), health insurance (Marks 2011), and fringe benefits (Clemens, Kahn, and Meer 2018; Simon and Kaestner 2004), with mixed findings. A related literature has theoretically examined how factors external to the firm affect firms’ internal organizational structure in the face of
nontransferable utility (Legros and Newman 2008, 2013). We add to this literature by analyzing how the bindingness of the minimum wage affects the use of NCAs, which are not only an important aspect of nonwage compensation but also an organizational feature of the firm. Moreover, by illustrating an important source of heterogeneity in the employment effect of the minimum wage, our results inform the variability in estimates found in the large literature examining this relationship; see Belman and Wolfson (2014) and Neumark and Wascher (2008) for overviews.

II. Theoretical Motivation

The implications of our theoretical framework are straightforward. An NCA offers a benefit to employers (such as, by raising the value of investment in transferable assets, reducing worker turnover) but imposes a cost on employees (such as, by limiting future employment opportunities, reducing future bargaining power vis a vis their employer). If an NCA offers a net benefit to a firm (that is, the benefit to the employer outweighs the cost to the employee, such that the employee could be compensated for the cost), the firm will use an NCA regardless of conditions in the labor market. On the other hand, if an NCA causes a net harm to the employer-employee pair (by imposing a cost on the employee that exceeds the benefit received by the employer), the firm might use an NCA as a nonmonetary lever to equilibrate labor supply and labor demand. This occurs when frictions or constraints on monetary transferability are great enough to prevent equilibration from occurring via the wage alone. At the firm level, this implication builds on the theoretical insights of Rubin and Shedd (1981) and Wickelgren (2017). Rubin and Shedd (1981), for example, illustrate how NCAs can arise in the presence of workers’ liquidity constraints to facilitate the provision of surplus-enhancing training. This implication also
shares features with the model of Basu (2003), which considers sexual harassment as a nonwage disamenity.

We extend the insights of those theories by illustrating how external market conditions affect this internal decision of the firm. There are many documented frictions that limit firms’ ability to adjust the wage to meet the terms of trade in the labor market. A salient example is a regulated minimum wage or other wage floor, but such frictions could also include downward wage rigidity (Altonji and Devereux 2000), a subsistence requirement, and employee cooperation (Fehr and Falk 1999), among others. Market conditions determine whether such frictions to adjusting the wage bind. In slack labor markets (or labor markets with high labor supply) in which the market-clearing wage would be low, a transferability constraint like the minimum wage is more likely to be a binding constraint on a worker’s wage. This suggests that labor market tightness and labor supply, as well as the level of a constraint like the minimum wage, play a role in determining how frequently firms use NCAs: when the minimum wage is higher, or the labor market has more slack or greater labor supply, firms will use NCAs more frequently—but only when an NCA yields a net harm to the pair. We formalize this intuition in a full theoretical model in Online Appendix A, where we also discuss how NCA use that is driven by labor market conditions affects the distribution of surplus across firms.

This intuition is summarized in Figure 1. We consider an employer-employee pair for which an NCA induces a net harm. In Panel (a), the two lines indicate the possible divisions of surplus when there are no constraints on the wage, with and without NCAs; the net harm of the NCA is evidenced by the possible divisions of surplus with NCAs falling below the divisions without NCAs. The Pareto frontier—the set of contracts that are not dominated by any other contract—only includes contracts without NCAs: it is exactly the line representing the divisions
of surplus without NCAs. In equilibrium, the terms of trade—how the surplus is divided between the employer and the employee—will be determined by labor supply and labor demand, bargaining power, and other factors determining the wage. The wage will adjust to position the contract, which will not include an NCA, in a specific place along the Pareto frontier.

In Panel (b), a transferability constraint prevents contracts from being written on a large part of both frontiers. The most direct example of such a constraint is a minimum wage that prevents the employee’s wage from going below a certain level. The new constrained Pareto frontier comprises contracts without an NCA up to a certain level of employer utility, and with an NCA thereafter; the horizontal distance comprising the portion of the constrained frontier with NCAs reflects the benefit the NCA brings to the employer. Thus, the firm may or may not use an NCA, depending on the terms of trade. If labor market conditions dictate terms of trade that offer the employee a large allocation of utility, the contract will not have an NCA, as in Panel (c). If, on the other hand, enough utility must be allocated to the employer, as in Panel (d), the contract will have an NCA.

It is also evident from Panels (c) and (d) that, holding the terms of trade constant, the firm will be more likely to use an NCA the higher is the transferability constraint.9

We summarize the implications of Figure 1 in the following predictions.

When NCAs cause a net harm to the pair:

**Prediction 1**  NCA use will be increasing in the favorability of the labor market terms of trade to employers (for example, due to high labor supply or slack labor markets).

**Prediction 2**  NCA use will be increasing in the tightness of monetary transferability constraints (for example, due to a high minimum wage).
We test these predictions in Section IV.A.

These predictions are true, however, only when an NCA causes a net harm to the pair. If, on the other hand, the NCA provides a net benefit to the pair (when the benefit accruing to the employer exceeds the cost borne by the employee), the firm will use an NCA regardless of market conditions and constraints that force the wage to be above a certain threshold.

This point is illustrated in Figure 2. We now consider a pair for which an NCA provides a net benefit, as evidenced by the higher frontier comprising contracts that include NCAs in Panel (a). In Panel (b), even in the presence of a transferability constraint, the constrained Pareto frontier only includes contracts with NCAs. Thus, regardless of the terms of trade or level of the transferability constraint, all contracts that the firm would write include NCAs.

We summarize this point with the following prediction:

**Prediction 3**  When NCAs yield a net benefit to the pair, pairs will use NCAs at a high rate: terms of trade and transferability constraints will not affect their use.

We test this prediction in Section IV.C.

Finally, our theory yields a related, but distinct, implication. When NCAs impose a net harm on pairs (and their use is therefore dictated by market conditions), some firms in the market will only be able to form when NCAs are available. In the presence of a transferability constraint, there may be some firms whose productivity enables them to earn enough utility for the employer only when the firm uses an NCA. If such a firm is unable to use an NCA it will exit the market. This intuition can be seen in Panel (d) of Figure 1. If NCAs are unavailable, then the Pareto frontier
ends at the rightmost point that does not include an NCA; the firm is unable to meet the terms of trade dictated to the employer, and the firm exits the market.\textsuperscript{10}

This implication is easily applied by considering an increase in the minimum wage. An increase in the minimum wage pushes the edges of the Pareto frontier leftward. If this shift in the frontier moves the equilibrium contract from one that does not include NCAs to one that includes them, the firm will not be able to form if it is unable to use NCAs.

This leads to our final prediction:

\textbf{Prediction 4} \textit{An increase in the minimum wage leads to a larger employment loss when NCAs are unavailable to firms.}

We test this prediction in Section V.

\textbf{III. Setting, Data and Measures}

We test the predictions of our model in two settings: first, in a sample of independent hair salons (Section IV), and second, in revisiting two recent studies of the employment effects of the minimum wage (Section V).

Salons present a ripe setting to understand the use of NCAs. The benefits and costs of NCAs are clear in this industry. Client attraction, client retention, and on-the-job training are essential to production. NCAs protect investment in these inputs by limiting workers’ ability to leave, which benefits salon owners. At the same time, NCAs impose potentially high costs on workers. NCAs in this industry typically specify a worker may not enter another job in a salon within a specified geographic radius, and all stylists must pass state-specific occupational licensing
requirements, making mobility to other areas especially costly.\textsuperscript{11}

This industry is also a fruitful setting to test the predictions of our model, particularly those related to the minimum wage. The minimum wage is likely binding for many hair stylists, even those in higher-end independent salons. Consider a stylist working in an independent salon earning the 75th percentile of hourly earnings for hairdressers, hairstylists and cosmetologists, which in 2016 was $16.43, according to the Bureau of Labor Statistics.\textsuperscript{12} Typical compensation in this industry is largely comprised of tips, meaning that the hourly wage paid by employers is often much lower. If a stylist performs one haircut per hour, with an average price of $75 (which is the average service price among salons we surveyed, described below), at an 18\% tip rate the implied hourly wage for workers in our sample would be ($16.43-$13.5=) $2.93, which is very close to being bound by the federal tipped minimum wage of $2.13 (and would indeed be bound in 27 of the 50 states in 2017).\textsuperscript{13} Our discussions with hair salons highlighted the salience of the minimum wage in this industry; for example, one owner told us that she always sought to pay her stylists an hourly rate slightly above the minimum wage, meaning that the minimum wage was tacitly binding.\textsuperscript{14}

To analyze determinants of NCA use, we conducted a survey of owners of independent hair salons in the U.S. in April 2015. We conducted the survey by email via the Professional Beauty Association (PBA),\textsuperscript{15} a trade organization of salon professionals. The survey asked salon owners about various business, employment, compensation, and hiring practices, their experience using NCAs, and various geographic and demographic details. Individuals who completed the survey were entered into a raffle for one of ten $50 Amazon gift cards. We surveyed hair stylists separately, but do not discuss those results in this paper.\textsuperscript{16}

The PBA emailed its entire email list, which includes both salon owners and individual
hair stylists, and the email included separate links for the survey for owners and the survey for individual stylists. The email list included 26,827 individuals, and PBA estimates 20% of these were salon owners. We received 218 completed surveys, resulting in a response rate of 4% among those receiving an email. However, many of these email addresses may have been inactive or unaware of PBA mailings—only 3,523 individuals opened the email. If the ratio of salon owners to stylists among those opening the email was identical to the ratio on the email list as a whole, our response rate among those opening the email would be 218/(3,523*0.20) = 31%. Thus, our “true” response rate lies between 4% and 31%. The response rate was in line with, if not slightly higher than, prior surveys PBA had sent its members on a variety of topics.\textsuperscript{17} While our response rate is uncertain, we do not anticipate it causes selection that biases our results, as the survey was advertised as part of a research study to learn about the use of certain business and hiring practices in the salon industry, and the email did not mention NCAs. We provide more information about our sample in Online Appendix B.1.

A. Measures

The model in Section II made empirical predictions regarding the use of NCAs, the terms of trade, and transferability constraints. Here we describe our measures for each of these items.

