Corporate Culture as an Implicit Contract*

Jessica Jeffers
University of Chicago, Booth

Michael Junho Lee
Federal Reserve Bank of New York

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Abstract

We develop a measure of corporate culture using coworker connectivity on LinkedIn's platform, and show it is strongly correlated with positive employee relations and satisfaction. Using state-level changes to employment agreements as shocks to explicit contracts, we find that these changes significantly impact employees in weakly connected firms, but have little to no effect on those at strongly connected firms. Our results suggest that firms with strong corporate culture are less dependent on explicit contracts to retain human capital. We document implications for firms' investment decisions and other outcomes.

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*Jessica Jeffers, jessica.jeffers@chicagobooth.edu. Michael Junho Lee, michael.j.lee@ny.frb.org. The views expressed in this paper are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System. We are grateful to LinkedIn for making the data for this project available to us through the Economic Graph Challenge. We thank Guy Berger, Jillian Grennan, David Matsa, Paige Ouimet, Ashwini Agrawal, and participants at various presentations including those at the NY Fed, Rome Junior Finance Conference, 2019 AEA meetings, and 2019 MFA meetings for thoughtful comments and feedback.

1 Introduction

Corporate culture is commonly viewed by executives as one of the most important factors that determine firm value (Graham, Harvey, Popadak and Rajgopal 2016). However, empirically, little is understood about the exact channels through which corporate culture can impact firm value. Using novel data on internal networks and employee flows, this paper provides empirical evidence that corporate culture, measured by connectivity among coworkers, may function as an implicit contract between a firm and its employees.

Theoretical studies posit the role of corporate culture as an implicit contract (Kreps 1996). Intrafirm reputation works to create a self-enforcing implicit contract between workers and firms to facilitate optimal long-term relationships, which cannot otherwise be achieved via explicit contracts due to asymmetric information or incomplete contracts (Bull 1987), and provide a foundation for the theory of the firm (Baker, Gibbons and Murphy 2002). Whether a firm's corporate culture aligns with values that are attractive to its employees (Meglino, Ravlin and Adkins 1989), establishes a cohesive vision (Crémer 1993), or improves coordination (Bolton, Brunnermeier and Veldkamp 2013), it can establish credible expectations between the firm and its employees that can shape the sustainability of long-term relationships and investments.

In this paper, we focus on a specific dimension of corporate culture: connectivity among coworkers.[1] Building on existing studies that relate corporate culture to the structure of internal networks (Provan, Fish and Sydow 2007, Kogut 2000), we argue that firms whose employees interact more, and whose employees view within-firm relationships as a valuable professional investment, will all else equal tend to be more connected. In this sense, strong connectivity is a proxy for workers who view their relationship with the firm as a longer-term objective. We quantify the strength of this dimension using proprietary access to LinkedIn's professional network data.

Consistent with this framework, we find that internal connectivity is strongly positively correlated with positive signals of workplace culture. Specifically, we consider three measures of internal connectivity, normalized by industry and year: (1) average within-firm connections, (2) the ratio of internal to external connections, and (3) *absorption*. The first measure

[1] Other dimensions of corporate culture include principles and values of the firm (Guiso, Sapienza and Zingales 2015a), leadership (Bertrand and Schoar 2003), corporate governance (Grennan 2019); see also Graham, Harvey, Grennan and Rajgopal (2019) for a more structured overview.

captures how connected coworkers are with each other; the second captures how connected coworkers are with each other, relative to their entire professional network; and the third captures how much new employees are connected with coworkers within their first year of joining. The relation between these measures and corporate culture is discussed in greater detail in Section 3.1.

We show that each of these measures is positively correlated with strengths in employee relations, and negatively correlated with concerns, using MSCI's KLD database. We also find each of these measures correlates with the company's presence on Fortune's "100 Best Companies to Work For" lists. Interestingly, we document substantial heterogeneity across firms for these measures, which suggests that strong connectivity may not be the equilibrium choice for all firms.