1. \textit{NCA Use}

To measure use of NCAs, we asked owners whether their most recently hired stylist signed an NCA and, if not, whether they have ever had a stylist sign an NCA in the past, as well as the first year the owner used an NCA. Our primary measure of NCA use is a dummy equal to one if an owner used an NCA for its most recently hired stylist (\textit{Last Hire Signed NCA}). In some analyses we also measure NCA use with a dummy equal to one if an owner has ever used an NCA, either
for its most recently hired stylist or in the past.

2. *Terms of Trade and Transferability Constraints*

We measure variation in the terms of trade two ways. Our first measure is a proxy of labor supply. We asked owners\(^{18}\) for the number of applicants they received for their most recent vacancy (\(#\text{Applicants}\)\). We also asked whether this number was more, about the same, or less than they had received for a typical vacancy in the past.

Our second measure of variation in the terms of trade is based on the local unemployment rate. In a frictionless labor market, unemployment only occurs as a result of monetary transferability constraints. However, other models of the labor market, such as Mortensen and Pissarides (1994) and Beaudry and DiNardo (1991), generate a direct negative relationship between the unemployment rate and the wage, under mild assumptions.\(^{19}\) We obtain the county-level annual average unemployment rate from the Bureau of Labor Statistics Local Area Unemployment Statistics. We merge this dataset into our survey dataset using each salon’s county.\(^{20}\)

Because counties with a high unemployment rate level likely differ from those with low levels for many confounding reasons, we calculate the county-level change in the unemployment rate between 2006 and 2012.\(^{21}\) The period over which this change is calculated roughly spans the Great Recession, a period in which the national unemployment rate increased from 4.7% to 8.3%.\(^{22}\) We use this change in the county’s unemployment rate between 2006 and 2012 (*Change in the Local Unemployment Rate*) as our second measure of the terms of trade. In robustness checks reported in Section IV.B, we consider an alternative measure of the terms of trade that is plausibly exogenous to NCA use.

To measure transferability constraints, we use the schedule of state-level minimum wages...
in 2014 from the Department of Labor. As described above, the minimum wage is a salient constraint in this setting. Because hair stylists are tipped employees, we use each state’s minimum hourly cash wage for *tipped* employees in 2014 as the relevant constraint (*Tipped Minimum Wage, 2014*); we discuss the role of the *untipped* minimum wage in Section IV.B.3.

3. *Additional Variables*

We merged in other datasets primarily to include relevant controls in our regressions. We use data from Bishara (2010) to measure each state’s enforceability of NCAs as of 2009. The measures were created by analyzing case law in each state and comparing laws based on seven dimensions. Each state is assigned a score from 0–10 on each of these dimensions, with a higher score indicating stricter enforcement, and given a composite score based on a weighted sum of the seven scores. We normalize each state’s aggregate score by dividing by the highest (that is, most enforceable) score across all 50 states and the District of Columbia, so that the normalized score ranges from zero to one. We also use each salon’s county to merge in the number of salons in each respondent’s county in 2013, which comes from the County Business Patterns database from the Census Bureau.

Some of our survey questions had small rates of nonresponse. To deal with nonresponses, we imputed missing values by regressing each variable on the state’s Bishara score and minimum wage, a dummy for employment-based salons, and the number of salons in the respondent’s county, and generating predicted values for missing responses. We only performed this imputation for potential covariates to our models and not for our regressors of interest.

B. *Summary Statistics and Sample Representativeness*

Table 1 displays summary statistics for our salon sample. Thirty percent of our sample had
their most recently hired stylist sign an NCA, and 39% has ever used one. Compare this with prior studies: Starr, Prescott, and Bishara (2019) found that 19% of respondents in “Personal Care/Services” (a Standard Occupational Classification which includes Hairdressers, Hairstylists and Cosmetologists, among other personal care occupations) were currently bound by an NCA. Lavetti, Simon, and White (2019) find 45% of a sample of physicians were currently working under an NCA, and Marx (2011) finds 47% of a sample of engineers had ever signed one. The average salon in our sample has 7.1 stylists working and an annual revenue of $379,000. Forty-eight percent of our owners own employment-based salons, meaning the stylists work as employees (and are therefore covered by the Fair Labor Standards Act). The remaining 52% are contractor-based salons, meaning the stylists that work there are independent contractors. Stylists in such salons typically rent space from the owner and do not earn wages; income for contractors comes directly from the services they provide. A tabulation of the states in our sample is given in Online Appendix Table D.1.

Online Appendix Table D.2 shows the means of these salon characteristics and other variables separately for salons that did and did not have their most recently hired stylist sign an NCA. Salons that did use an NCA hire a statistically significantly larger share of their workers directly from cosmetology school, are more likely to be employment-based salons, are located in states with higher Bishara NCA enforceability scores, are more likely to have a line of credit with a bank, and had a higher number of applicants for their most recent vacancy.

How does a salon in our sample compare to a typical independent hair salon in the U.S.? In 2014, 7.7 stylists worked in the typical hair salon, the typical salon earned $233,000 in annual revenue, and roughly half of barbers, hairdressers and cosmetologists were self-employed (Small Business Development Center Network 2014). Thus, the average salon in our sample shares many
characteristics with the average hair salon in the U.S. as a whole.27

A related question is what share of the population of hair salons we have surveyed in our sample. To get a rough sense of how many independent hair salons there are in the U.S., we scraped the website Yelp.com in May 2015 for all U.S. establishments under the category “hair salons.” To identify independent salons (that is, those not part of a bigger chain), we dropped salons with names from popular chains (for example, Fantastic Sams, Great Clips, Supercuts), as well as salons that share a name with at least two other salons. We also dropped those with four or fewer reviews. This process left us with 21,104 salons in our Yelp data. If we take this as the number of independent hair salons in the U.S., then our sample of 218 salons in the PBA survey represents a 1% sample of the relevant population.

IV. Determinants of NCA Use: Evidence from Salon Survey

In this section, we first set out to test Predictions 1 and 2: that changes in the terms of trade, as well as tightening of monetary transferability constraints, increase NCA use. While none of our primary estimates are based on experimental or quasi-experimental variation, we provide evidence that is broadly supportive of a causal interpretation of these estimates with several additional analyses in Section IV.B, including placebo tests, one specification leveraging quasi-exogenous variation, and a variety of robustness checks for potential concerns.

We then test for heterogeneity of the effects of labor market conditions on NCA use that serves as a test of Prediction 3. We investigate a potential benefit of NCAs to employers (alleviation of investment hold-up), and then demonstrate that labor market conditions only affect NCA use among salons for which this benefit is likely low. These results further bolster the causal interpretation of our findings by highlighting heterogeneity that is aligned with our theoretical
predictions.

A. Main Findings: NCA Use, Terms of Trade and Transferability

Constraints

Table 2 displays our main results. Each column corresponds to a linear probability model in which the dependent variable is an indicator that the salon’s most recently hired stylist signed an NCA (Last Hire Signed NCA). Each specification controls for the state’s Bishara enforceability score, as well as a vector of additional covariates correlated with NCA use: the percent of a salon’s stylists hired directly out of school, a dummy for employment-based salons, the owner’s age, the number of stylists currently working in the salon, and the number of salons in a respondent’s county. Following Abadie et al. (2017), we use robust standard errors, clustering at the level at which the explanatory variable has variation. This means that we do not cluster when #Applicants is the explanatory variable; rather, we cluster by commuting zone when Change in Local Unemployment Rate is the explanatory variable, and by state when Tipped Minimum Wage is the explanatory variable.

Columns 1 and 2 investigate the relationship between NCA use and our two measures of the terms of trade, which shift the market-clearing wage. Column 1 shows that one additional applicant for a position is associated with a one percentage point increase ($p < .01$) in the probability the hired stylist signed an NCA. To put this magnitude in perspective, the standard deviation of #Applicants in our sample is 9.4. This suggests that a one standard deviation increase in number of applicants received for a position is associated with a roughly 9.1 percentage point increase in the probability the stylist that is hired signs an NCA: 29% of the sample mean.

Column 2 displays the coefficient on Change in the Local Unemployment Rate. The
coefficient suggests a one percentage point increase in the change in the local unemployment rate is associated with a 4.1 percentage point increase in the probability that an owner’s most recently hired stylist signed an NCA ($p = .044$).

Column 3 tests whether increases in transferability constraints increase NCA use by including *Tipped Minimum Wage, 2014* as our explanatory variable. A $1$ increase in the tipped minimum wage is associated with a 2.9 percentage point increase in the probability that the owner’s most recent hire signed an NCA ($p = .058$).

The coefficient on the *Bishara Score* is informative. Going from the state with the lowest to highest NCA enforceability is associated with an increase in NCA use between 27 and 40 percentage points (depending on the column). This range of estimated effects of enforceability on NCA use is in line with what Lavetti, Simon, and White (2019) find for physicians.³³

If an owner’s number of applicants for a position, the local unemployment rate, and the minimum wage are correlated with each other, then they may not truly serve as separate measures. Column 4 includes both measures of the terms of trade; the coefficients on each are essentially unchanged. Column 5 additionally includes the tipped minimum wage. The coefficient on # Applicants remains unchanged; the other two coefficients decrease slightly in magnitude and statistical significance, but they remain positive.

The results in Column 4 and 5 address a potential concern with our interpretation of the coefficients on # Applicants and Change in the Local Unemployment Rate. First, the unemployment rate could drive NCA use not by affecting transferability via the wage (as proposed by our theory), but rather by affecting the benefit that the NCA yields to the owner. That benefit may decrease if consumers spend less money on hair related services when unemployment is high, or it may increase if competition over a more scarce resource (customers) drives the value of
customer retention up. The estimates in Column 4 suggest that, while this demand-side channel may play a role, there is an independent effect of the terms of trade: if it is only variation in the benefit to the owner that is causing the terms of trade to drive NCA use, then shifts in the number of applicants received for a position should have no effect on NCA use after conditioning on the unemployment rate.

\[ \text{B. Robustness Checks on Main Findings} \]

In this section, we conduct several tests to support a causal interpretation of the main results presented in Section IV.A. In addition to the robustness checks presented here, in Online Appendix B.2 we describe a reweighting exercise to ensure that our results to not meaningfully change when we weight our observations to reflect the population geographic distribution of hair salons.

\[ \text{1. Placebo Tests} \]

Though the models in Table 2 control for variables that are jointly correlated with NCA use and our explanatory variables, these controls may not capture an unobserved variable that jointly determines NCA use and the terms of trade. Consider the number of applicants an owner received for a position. Some owners may get a reputation for NCA use, which may deter potential applicants from applying. Alternatively, owners that use NCAs may also provide unobserved workplace benefits that get bundled with NCAs, which may increase the number of applicants.

The first way that we address the concern of omitted variable bias is by considering owners’ prior NCA use. Intuitively, if the unobserved variable is correlated with overall NCA use, not just for the most recent hire, we can capture it by controlling for NCA use prior to the most recent hire.

Table 3 reports results that take into account prior NCA use. In Column 1 the key
explanatory variable is \# Applicants, and this model is identical to that in Column 1 of Table 2 except that we now include a dummy indicating whether an owner ever used NCAs prior to his or her most recent hire. As would be expected, its coefficient is large (0.59) and highly significant \((p < .01)\). Even controlling for prior NCA use, though, the coefficient on \# Applicants remains highly significant and decreases in magnitude only slightly to 0.82 percentage points \((p = 0.012)\).

Column 2 performs an analogous test for our second terms of trade measure, Change to Local Unemployment Rate. We restrict the sample to owners who reported being in the beauty industry since at least 2006 and include as an independent variable a dummy equal to one if she reported using NCAs in 2006 or earlier \((Used \ NCAs \ in \ 2006 \ or \ Earlier)\). The point estimate and statistical significance on the change in the unemployment rate are essentially identical to those in Column 2 of Table 2.

A corroborating test to ensure that the relationship between our measures of the terms of trade and NCA use is not driven by an unobserved variable is whether \textit{prior} NCA use is correlated with the \textit{current} terms of trade. For example, the number of applicants received for an owner’s most recent position should have no causal effect on whether an owner used NCAs prior to this most recent position. Columns 3 and 4 report specifications in which the dependent variable is an indicator if the owner used an NCA prior to her most recent hire, and prior to 2006, respectively. Reassuringly, the coefficients on our terms of trade measures are both small and statistically indistinguishable from zero.

A related way that we address potential omitted variable bias is by considering both prior NCA use and numbers of applicants owners received for prior vacancies. Online Appendix Table D.3 investigates the effects of a \textit{change} in the number of applicants an owner gets for a position on the \textit{change} in her use of NCAs. The dependent variable is the difference between \textit{Last Hire}
Signed NCA and Used NCAs Prior to Most Recent Hire.\textsuperscript{34} We find that owners that received more applicants than usual for their most recent hire (an outward shift in labor supply) are more likely to switch into NCA use (though the result is not quite statistically significant: $p = .15$), tentatively supporting the hypothesis that changes in our measure of labor supply also lead to within-owner changes in the use of NCAs.

2. An Exogenous Shifter of the Market Terms of Trade

Changes to the local unemployment rate may be a function of many factors (and may be measured with error). We leverage a more exogenous source of variation in the terms of trade in the labor market for hair salons: county-level variation in the decline in home prices during the Great Recession. Areas that experienced larger declines in home prices in this period saw greater declines in employment in nontradable sectors (Giroud and Mueller 2017; Mian and Sufi 2014). The deterioration of households’ balance sheets during this period lowered labor demand in nontradables (such as hair salons), which would lead the terms of trade for workers to fall. Notably, the economic shock of the Great Recession had long-term effects on local labor markets hit hardest by it (Yagan 2019), motivating us to use it as a source of variation in the terms of trade in 2015. We follow Giroud and Mueller (2017) to calculate the log change in median house prices from 2006 to 2009 by county, using data from Zillow.com. Using this measure, we test whether NCA use is higher among salons in our sample located in counties that experienced larger decreases in house prices, among owners who report being in the beauty industry since at least 2007.

Table 4 reports the results. The estimate in Column 1 implies that a 1% decrease in the median home price in a salon’s county between 2006-2009 leads to a .38 percentage point increase in the likelihood that the owner’s most recent hire signed an NCA ($p = .016$). This estimate
attenuates slightly when we control for whether the owner had ever used an NCA prior to 2006, but it remains statistically significant at the 10% level \((p = .09)\). These estimates demonstrate that a tangible shock that worsened the terms of trade for workers in the hair salon industry led to an increase in NCA use, corroborating the results using the unemployment rate.

3. Robustness Checks on Minimum Wage Results

Table 5 investigates robustness checks on our estimated effect of the state tipped minimum wage on NCA use. Column 1 replicates our baseline estimate (Column 3 from Table 2). One concern is that cross-sectional variation in the minimum wage is very likely correlated with other state-level policies and labor market conditions affecting the terms of trade. In Column 2, we include controls for two other important state-level labor laws, which we find to be correlated with the minimum wage: a dummy for whether a state had enacted right-to-work laws as of 2015, and each state’s adoption of wrongful discharge laws that give exceptions to at-will employment (Autor, Donohue III, and Schwab 2006).\(^{35}\) Including these variables increases the point estimate on \textit{Tipped Minimum Wage, 2014} to 0.043 \((p < .01)\).\(^{36}\)

However, even controlling for state-level labor laws likely correlated with the minimum wage, cross-sectional variation in the minimum wage might be driven by other unobservable differences across states that biases the coefficient on \textit{Tipped Minimum Wage}. We account for this possibility in two ways.

The first way we address identification concerns with cross-sectional variation in the minimum wage is by noting that minimum wage laws are only applicable to employment-based salons; independent contractors are not covered by the Fair Labor Standards Act. Thus, to the extent the minimum wage may bind the market-clearing wage, it could only do so for employment-
based salons, and we can treat contractor-based salons as a “placebo group.” In Column 3, we interact the minimum wage with both categories of Emp-based Salon.\textsuperscript{37} The coefficient on $\text{Tipped Minimum Wage} \times \text{Emp-based salon} = 0$ implies that the effect of the minimum wage on NCA use by contractor-based salons is small (0.033, $p=.07$); that on $\text{Tipped Minimum Wage} \times \text{Emp-based salon} = 1$ implies that, among employment-based salons, a $1$ increase in the minimum wage leads to an 7.1 percentage point increase in the likelihood that the owner has used an NCA ($p < .01$), which is 17\% of the mean among employment-based salons.

The second way that we address identification issues with cross-sectional variation in the minimum wage is by also examining the effect of the untipped minimum wage. As we describe in Online Appendix A.5, a higher minimum wage may not just decrease transferability, which our model predicts will increase NCA use, but it could also increase workers’ outside option (for example, by increasing the value of jobs in other occupations), which our model predicts will decrease NCA use. Because hair stylists are tipped employees, it is the tipped minimum wage that affects the transferability constraint: the minimum wage for untipped workers affects only hair stylists’ outside options.\textsuperscript{38}

Column 4 displays the coefficient on the 2014 Untipped Minimum Wage, which is positive but statistically indistinguishable from zero. Column 5 includes both the tipped and the untipped minimum wage. The coefficient on the tipped minimum wage increases to 0.077 ($p < .01$), relative to 0.043 in Column 2, and the coefficient on the untipped minimum wage is negative ($p = .055$). These results are consistent with the untipped minimum wage affecting only workers’ outside option and the tipped minimum wage affecting the transferability constraint. Furthermore, any omitted variables that could bias the coefficient on $\text{Tipped Minimum Wage}$ would almost certainly be highly correlated with the Untipped Minimum Wage: the fact that our coefficient on
*Tipped Minimum Wage increases* when we control for the untipped minimum wage suggests that our estimates are not driven by omitted variable bias.

These results strongly support our prediction that the minimum wage affects NCA use. They also provide evidence that the effect of the minimum wage on NCA use is not driven by omitted variable bias or sampling error.

C. Do NCAs Create a Net Harm for All Employer-Employee Pairs?

The empirical findings in Sections IV.A and IV.B suggest that characteristics of the labor market—both shifts in the market-clearing wage and limits to transferability via the wage—affect NCA use in our sample of independent hair salons. These results imply that there are firms in our sample for which the cost of NCAs to employees outweigh the benefits to owners (that is, NCAs cause a net harm). However, our results do not necessarily imply that NCAs reduce surplus for every firm in our sample. If the benefit of NCAs is heterogeneous across salon owners, it is possible that the benefit of NCAs is high enough for some owners to cause NCAs to be net beneficial contracts for those firms. As noted in Prediction 3, such firms will use NCAs at a high rate, unaffected by labor market conditions.

To investigate whether such heterogeneity is present, the next section discusses a proxy for the magnitude of the benefit an owner receives from an NCA: whether the owner has a line of credit with a bank. In the section that follows, we use this proxy to test whether the magnitude of the benefit of an NCA to an owner moderates the effect of labor market conditions on NCA use.

1. Owner Access to Credit as a Measure of NCA Benefit

One commonly cited potential benefit of NCAs is that, by effectively assigning control
rights over nonphysical assets to the owner, they mitigate hold-up problems that distort incentives to invest in those assets (Lavetti, Simon, and White 2019). For example, states with higher NCA enforceability have been shown to have higher rates of firm-sponsored training (Starr 2019), and employees signing NCAs are more likely to receive such training (Starr, Prescott, and Bishara 2019). If such assets are valuable to production, the benefits of NCAs could be quite large.

Our survey indicated that transferable assets are sizable, essential to production, and a salient reason why firms use NCAs in the salon industry. For example, we gave owners who reported having their most recently hired stylist sign an NCA the opportunity to tell us why. Three responses are illustrative:

“We are investing approximately $9,000 in direct training costs on the person during their Apprentice training...Why would I train and help perfect a Stylist’s life-long skill to have them compete with us at a nearby Salon?”

“The salon does most of the advertising and work to bring in clients, not the stylist.”

“...the guests they serve are not ‘theirs’ and...the salon invests not only in their training, but in the marketing of their services to prospective guests.”

We asked owners about their investments in client attraction including whether they have a website, have a social media account, give offers on daily deal sites (for example, Groupon), maintain a client email list with regular promotions, or engage in other types of marketing. Regarding training, we asked whether the owner’s salon provided on-the-job training for newly
hired stylists.

Salons in our sample that use NCAs are indeed more likely to make investments in client attraction and training. The first panel of Table 6 reports coefficients from a series of regressions with the dependent variable equal to one if the owner indicated engaging in each corresponding type of investment, and the explanatory variable of interest being an indicator if the salon has ever used an NCA (Ever Used NCA). We include the Bishara score and controls from previous regressions. The coefficient on Ever Used NCA is positive for all but one form of investment in client attraction (social media), and is statistically significant for Deal Sites and nearly so for Email List ($p = .102$). These latter two correspond to discounts and promotions, and are likely the most costly and thus most affected by the hold-up problem. Column 6 gives the results for training. The coefficient of 0.11 ($p = .01$) suggests salons that use NCAs are 14% more likely to provide training to new workers relative to the sample mean ($0.11/0.798 = 0.14$). These regressions should be interpreted as correlations rather than causation, since the decisions to make these investments and use NCAs are made jointly, but they do support the idea that NCAs can indeed offer benefits by improving owners’ incentives to invest in transferable assets valuable to production.