We apply these measures to test the hypothesis that corporate culture functions as an implicit contract. Intuitively, we propose that if strong connectivity (SC) firms are able to use implicit contracts, they should be less sensitive to changes in explicit contracts. One of the key purported values of strong culture is to foster long-term investments, by aligning employees' efforts with the firm's longer term objectives (Kreps 1996). Correspondingly, we turn to an explicit contracting tool also designed to foster long-term investments: non-compete agreements (NCs).

NCs represent an ideal setting to test our hypothesis for two reasons. First, NCs are intended to encourage firm investment into workers (Starr 2018, Lavetti, Simon and White 2014), by barring employees from working in a competing activity for a period of time after leaving the firm. NCs are thus an explicit counterpart to the implicit contracts described in work such as Baker et al. (2002): they are a way for firms without access to implicit contracts to complete the contracting space, in order to develop long-term relationships with employees. Second, previous work has shown that NCs are binding for skilled employees, causing a sharp drop-off in departure rates when NCs become more enforceable (Jeffers 2018). This means there is an observable baseline impact, on which we can test the potential mitigating effect of connectivity. We exploit eight state-level changes in the enforceability of NCs from 2009 to 2013, to test whether SC and WC firm are differentially impacted.

Our main result: we find that while changes in these restrictive agreements significantly impact WC firms, the impact dissipates almost entirely for SC firms. Specifically, departure rates of skilled employees decline by 63 basis points in WC firms, but only 3 basis points for

SC firms. This result is consistent with the the view that strong corporate culture increases firms' resilience to changes in the explicit contracting environment. Additionally, we provide suggestive evidence that firms' prospects are affected, by showing that market-to-book and return on assets increase in SC firms following these changes, relative to WC firms.

Our contribution is twofold. First, we propose a new approach to quantitatively measure one dimension of corporate culture, using the properties and formation of internal networks. This approach has the advantage of generating quantifiable measures of firm characteristics, for a broad set of firms. It also complements existing survey-based research by building on individually rational voluntary behavior. Moreover, this approach provides some insight into the underpinnings of commonly-used employee satisfaction and well-being measures, by showing that these correlate with measures of interaction among employees.

Second, we complement the burgeoning literature that explores the implications of corporate culture by building a relation between the characteristics of intrafirm networks and their impact on firms' ability to retain human capital and foster long-term investments. This supports a deep theoretical literature that studies the use of implicit contracts, and complements empirical research on the link between culture and implicit or institutional structures that guide coordination (Greif 1993, Greif 1994, Sheridan 1992). Our implications on firm outcomes contribute to the ongoing debate on tradeoffs regarding the policies aimed at protecting firms' intangible capital, such as non-competes (Jeffers 2018). In addition, by highlighting a clear role through which corporate culture may directly impact firm value (Grennan 2019), we add to existing evidence that firms realize long-run benefits from cultivating strong corporate culture (Sørensen 2002, Huselid 1995, Guiso, Sapienza and Zingales 2015b).

It is noteworthy that while corporate culture is increasingly recognized as important, there exists wide dispersion on what it is and how to study it (Graham et al. 2019). Our approach is to treat culture as a form of intangible asset that firms can strategically invest into and maintain. In this context, building a culture that is effective at retaining human capital is costly, just as designing, managing, and enforcing sophisticated labor contracts are. While culture may exhibit high persistence (Tirole 1996), this approach is conducive to the view that culture, albeit costly, is something that organizations can actively cultivate and reform.

More broadly, this paper contributes to the literature that studies the causal impact of

culture on economic growth. Corporations provide an accessible and practical setting to study and better identify the ramifications of culture (Guiso et al. 2015a). In particular, this paper provides evidence that coworker connectivity leads to lower dependence on explicit contracts. This builds on Bloom, Eifert, Mahajan, McKenzie and Roberts (2013), who show that organizational structure has a significant impact on firm productivity. As human capital becomes a significant component of firm value, we show that firm culture may play a strategic role for firms in retaining key employees and making long-term investments.