While mitigating investment hold-up is likely an important benefit of NCAs, this benefit is unlikely to be homogeneous across firms. One likely source of heterogeneity in the magnitude of this benefit is firm owners’ capacity to make investments in nonphysical assets. An insight from the corporate finance literature is that financing constraints limit an owner’s ability to make valuable investments (Fazzari et al. 1988). Such constraints may result in less potential investment to be “held-up,” limiting the benefits of NCAs.

To measure the extent to which an owner is financially constrained from making
investments, we asked owners “Do you have a line of credit or other ongoing banking relationship you use to finance cash outlays?” Access to lines of credit have been shown to be a statistically powerful measure of financial constraints (Sufi 2009). Lines of credit alleviate capital market frictions, ensuring funds are available to firms for valuable investments. Indeed, in the second panel of Table 6, we find owners in our sample with a line of credit have higher rates of investment in all forms of client attraction and training.

Since these owners have higher capacity for investment, they also likely have more to gain from using NCAs. This relationship suggests that an owner’s access to a line of credit is a meaningful proxy for the magnitude of the benefit of using NCAs. This statement is true even if a line of credit does not have a causal effect on investment. If the relationship instead reflects that owners that make larger investments are more likely to obtain a line of credit, it still means that owners that have a line of credit have more potential for investment, and thus more potential benefit of NCAs.42

In the next section, we use variation in owners’ access to lines of credit to examine whether the effect of labor market conditions on firms’ use of NCAs depends on the magnitude of the benefit the NCA accrues to the owner.

2. Moderating Role of Owner Access to Credit on NCA Use

If the benefit of NCAs to owners with a line of credit is high enough to cause NCAs to bring a net benefit to employer-employee pairs, NCAs will be used among such firms independent of whether or not the unconstrained market-clearing wage is bound by the minimum wage, as described in Prediction 3.43 Owners with a line of credit will thus have high rates of NCA use that is unaffected by shifts in labor supply and the minimum wage. The effects we observed between
NCA use, the terms of trade, and the minimum wage in Section IV.A, then, would be entirely driven by owners without a line of credit.

Table 7 tests these predictions. Columns 1–3 report results examining how access to a line of credit affects NCA use, and how it moderates the relationship between NCA use and labor supply. The dependent variable is, again, Last Hire Signed NCA (a dummy equal to one if the most recently hired stylist signed an NCA). In all regressions, we control for the same full set of controls as previous tables. Column 1 shows that owners with a line of credit (Line of Credit) are 15 percentage points more likely to have had their most recently hired stylist sign an NCA ($p = .024$). One potential concern is that access to a line of credit may be picking up a measure of overall business acumen or management quality of the owner, and not just its ability to access credit for investment. One piece of evidence this is not a practical concern is that the coefficient on Line of Credit changes very little if we do not include the full set of controls (results not shown). As a second piece of evidence, if better managed firms get a higher number of applicants, then including our # Applicants measure should change the coefficient on Line of Credit. However, the coefficient on Line of Credit is essentially unchanged when we control for # Applicants (Column 2). A

Column 3 includes an interaction of Line of Credit with # Applicants. If the benefit of NCAs for those owners with a line of credit is large enough such that it outweighs the cost to employees, then by Prediction 3, changes in labor supply should have no effect on their use. The results strongly support this prediction: the main effect of # Applicants (0.017) and its interaction term with Line of Credit (-0.016) completely cancel each other out, meaning that shifts in applicants have no effect on NCA use among owners with a line of credit. On the other hand, the main effect on # Applicants shows that, among owners without a line of credit, one additional applicant is associated with a 1.7 percentage point increase in the probability the hired worker
signed an NCA ($p < .01$). Put differently, the average predicted probability that owners with a line of credit in our sample used an NCA for their most recent hire is stable at roughly 0.37 no matter the number of applicants received. On the other hand, the predicted probabilities for owners without a line of credit vary significantly with the number of applicants. If the number of applicants received is one (the tenth percentile in our sample, where the market-clearing wage is least likely constrained by the minimum wage), the predicted probability is 0.12. If the number of applicants is 15 (the 90th percentile, where the market-clearing wage is most likely constrained by the minimum wage), the predicted probability jumps to 0.36.

As another way to visualize these results, Panel A of Figure 3 displays binned scatterplots of the relationship between Last Hire Signed NCA and # Applicants for owners without a line of credit (Column 1) and with a line of credit (Column 2). The scatterplots corroborate a statistically significant and roughly linear relationship for owners without a line of credit, versus a roughly orthogonal relationship for owners with a line of credit.45

Turning back to Table 7, Columns 4-6 investigate how access to credit moderates the relationship between NCA use and the change in the local unemployment rate. Column 4 reproduces the specification in Column 1, but for all 218 salons (rather than just the 195 that reported # Applicants.) In Column 5, the main effect of Line of Credit still holds after controlling for the change in the local unemployment rate between 2006–12. In Column 6, the inclusion of an interaction between these two variables leads to results remarkably similar to Column 3: the main effect of the change in the unemployment rate and its interaction with Line of Credit completely cancel out, suggesting changes in the unemployment rate have no effect on NCA use among owners with a line of credit. On the other hand, among owners without a line of credit, a one percentage point increase in the unemployment rate over the 2006–12 period is associated with an
8.3 percentage point increase in the probability the most recently hired worker signed an NCA \((p < .01)\). Binned scatterplots in Panel B of Figure 3 corroborate these estimates.

Columns 7–8 report results examining how access to credit moderates the relationship between NCA use and the minimum wage. The coefficient on Line of Credit is unchanged whether or not the state’s tipped minimum wage is included in the regression (Columns 4 versus 7). Column 8 includes an interaction of Line of Credit with the tipped minimum wage. Once again, the the main effect of the minimum wage \((0.062, \ p < .01)\) and its interaction with Line of Credit \((-0.042, \ p = .018)\) nearly cancel out, implying essentially no effect of the minimum wage on NCA use among owners with a line of credit, but a substantial effect for owners without a line of credit. The binned scatterplots in Panel C of Figure 3 corroborate these estimates.

We emphasize that these results each consistently show that, when wages are unconstrained, only those firms that we expect to benefit from NCAs are likely to use them. The main effects of Line of Credit in Columns 3, 6 and 8—respectively 0.27 \((p < .01)\), 0.43 \((p < .01)\), and 0.33 \((p = .024)\)—estimate the difference in the probability that owners with high versus low benefit of NCAs use them in three different scenarios when the market-clearing wage is unlikely to be constrained. These estimates provide further support that our model captures the determinants of NCA use in our sample: owners with high benefit from NCAs use them more often than owners with low benefit when the market clearing-wage is unconstrained.

These results paint a nuanced portrait of the benefits that NCAs bring to firms in our sample. Constraints on wages in the labor market have a statistically significant and economically meaningful effect on NCA use. However, this relationship only exists for the owners in our sample likely to benefit the least from NCA use (that is, employer-employee pairs which likely suffer a net harm from NCA use). On the other hand, among owners likely to benefit the most from NCAs,
and for whom NCAs are most likely to bring a net benefit, NCAs are both more widely used, and are unaffected by wage constraints. This suggests NCAs provide a net benefit for some firms in our sample, but not others.

In this section, we considered the implications when the benefit of NCA use is heterogeneous across owners. It is also possible that the cost of an NCA is heterogeneous across workers, or even that the cost of an NCA is endogenous to labor market conditions. We assess the potential that such variation is present in our sample in Online Appendix A.6, where we argue that these considerations are unlikely to meaningfully affect the interpretation of our estimates. We also acknowledge that some unobserved trait of salon owners or managers (such as, for example, comfort with handling paperwork) may simultaneously affect the probability that a salon obtains a loan and the probability that a salon uses an NCA. While we cannot control for such traits directly, we note that we do control for the owner’s age, which likely captures a portion of managerial acumen.

V. NCAs, the Minimum Wage, and Employment

The results in Section IV provide evidence that firms use NCAs to transfer utility when there are frictions to transferability via the wage, consistent with the predictions derived in Section II. Our theory makes a related prediction: when NCAs are available, the negative employment effects of one particular friction on the wage—the minimum wage—will be smaller than if NCAs are not available (Prediction 4). In the presence of a binding minimum wage, some owners who would otherwise be unwilling to hire at the minimum wage can hire with an NCA as long as NCAs provide a benefit to them.

Some existing empirical evidence is consistent with this prediction. Luca and Luca (2019)
find that minimum wage increases in California led to significant increases in exit rates of (lower quality) restaurants. The setting for their study, California, is a state in which NCAs are completely unenforceable, and thus unavailable as a means of utility transfer. Our model suggests that if this study took place in a different state where NCAs are enforceable, like Florida, the effect would be much smaller.

The literature pertaining to the estimation of the minimum wage’s effect on employment contains myriad estimation strategies, many of which yield conflicting conclusions. A recent Congressional Budget Office report describes the results of several recent entries in this literature, which estimate employment elasticities of the minimum wage ranging from 0.4 (Cengiz et al. 2019) to -1.7 (Clemens and Wither 2019). We remain agnostic on the best approach to identify the employment effect of the minimum wage. Below, we revisit two recent studies that use very different approaches and yield vastly different findings on the baseline employment effect of the minimum wage; with both approaches, we show heterogeneity in the employment effect that is consistent with Prediction 4. We briefly discuss the estimation strategy for both studies here and provide further details in Online Appendix C.

The first study we revisit is Dube, Lester, and Reich (2016). The authors use the set of all border county pairs in their regression sample, and they estimate the log change in employment in counties in a state that experiences a minimum wage increase, relative to adjacent border counties in the same time period. Dube, Lester, and Reich (2016) measure quarterly employment using the Quarterly Workforce Indicators (QWI) from the Census Bureau, and they use state and federal changes to the minimum wage over 2000-11. They perform their analysis separately for teens and for restaurant workers, two groups considered in the literature to typically be bound by the minimum wage. We restrict attention to restaurant workers.
The second study we revisit is Meer and West (2016). Though Dube, Lester, and Reich (2016) provide evidence that their approach credibly identifies the overall effect of the minimum wage, there is substantial methodological debate over the merits of this approach in the literature (Neumark, Salas, and Wascher 2014). Additionally, the results from that study could be local to the geographies covered (border counties only), the time frame (2000-11), the dataset (QWI), or the particular research design. Thus, a benefit of also revisiting Meer and West (2016) is that this study uses a completely different methodology than Dube, Lester, and Reich (2016): Meer and West (2016) focus on a longer time frame (1977-2011), a different dataset (the US Census Bureau’s Business Dynamics Statistics), a broader geographic region (all US counties), and a different research design than Dube, Lester, and Reich (2016). Furthermore, these two studies reach very different conclusions about the overall employment effects of the minimum wage: whereas Dube, Lester, and Reich (2016) finds an employment elasticity of essentially zero, Meer and West (2016) find evidence of an overall negative employment elasticity.

As part of their analysis, Meer and West (2016) use a standard two-way fixed effects difference-in-difference model to estimate the effect of the minimum wage on employment. While both Meer and West (2016) and Dube, Lester, and Reich (2016) critique the two-way fixed effects method, it is a “classic” specification used in many papers throughout the literature; it thus serves as a useful counterpart to the newer methodology of Dube, Lester, and Reich (2016).

To test Prediction 4—that the employment effect of the minimum wage is more negative when NCAs are unavailable—we examine whether the overall employment effect of the minimum wage found by both Dube, Lester, and Reich (2016) and Meer and West (2016) is moderated by states’ enforceability of NCAs. In states in which NCAs are unenforceable (like California), they are likely a less valuable tool to transfer utility than in states where they are highly enforceable.
(like Florida). For both studies, we add to their respective baseline estimating equations a term that interacts the log of the state’s minimum wage \((\log(MW))\) with \(\text{Enforce}\): the standardized state NCA enforceability score in 2009 from Bishara (2010), described above. The coefficient on this interaction term estimates the differential effect of a minimum wage increase for a state with the highest NCA enforceability relative to a state with the lowest enforceability; the coefficient on the main effect of the minimum wage estimates the effect of the minimum wage for a state with the lowest enforceability.

Table 8 shows our results. Panel A reports the extension of Dube, Lester, and Reich (2016), and Panel B reports the extension of Meer and West (2016). Column 1 in each panel replicates the overall employment effect of the minimum wage from each respective study: the coefficients on \(\ln(MW)\) in each panel reveal that Dube, Lester, and Reich (2016) finds an overall employment elasticity that is negative, but small in magnitude and statistically insignificant, whereas Meer and West (2016) finds an overall employment elasticity that is negative (-0.169) and highly statistically significant \((p < .01)\).

Introducing an interaction term with NCA enforceability in Column 2 reveals substantial heterogeneity in this average effect. Turning first to Panel A, the main effect on \(\ln(MW)\) implies that the employment elasticity of the minimum wage in the states with the lowest NCA enforceability is much more negative (-0.38, \(p = .024\)) than the average effect. On the other hand, the point estimate on the interaction term, 0.44 \((p = .011)\), implies that the employment elasticity of the minimum wage is substantially smaller when NCAs are available as a tool for firms to transfer utility: the combination of the main effect and interaction term implies that the elasticity is essentially zero in the state with highest enforceability.

Column 2 in Panel B reveals similar heterogeneity in the overall employment effect found
by Meer and West (2016) that mirrors what we found for the Dube, Lester, and Reich (2016) extension in Panel A. The main effect on $ln(MW)$ is negative, large in magnitude (-.620), and highly statistically significant ($p < .01$), whereas the interaction term implies a much more muted employment effect in states in which NCAs are enforceable (.624, $p < .01$); as in Panel A, the two coefficients together imply an employment elasticity of essentially zero in states with the highest enforceability.

These estimates, consistent with our model, imply that a minimum wage increase will lead to a larger reduction in employment when NCAs are a less potent tool to transfer utility between workers and owners. However, these results might be misleading if NCA enforceability is correlated with other variables that moderate the employment effects of the minimum wage. We address this concern in two ways. First, prior studies have shown NCA enforceability is uncorrelated with states’ political preferences (Lavetti, Simon, and White 2019), as well as an array of economic outcomes and cultural views (Hausman and Lavetti 2019). Second, we add controls to our model for the same labor laws we included as controls in Table 5. In both panels, Column 3 includes a dummy equal to one for states with right-to-work laws interacted with $ln(MW)$ to control for any differential effect the minimum wage might have in right-to-work states. Column 4 instead controls for $ln(MW)$ interacted with each state’s adoption of wrongful discharge laws that give exceptions to at-will employment (Autor, Donohue III, and Schwab 2006). The coefficients of interest are stable to the inclusion of these controls.

In sum, we find robust evidence that the employment effects of the minimum wage depend on the legal enforceability of NCAs, extending two recent studies on the topic that use different research designs, sample periods, and geographic coverage. Consistent with Prediction 4, the minimum wage has essentially zero effect on employment in states where NCAs are strictly
enforced (and thus available as a means to transfer surplus in firms). On the other hand, the minimum wage has a negative effect on employment in states where NCAs are unenforceable (and thus unavailable as a means to transfer surplus).

VI. Conclusion

Noncompete agreements are part of a large and growing share of employment relationships in the U.S., and questions about their rationale, effects, and efficiency have made NCAs a controversial topic. This paper shows that firms will use NCAs in some instances despite the fact that the costs borne by an employee outweigh the benefits the employer receives. We develop a theory with the implication that, when employees and employers are constrained in their ability to use the wage to equilibrate labor markets, NCAs arise as a nonpecuniary tool to transfer utility from employees to employers. Such constraints will only affect NCA use if NCAs are not used in an unconstrained world, which they will not be if the employee’s cost of an NCA exceeds the employer’s benefit. Our theory thus provides an explanation for why NCAs may be used in industries and occupations in which they appear to be a suboptimal contract, by highlighting the role of the terms of trade in the labor market and frictions in adjusting the wage.

Using a new survey of independent salon owners, we find strong empirical evidence that changes to transferability constraints have statistically significant and economically meaningful effects on NCA use. We provide some of the first evidence that changes to the labor market affect internal nonmonetary contracting decisions of firms. This evidence implies that some firms use NCAs that cause a net harm: that is, NCAs for which the employee’s cost outweighs the owner’s benefit. Otherwise, these firms would use NCAs regardless of market conditions. We then go on to find that the use of NCAs that cause a net harm are concentrated among a well-defined subset
of firms in our sample: those that *ex ante* have low capacity for investment.

Our findings highlight a social welfare tradeoff inherent in policies that would render NCAs unenforceable for low-wage workers. If NCAs exist that provide a net harm to firms, then on one hand, rendering NCAs unenforceable might decrease employment and firm formation among firms not productive enough to hire workers without an NCA, reducing surplus. On the other hand, such a policy would increase surplus in firms that are productive enough to hire workers without an NCA (but end up using them in equilibrium if NCAs are allowed). The net effect will depend on the magnitude of the difference between an NCA’s cost to an employee and the benefit to an employer, the degree of productivity differences across firms, and other factors. We note that there are other reasons that NCAs may reduce social surplus: NCAs depress entrepreneurship (Rauch and Watson 2014; Samila and Sorenson 2011), decrease labor market churn (Marx, Strumsky, and Fleming 2009), and lead to fewer job vacancies even for workers not bound by NCAs (Starr, Frake, and Agarwal 2019).

While our study analyzed how limited transferability via the wage affects NCA use specifically, there are other ways firms could transfer utility between employees and employers. Other job attributes that benefit the employer but cost the employee could also be used as a nonmonetary transfer of utility in the presence of wage frictions. Indeed, recent studies have considered how the minimum wage might affect on-call scheduling (Clemens and Strain 2020), fringe benefits (Clemens, Kahn, and Meer 2018), and worker productivity (Coviello, Deserranno, and Persico 2018; Ku 2018). Our theory and empirical framework generalize to other such job attributes, and future research could investigate whether the forces considered in this paper can also explain these changes.
References


Table 1

Summary Statistics

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<td>Ever used NCA</td>
<td>218</td>
<td>0.39</td>
<td>0.49</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Num stylists working in salon</td>
<td>218</td>
<td>7.13</td>
<td>8.79</td>
<td>4.00</td>
<td>0.00</td>
<td>52.00</td>
</tr>
<tr>
<td>Salon 2014 annual revenue, 000s</td>
<td>218</td>
<td>379.00</td>
<td>390.53</td>
<td>250.00</td>
<td>25.00</td>
<td>1500.00</td>
</tr>
<tr>
<td>% of stylists hired out of school</td>
<td>218</td>
<td>42.33</td>
<td>36.65</td>
<td>32.69</td>
<td>5.00</td>
<td>95.00</td>
</tr>
<tr>
<td>Appointment only</td>
<td>218</td>
<td>0.32</td>
<td>0.47</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Years in beauty industry</td>
<td>218</td>
<td>27.39</td>
<td>13.29</td>
<td>27.00</td>
<td>1.00</td>
<td>59.00</td>
</tr>
<tr>
<td>Age of owner</td>
<td>218</td>
<td>50.93</td>
<td>10.45</td>
<td>51.00</td>
<td>26.00</td>
<td>82.00</td>
</tr>
<tr>
<td>Emp-based salon</td>
<td>218</td>
<td>0.48</td>
<td>0.50</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Bishara State NCA score, standardized</td>
<td>218</td>
<td>0.62</td>
<td>0.33</td>
<td>0.76</td>
<td>0.07</td>
<td>1.00</td>
</tr>
<tr>
<td>Line of Credit</td>
<td>218</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td># applicants for last vacancy</td>
<td>195</td>
<td>6.79</td>
<td>9.37</td>
<td>4.00</td>
<td>0.00</td>
<td>60.00</td>
</tr>
<tr>
<td># applicants fewer than usual</td>
<td>218</td>
<td>0.31</td>
<td>0.46</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td># applicants same as usual</td>
<td>218</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td># applicants more than usual</td>
<td>218</td>
<td>0.10</td>
<td>0.30</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Num beauty salons in county, 2012</td>
<td>218</td>
<td>386.68</td>
<td>498.22</td>
<td>183.50</td>
<td>1.00</td>
<td>1762.00</td>
</tr>
</tbody>
</table>

Notes: Bishara score is a standardized measure of each state’s enforceability of NCAs. For all variables (except # applicants for last vacancy), we impute missing values by regressing each variable on the state’s Bishara score, the state’s minimum wage, a dummy for employment-based salons, and the number of salons in the respondent’s county, and generating predicted values for missing responses. Revenue, Number of Applicants, and Number of Salons in County topcoded at 99th percentile.
Table 2

The Relationship Between NCA Use, Terms of Trade, and Restrictions on Transferability

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DV=last hire signed NCA</td>
<td>0.0097</td>
<td>0.0096</td>
<td>0.0100</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0037)***</td>
<td>(0.0040)**</td>
<td>(0.0042)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td># applicants for last vacancy</td>
<td>0.0097</td>
<td>0.0096</td>
<td>0.0100</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0037)***</td>
<td>(0.0040)**</td>
<td>(0.0042)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in local Unemployment Rate 2006-12</td>
<td>0.041</td>
<td>0.040</td>
<td>0.030</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.020)**</td>
<td>(0.023)*</td>
<td>(0.021)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tipped Minimum Wage, 2014</td>
<td></td>
<td>0.029</td>
<td>0.026</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.015)*</td>
<td>(0.016)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bishara State NCA score, standardized</td>
<td>0.27</td>
<td>0.31</td>
<td>0.40</td>
<td>0.33</td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td>(0.10)***</td>
<td>(0.094)***</td>
<td>(0.100)***</td>
<td>(0.086)***</td>
<td>(0.085)***</td>
</tr>
<tr>
<td>Observations</td>
<td>195</td>
<td>218</td>
<td>218</td>
<td>195</td>
<td>195</td>
</tr>
<tr>
<td>(R^2)</td>
<td>0.148</td>
<td>0.117</td>
<td>0.115</td>
<td>0.162</td>
<td>0.171</td>
</tr>
<tr>
<td>Mean Dep Var</td>
<td>0.303</td>
<td>0.298</td>
<td>0.298</td>
<td>0.303</td>
<td>0.303</td>
</tr>
<tr>
<td>Cluster</td>
<td>none</td>
<td>CZ</td>
<td>state</td>
<td>CZ</td>
<td>state</td>
</tr>
</tbody>
</table>

Notes: The dependent variable is a dummy equal to one if the most recently hired stylist signed a NCA. Bishara score is a standardized measure of each state’s enforceability of NCAs. All regressions control for: Bishara score (a standardized measure of each state’s enforceability of NCAs), the percent of a salon’s stylists hired directly out of school, a dummy for employment-based salons, the owner’s age, the number of stylists working in the salon, and the number of salons in a respondent’s county. Linear Probability Model. Robust SEs, clustered at the level designated in the footer, in parentheses. ***P<.01, **P<.05, *P<.1
Table 3

Placebo Checks on the Relationship Between NCA Use and Terms of Trade

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
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<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable =</td>
<td>Last hire signed NCA</td>
<td>Used NCA prior to most recent hire</td>
<td>Used NCA in 2006 or earlier</td>
<td></td>
</tr>
<tr>
<td># applicants for last vacancy</td>
<td>0.0082</td>
<td>0.0025</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0034)**</td>
<td>(0.0036)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used NCAs prior to most recent hire</td>
<td>0.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.073)***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in local Unemployment Rate 2006-12</td>
<td>0.042</td>
<td>0.0021</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.021)*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used NCAs in 2006 or earlier</td>
<td>0.45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.11)***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>195</td>
<td>204</td>
<td>195</td>
<td>204</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.418</td>
<td>0.242</td>
<td>0.170</td>
<td>0.138</td>
</tr>
<tr>
<td>Mean Dep Var</td>
<td>0.303</td>
<td>0.294</td>
<td>0.267</td>
<td>0.172</td>
</tr>
<tr>
<td>Cluster</td>
<td>none</td>
<td>CZ</td>
<td>none</td>
<td>CZ</td>
</tr>
</tbody>
</table>

Notes: Columns 2 and 4 restrict to owners who reported being in the salon industry since at least 2006. All regressions control for: Bishara score (a standardized measure of each state’s enforceability of NCAs), the percent of a salon’s stylists hired directly out of school, a dummy for employment-based salons, the owner’s age, the number of stylists working in the salon, and the number of salons in a respondent’s county. Linear Probability Model. Robust SEs, clustered at the level designated in the footer, in parentheses. ***\( P<.01 \), **\( P<.05 \), *\( P<.1 \)
Table 4

The Effect of Changes in Local House Prices 2006-2009 on NCA Use

<table>
<thead>
<tr>
<th>DV = last hire signed NCA</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log change median home price 2006-2009</td>
<td>-0.38</td>
<td>-0.29</td>
</tr>
<tr>
<td></td>
<td>(0.16)**</td>
<td>(0.17)*</td>
</tr>
<tr>
<td>Used NCAs in 2006 or earlier</td>
<td>0.44</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>(0.11)***</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>204</td>
<td>204</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.125</td>
<td>0.237</td>
</tr>
<tr>
<td>Mean Dep Var</td>
<td>0.294</td>
<td>0.294</td>
</tr>
</tbody>
</table>

Notes: The dependent variable is a dummy equal to one if the most recently hired stylist signed a NCA. The sample is restricted to owners who reported being in the beauty industry since 2006. The Log Change in Median Home Prices 2006-2009 is the log change in the median house price in the salon’s county, based on data from Zillow. All regressions control for: Bishara score (a standardized measure of each state’s enforceability of NCAs), the percent of a salon’s stylists hired directly out of school, a dummy for employment-based salons, the owner’s age, the number of stylists working in the salon, and the number of salons in a respondent’s county. Linear Probability Model. Robust SEs, clustered by commuting zone, in parentheses. ***$P<.01$, **$P<.05$, *$P<.1$
Table 5

NCA Use and the Minimum Wage: Robustness Checks

<table>
<thead>
<tr>
<th></th>
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<th>(3)</th>
<th>(4)</th>
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</thead>
<tbody>
<tr>
<td>DV = last hire signed NCA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tipped Minimum Wage, 2014</td>
<td>0.029</td>
<td>0.043</td>
<td>0.077</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.015)*</td>
<td>(0.013)***</td>
<td></td>
<td>(0.023)***</td>
<td></td>
</tr>
<tr>
<td>Emp-based salon=0 × Tipped</td>
<td></td>
<td></td>
<td>0.033</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum Wage, 2014</td>
<td></td>
<td></td>
<td></td>
<td>(0.017)*</td>
<td></td>
</tr>
<tr>
<td>Emp-based salon=1 × Tipped</td>
<td></td>
<td></td>
<td>0.071</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum Wage, 2014</td>
<td></td>
<td></td>
<td></td>
<td>(0.025)***</td>
<td></td>
</tr>
<tr>
<td>Untipped Minimum Wage, 2014</td>
<td></td>
<td></td>
<td>0.016</td>
<td>-0.16</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.073)</td>
<td>(0.079)*</td>
</tr>
<tr>
<td>Observations</td>
<td>218</td>
<td>218</td>
<td>218</td>
<td>218</td>
<td>218</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.115</td>
<td>0.126</td>
<td>0.167</td>
<td>0.104</td>
<td>0.140</td>
</tr>
<tr>
<td>Mean Dep Var</td>
<td>0.298</td>
<td>0.298</td>
<td>0.298</td>
<td>0.298</td>
<td>0.298</td>
</tr>
<tr>
<td>Mean Dep Var, Emp-based salons</td>
<td>0.410</td>
<td>0.410</td>
<td>0.410</td>
<td>0.410</td>
<td>0.410</td>
</tr>
<tr>
<td>Mean Dep Var, Non-emp-based salons</td>
<td>0.195</td>
<td>0.195</td>
<td>0.195</td>
<td>0.195</td>
<td>0.195</td>
</tr>
<tr>
<td>Right-to-work and WDL controls</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

Notes: All regressions control for: Bishara score (a standardized measure of each state’s enforceability of NCAs), the percent of a salon’s stylists hired directly out of school, a dummy for employment-based salons, the owner’s age, the number of stylists working in the salon, and the number of salons in a respondent’s county. Right-to-work and WDL controls are, respectively, 1) a dummy equal to one if a state had adopted Right-to-Work laws as of 2015, and 2) a mean of three dummies, each indicating if a state had passed one of three Wrongful Discharge Laws as of 2000. Emp-based salon is a dummy if the salon hires stylists as employees. The specification in Column 3 is a fully-interacted model, meaning that Emp-based salon is also interacted with each of the additional controls variables. Linear Probability Model. Robust SEs clustered by state in parentheses. ***P<.01, **P<.05, *P<.1
### Table 6

The Relationship Between Investment in Transferable Assets and NCA Use

<table>
<thead>
<tr>
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<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Outcomes related to investment in client attraction</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Social Media</td>
<td>-0.036</td>
<td>0.059</td>
<td>0.11</td>
<td>0.11</td>
<td>0.081</td>
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<tr>
<td></td>
<td>(0.058)</td>
<td>(0.062)</td>
<td>(0.052)**</td>
<td>(0.066)</td>
<td>(0.069)</td>
<td>(0.043)**</td>
</tr>
<tr>
<td>Ever used NCA</td>
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<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Line of Credit</td>
<td>0.10</td>
<td>0.072</td>
<td>0.077</td>
<td>0.19</td>
<td>0.12</td>
<td>0.068</td>
</tr>
<tr>
<td></td>
<td>(0.054)*</td>
<td>(0.063)</td>
<td>(0.046)*</td>
<td>(0.065)***</td>
<td>(0.068)*</td>
<td>(0.050)</td>
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<td>Observations</td>
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<td>218</td>
<td>218</td>
<td>218</td>
<td>218</td>
<td>218</td>
</tr>
<tr>
<td>Mean Dep Var</td>
<td>0.807</td>
<td>0.720</td>
<td>0.115</td>
<td>0.583</td>
<td>0.362</td>
<td>0.798</td>
</tr>
</tbody>
</table>

Notes: The dependent variable in each column is a dummy for whether the employer indicated using the corresponding tool. All regressions control for: Bishara score (a standardized measure of each state’s enforceability of NCAs), the percent of a salon’s stylists hired directly out of school, a dummy for employment-based salons, the owner’s age, the number of stylists working in the salon, and the number of salons in a respondent’s county. Linear Probability Model. Robust SEs in parentheses. ***P<.01, **P<.05, *P<.1
Table 7
Labor Market Conditions Only Affect NCA Use Among Financially Constrained Firms

<table>
<thead>
<tr>
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<th>(2)</th>
<th>(3)</th>
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<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
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<tbody>
<tr>
<td>Dep Var = last hire signed NCA</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Line of Credit</td>
<td>0.15</td>
<td>0.17</td>
<td>0.27</td>
<td>0.11</td>
<td>0.11</td>
<td>0.43</td>
<td>0.11</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>(0.065)**</td>
<td>(0.064)**</td>
<td>(0.072)**</td>
<td>(0.064)*</td>
<td>(0.063)*</td>
<td>(0.16)**</td>
<td>(0.072)</td>
<td>(0.13)**</td>
</tr>
<tr>
<td># applicants for last vacancy</td>
<td>0.010</td>
<td>0.017</td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(0.0039)***</td>
<td>(0.0029)***</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Line of Credit=1 × # applicants for last vacancy</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0062)***</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in local UR 2006-12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.041</td>
<td>0.083</td>
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<td></td>
<td></td>
<td></td>
<td>(0.021)**</td>
<td>(0.021)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line of Credit=1 × Change in local UR 2006-12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.083</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.036)**</td>
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<tr>
<td>Tipped Minimum Wage, 2014</td>
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<td></td>
<td></td>
<td></td>
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<td>0.042</td>
<td>0.062</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.014)***</td>
<td>(0.014)***</td>
<td></td>
</tr>
<tr>
<td>Line of Credit=1 × Tipped Minimum Wage, 2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.042</td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>(0.016) **</td>
<td></td>
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</tr>
<tr>
<td>Observations</td>
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<td>195</td>
<td>195</td>
<td>218</td>
<td>218</td>
<td>218</td>
<td>218</td>
<td>218</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.139</td>
<td>0.177</td>
<td>0.200</td>
<td>0.115</td>
<td>0.130</td>
<td>0.151</td>
<td>0.137</td>
<td>0.153</td>
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<tr>
<td>Mean Dep Var</td>
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<td>0.303</td>
<td>0.303</td>
<td>0.298</td>
<td>0.298</td>
<td>0.298</td>
<td>0.298</td>
<td>0.298</td>
</tr>
</tbody>
</table>

Notes: All regressions control for: Bishara score (a standardized measure of each state’s enforceability of NCAs), the percent of a salon’s stylists hired directly out of school, a dummy for employment-based salons, the owner’s age, the number of stylists working in the salon, and the number of salons in a respondent’s county. Linear Probability Model. Robust SEs clustered by commuting zone in Columns 4-6 and by state in Columns 7-8, in parentheses. ***P<.01, **P<.05, *P<.1
Table 8

NCA Enforceability Moderates the Employment Effects of the Minimum Wage

<table>
<thead>
<tr>
<th></th>
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<th>(3)</th>
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<tbody>
<tr>
<td></td>
<td>DV = log county employment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln(Min wage)</td>
<td>0.022</td>
<td>-0.38</td>
<td>-0.41</td>
<td>-0.40</td>
</tr>
<tr>
<td></td>
<td>(0.064)</td>
<td>(0.16)**</td>
<td>(0.17)**</td>
<td>(0.18)**</td>
</tr>
<tr>
<td>ln(Min wage)*NCA Enforceability Score</td>
<td>0.44</td>
<td>0.45</td>
<td>0.43</td>
<td>0.43</td>
</tr>
<tr>
<td></td>
<td>(0.17)**</td>
<td>(0.17)***</td>
<td>(0.16)**</td>
<td>(0.18)***</td>
</tr>
<tr>
<td>Observations</td>
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<td>78528</td>
<td>78528</td>
<td>78528</td>
</tr>
<tr>
<td>Right to work</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Wrongful Discharge Law</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
</tbody>
</table>

Panel B: Meer and West (2016) Replication

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DV = log state employment</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>ln(Min wage)</td>
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<td>-0.629</td>
<td>-0.606</td>
<td>-0.598</td>
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<tr>
<td></td>
<td>(0.038)**</td>
<td>(0.136)**</td>
<td>(0.138)**</td>
<td>(0.153)***</td>
</tr>
<tr>
<td>ln(Min wage)*NCA Enforceability Score</td>
<td>0.624</td>
<td>0.612</td>
<td>0.614</td>
<td>0.614</td>
</tr>
<tr>
<td></td>
<td>(0.183)**</td>
<td>(0.184)***</td>
<td>(0.184)***</td>
<td>(0.184)***</td>
</tr>
<tr>
<td>Observations</td>
<td>1785</td>
<td>1785</td>
<td>1785</td>
<td>1785</td>
</tr>
<tr>
<td>Right to work</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Wrongful Discharge Law</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
</tbody>
</table>

Notes: The table reports estimates that replicate, and build from, Dube, Lester, and Reich (2016) and Meer and West (2016) in Panels A and B, respectively. Column 1 replicates the baseline estimates of the employment elasticity of the minimum in each paper, which in Panel A is for restaurant workers and reported in Column (4), Row (2), of Table 3 in Dube, Lester, and Reich (2016), and for Panel B is reported in Column (3) of Table 2 in Meer and West (2016). In Panel A, the regressions include county fixed effects, and period fixed effects interacted with county pairs (adjacent counties on state borders), and robust standard errors, in parentheses, are clustered at the state and border-segment level. In Panel B, the regressions include state fixed effects, year-by-Census region fixed effects, as well as states’ log-population, the share aged 15–59, and log real gross state-product per capita, and robust standard errors, in parentheses, are clustered at the state level. Columns 2–5 of Panel B also include year fixed effects interacted with states’ NCA Enforceability Score. See Online Appendix C, and Dube, Lester, and Reich (2016) and Meer and West (2016), for further details. NCA Enforceability Score, a variable ranging from zero to one, is a normalized measure of each state’s 2009 NCA enforceability score from Bishara (2010). Column (3) includes a dummy equal to one if a state passed a Right-to-Work law as of 2009 interacted with ln(MW). Column (4) does the same, but for a variable equal to the mean of three dummies, each indicating if a state had passed one of three Wrongful Discharge Laws as of 2000. ***p.<.01., **p.<.05, *p.<.1
(a) With no constraints, the firm will contract in a way that maximizes joint surplus: here, NCAs cause a net harm to the pair, so no contract includes an NCA.

(b) With a transferability constraint, the Pareto frontier includes contracts with NCAs.

(c) If the terms of trade favor the employee, contracts will not include NCAs.

(d) If the terms of trade favor employers, contracts will include NCAs, even though they cause a net harm to the pair.

Figure 1

How Labor Market Conditions Determine NCA Use When the NCA Causes a Net Harm to the Employer-Employee Pair.
(a) With no constraints, firms will use optimal contracts: here, NCAs cause a net benefit to the pair, so such contracts include NCAs.

(b) With a transferability constraint, the Pareto frontier still only includes contracts with NCAs.

Figure 2

How Labor Market Conditions Determine NCA Use When the NCA Provides a Net Benefit to the Employer-Employee Pair.
Figure 3: Binned Scatterplots Showing that Wage Constraints Only Affect NCA Use for Firms Without a Line of Credit With a Bank

Panel A: # Applicants

Panel B: Change in Local Unemployment Rate

Panel C: Tipped Minimum Wage

Notes: Each panel displays a binned scatterplot with Last Hire Signed NCA on the y-axis, and the variable in the graph title. In Column (1), the sample includes salon owners without a line of credit with a bank, and in Column (2) the sample includes owners with a line of credit. All variables are residualized from the set of controls used in the regressions.
For example, Starr, Prescott, and Bishara (2019) find that 12% of workers making less than $20,000 a year were bound by an NCA, compared to 19% for the overall population.


These are the Mobility and Opportunity for Vulnerable Employees (MOVE) Act (Senate bill S. 1504. Full text available at https://www.govtrack.us/congress/bills/114/s1504/text), and the Limiting the Ability to Demand Detrimental Employment Restrictions (LADDER) Act (House of Representatives bill H.R.2873. Available at https://www.congress.gov/bill/114th-congress/house-bill/2873/text).

Some examples include Washington (HB 1926; introduced February 2, 2015), Utah (HB 251; introduced February 1, 2016), Massachusetts (H.4434; substituted for H.4323 June 27, 2016), and Illinois (Illinois Freedom to Work Act; went into effect January 1, 2017)


This insight shares features with the model in Clemens, Kahn, and Meer (2018), who show that a higher minimum wage induces firms to decrease their provision of employer-sponsored health insurance. Our theory complements theirs, as we additionally consider how labor market
conditions—which determine whether or not the minimum wage is binding—affect NCA use. Furthermore, we analyze how the minimum wage affects employment depending on whether nonmonetary aspects of contracts (for example NCAs) are available or unavailable (see Prediction 4).

10 In reality, the marginal firm may respond to a binding transferability constraint by adjusting the intensive margin of hiring (for example, opting to hire fewer workers) rather than the extensive margin (shutting down the firm altogether). Because our simplified model only considers firms consisting of a single employer-employee pair, the intensive margin is irrelevant. When we test this prediction empirically in Section IV.B.3 by examining how NCA enforceability moderates employment responses to minimum wage changes, these results will reflect both adjustments at the extensive and intensive margins.

11 Conversations we had with hair salon owners bolstered the idea that NCAs are not only widely used in this industry, but that they are also highly salient to both owners and workers. We spoke with four owners who had their new hires sign NCAs, and each said they explicitly go over the NCA with the worker at the time of hire. Two of the four owners had previously gone to court to enforce the NCA of a worker who had violated one.

12 https://www.bls.gov/oes/current/oes395012.htm

13 See https://www.dol.gov/whd/state/tipped.htm for minimum wages by state.

14 Prior studies have also highlighted how salient the minimum wage is in this industry: in an extreme case, a 2010 survey by the National Employment Law Project found that 36% of surveyed workers in hair and beauty salons in New York City were paid below the minimum wage, in violation of the law Bernhardt et al. (2010).

15 http://www.probeauty.org
While the survey of stylists may have generated new insights in this domain, the response rate was unfortunately too low to be of any empirical use.

Private email correspondence by authors with PBA staff on 11/19/2015.

We note that we use the terms “employer" and “owner" interchangeably for the most part; however, we use the term “owner" when discussing the survey and the empirical results relating to the survey, since the survey was explicitly conducted of salon owners. Some salons use an independent contractor model, and the owners of such salons are therefore not employers in the strictest sense of the word.

In the canonical search model of the labor market of Mortensen and Pissarides (1994), exogenous positive shocks to the separation rate, the cost of capital, the cost of hiring a worker, or exogenous negative shocks to production technology lead to an increase in the equilibrium unemployment rate and a decrease in the equilibrium wage. In the “implicit contracts” model of the labor market Beaudry and DiNardo (1991), a causal negative relationship between the unemployment rate and wages arises, regardless of the reason for variation in the unemployment rate, due to the effect of the unemployment rate on workers’ reservation wage.

We identified each salon’s county from the zip code the owner reported, using a zip code–county crosswalk. Of the 218 respondents to our survey, we have 139 unique counties.

Our results are robust to using different years as start and end points to calculate the change in the unemployment rate (that is, using 2005 or 2007 as the start point, or using 2011 or 2013 as the end point).

There is overwhelming evidence that the overall increase in the unemployment rate over this period, as well as regional variation in the change, were due to factors other than increases in worker bargaining power or unemployment benefits (therefore justifying the mild assumptions.
necessary for the model of Mortensen and Pissarides (1994) to generate a negative relationship between the unemployment rate and the wage). County-level variation in the increase in non-employment over the Great Recession was driven by variation in the deterioration in housing net worth Mian and Sufi (2014), which points to a demand-level channel akin to a negative shock to production technology. Additionally, the cost of capital for small business increased in the Great Recession Greenstone, Mas, and Nguyen (2020).

23 See Bishara (2010) for a more thorough description of the data.

24 We identify beauty salons in County Business Patterns by NAICS industry code 812112.

25 All of our results are essentially unchanged when we instead use multiple imputation methods to impute missing values.

26 There is an active legal debate surrounding the extent to which NCAs signed by independent contractors should be enforceable. Currently, parties seeking to enforce NCAs signed by independent contractors may face a stricter burden of proof in court due to, for example, lack of clarity over ownership of relevant production assets such as customer bases. For one example of a decision which highlights this debate, see AG Spectrum Co. v. Elder, 181 F. Supp. 3d 615 (S.D. Iowa 2016).

27 The following variables in Table 1 had non-responses that we imputed (number of non-responses in parentheses): # Stylists Working in Salon (15); Salon 2014 Annual Revenue (10); % of stylists hired out of school (15); Years in beauty industry (3); Age of owner (24).

28 We obtain essentially identical statistical significance in all models using a logit or probit specification.

29 In theory, whether a salon is employment-based or not could itself be an outcome of our explanatory variables (for example the minimum wage). Our results are all robust to excluding this
variable from our set of controls.

Because we had many covariates we thought might be relevant to our analysis, we ran the risk of over-fitting the data by including all of them. Instead, we selected this set of covariates using an approach involving Least Absolute Shrinkage and Selection Operator (LASSO) outlined in Belloni, Chernozhukov, and Hansen (2014). LASSO penalizes having too many parameters in the model, and uses cross-validation to determine the subset of regressors that yields the best out-of-sample predictions of the dependent variable. LASSO ensures that we are objective in model selection. Following Belloni, Chernozhukov, and Hansen (2014), we run two LASSO regressions: the first with the dependent variable equal to one if the most recently hired stylist signed an NCA, and the second with the dependent variable equal to the number of applicants received for the most recent position. We keep the union of regressors selected in both LASSOs. We also include the number of salons in the owner’s county, which was not selected in this LASSO procedure, but which we include to ensure that # Applicants can be interpreted as labor supply, rather than reflecting the size of the beauty industry in the local labor market. For simplicity, we use the set of controls from the variable selection procedure for # Applicants model for each subsequent model. We obtain essentially identical results if we instead use the approach in Belloni, Chernozhukov, and Hansen (2014) to separately choose controls for the unemployment rate and minimum wage.

While our unemployment rate variation is at the county level, we cluster by commuting zones (which are themselves clusters of counties typically thought of as comprising a local labor market) to account for spatial dependence.

It is possible that the number of applicants is not representing a measure of labor supply, but rather proxies for overall turnover rates in the labor market, which could lead to increased NCA
use since an NCA might be more valuable when potential turnover is high. To assess the relevance of this concern, we obtained the 2014Q4 county-level turnover rate from the Quarterly Workforce Indicators dataset (described in Section V). This variable calculates “the rate at which stable jobs begin and end” by “summing the number of stable hires...and stable separations...and dividing by the average full-quarter employment” (source: https://lehd.ces.census.gov/doc/QWI_101.pdf). Including this variable as an additional control does not affect the magnitude or significance of the estimate (the coefficient on # Applicants becomes 0.0094; p=0.011), suggesting that it is not merely proxying for overall labor market churn.

33 Lavetti, Simon, and White (2019) estimate a coefficient of 0.305: see Table A7 of their Appendix. On the other hand, Starr, Prescott, and Bishara (2019) find that NCA enforceability has little predictive power on whether a worker has signed an NCA.

34 The mean of this variable is 0.036: 7% of our sample switched out of using NCAs, 10% switched in to using NCAs, and 83% did not change their NCA use.

35 Specifically, there are three exceptions to at-will employment that have been adopted across various states and years in the U.S. since 1970. Starting with three dummies indicating if a state had adopted each exception as of 2000, we create a variable equal to the mean of these three dummies to capture each state’s level of exceptions. This variable has a mean of 0.63 in our sample.

36 The coefficient on Right-to-Work status has a point estimate of 0.11 (p = .16), suggesting that NCA use is higher in right-to-work states. This relationship is consistent with the idea that right-to-work laws are correlated with other pro-business policies and climates that tend to shift terms of trade towards owners and away from workers Holmes (1998). Similarly, the coefficient on the presence of wrongful discharge laws is negative, though very imprecisely estimated (-0.04, p = .71), which would be expected if wrongful discharge laws, which establish greater protections for
workers, shift the terms of trade away from owners.

37 This regression is a fully interacted model, meaning that \textit{Emp-based Salon} is also interacted with the Bishara score and each of the additional controls. We use this approach because NCA enforceability, for example, may have a different effect on NCA use for employment-based and contractor-based salons. For example, the burden of proof the owner must provide to argue that an NCA supports a legitimate business interest is likely more stringent if a worker is an independent contractor rather than an employee. See Footnote 3.2 for more discussion.

38 The one exception in our sample is the state of Connecticut, in which workers in beauty salons must be paid the untipped minimum wage from the owner of their salon.

39 This mechanism is similar for related contracts firms use to limit worker mobility, such as training contracts (Hoffman and Burks 2017).

40 The magnitude of our result on training is strikingly similar to Starr, Prescott, and Bishara (2019): we find salons using NCAs are 11 percentage points more likely to offer training, relative to a sample mean of 0.8. Starr, Prescott, and Bishara (2019) find workers that have signed an NCA are 7.5 percentage points more likely to receive training, or 15% of the sample mean of 50%.

41 In unreported results, we predicted the first principal component of the five measures of client attraction to create a summary measure of firms’ investment in client attraction. We ran the same regression underlying each column of Panel A of Table 6, but with this principal component as the dependent variable. The estimated coefficient was positive (as expected) but not statistically significant (p=.25). However, the principal component placed large weight on the vectors associated with “social media” and “website,” both of which we expect to be the least associated with NCA use: both are cheap, widely used in our sample, and unlikely to be subject to a hold-up problem. If we estimate the principal component of the client attraction measures excluding either
the “social media” or “website” measures, the coefficient is positive and statistically significant in each case.

42 Owners with a line of credit likely differ from those without a line of credit for reasons other than their capacity to make investments. As long as these other unobserved traits are orthogonal to NCA use, then they will not affect the interpretability of our results. We discuss this concern in more detail in the next section.

43 In Online Appendix A.5, we formally show that this intuition holds in a market equilibrium.

44 Also note the coefficient on \# Applicants, 0.01, is nearly identical to that obtained without controlling for Line of Credit (Table 2, Column 1), which provides further evidence that \# Applicants is a measure of labor market conditions rather than driven by an unobserved owner-specific factor (at least one correlated with access to a line of credit).

45 The relationships shown in these figures are not driven by outliers in \# Applicants (that is, the single dots furthest to the right in both columns of Panel A): dropping the observations with the top 5% \# Applicants actually slightly increases the slope of the relationship for owners without a line of credit.

46 We get identical estimates using the 2006-2009 county-level log change in house prices: a larger decline in house prices is associated with higher NCA use among salons without a line of credit, and has essentially no effect among salons with a line of credit.


48 The estimating equation that we replicate is Equation 4 in Dube, Lester, and Reich (2016); see Online Appendix C for details.
The restaurant industry is a ripe setting to test the effects of NCA enforceability, as recent evidence highlights that NCAs are common in this industry. The recent scandal over Jimmy Johns (a fast-food sandwich chain) using NCAs for minimum wage workers is one salient example. A website targeted to restaurant professionals has a post, dated 4/7/2018, describing why it is important for restaurant owners to include NCAs in employees’ contracts (https://pos.toasttab.com/blog/restaurant-employment-agreement, accessed 2/1/2019).

In particular, we replicate the estimate in Column 3 of Table 2 in Meer and West (2016). The results that follow are essentially unchanged if we use any of the other specifications in Columns 1–4 of Table 2 in Meer and West (2016).

NCA enforceability could theoretically change the employment effect of the minimum wage for reasons other than allowing transferability of utility. However, plausible alternative explanations yield an opposite prediction to our own. For example, stricter NCA enforceability could mean workers that lose their job after a minimum wage increase stay non-employed for a longer duration because they are unable to take a new job that violates their prior NCA. However, this story implies that stricter enforceability leads to a larger effect of the minimum wage on employment, which is the opposite of our model’s prediction.

Note that there have been changes to NCA enforceability over the relevant time period. Hausman and Lavetti (2019) find 52 changes to NCA enforceability over the period 1991 to 2011. For simplicity, our estimates use the 2009 enforceability score, but we obtain essentially identical estimates if we use the 1991 enforceability score.

This estimate corresponds to Table 3, Column 4, Row 2 in Dube, Lester, and Reich (2016).

As in Table 5, we create a variable equal to the mean of three dummies indicating whether a state had adopted each of the three exceptions to at-will employment as of the year 2000.