The rest of the paper is as follows. Section 2 describes the data. In Section 3, we explore the relationship between connectivity and employee culture. In Section 4, we turn to the role of culture as an implicit contract. We conclude in Section 5.

2 Data

2.1 LinkedIn Network Data

LinkedIn is an online professional networking platform, which began in 2003 and has currently has over 450 million global users. In 2015, LinkedIn selected a small number of researchers to be part of the Economic Graph Challenge, an initiative to harness LinkedIn's data to gain new economic insight.As part of this group, we were granted access to detailed de-identified data from LinkedIn's platform. The data contain no name information and numerical member identifiers in the data are hashed. The data include about 52 million employment histories in the US, or roughly one third of the US workforce.[2]

We extract employment histories from users' profiles on LinkedIn, which includes data on employment location, work capacity, occupation, seniority, and other background information. This information is further augmented by LinkedIn through standardization: for example, occupation type and seniority levels are standardized in order to be comparable across individuals. This enables us in particular to identify employees in knowledge-intensive occupations, for which our natural experiment is most applicable. As users can retroactively provide past work experience, the data provide us with rich information on individual-level employment movements between firms.

[2]According to the Bureau of Labor Statistics, the size of the U.S. labor force was approximately 158 million by the end of 2015.

Network characteristics are based on observable connections formed between members of LinkedIn. These data include the direction of connections and the time and date at which the connection was formed. Combined with employment and background information extracted from members' profiles, we are able to measure various network characteristics of firms' internal networks and their changes over time.

LinkedIn data are merged to Compustat in order to observe firm outcomes. Figure A.1 shows the coverage of LinkedIn by sector for this sample, using the number of U.S. employees observed on LinkedIn relative to the number of employees reported on Compustat. The aggregate coverage rate is 30%. Our sample also has a higher concentration of white-collar occupations, such as engineers and managers, relative to blue-collar occupations, such as maintenance and construction. "Knowledge-intensive" occupations like the former are more likely to be affected by NCs (Jeffers 2018, Starr, Bishara and Prescott 2016). We take advantage of this feature and the granularity of our data to focus on departures most likely to be affected by NCs: the movement of individuals in knowledge-intensive occupations to positions of higher seniority than what they left (i.e., external promotions, building on the individual's prior experience). This allows us to have a more precise experiment, and works against us in finding a mitigating effect for connectivity. Throughout the paper, we succinctly refer to these moves as the departures of interest.

2.2 Employee Relations

We collect data on the quality of firm-employee relations from MSCI's ESG KLD STATS database (KLD). KLD is an annual data set of positive and negative environmental, social, and governance (ESG) performance indicators for publicly traded companies, and is a standard in the literature on corporate social responsibility. The data are collected by research analysts from a combination of data provided by the companies directly and independent research.

Our focus is the set of "employee relations" indicators tracked by KLD. Among the positive indicators, or strengths, are traits such as employee involvement, employee relations, and human capital development. Among the negative indicators, or concerns, are traits such as negative union relations and safety concerns. Following the literature, we construct a net score of employee relations by subtracting the sum of concerns from the sum of strengths

for each company year. We also provide results for strengths and concerns separately in the Appendix.

2.3 Best Companies to Work For

To supplement the KLD data, we collect data regarding Fortune's "100 Best Companies to Work For" (BCW) lists. These lists, published annually by Fortune magazine, capture U.S. companies with the highest levels of employee satisfaction. Importantly, the methodology to compile these lists is completely independent from the MSCI database methodology. The lists are compiled on the basis of extensive employee surveys administered by the Great Places to Work Institute.[3]

2.4 Firm Outcomes

Our sample consists of US firms in the merged Compustat-LinkedIn data between 2008 and 2014. We use Compustat data to measure corporate outcomes. To avoid bias from mergers or acquisitions, we exclude firm-year observations with more than 100% growth in sales or assets. We drop financial (SIC 6000-6999), utility (SIC 4900-4999), and regulated (SIC 9000-9999) industries. In addition, given that our sample overlaps with the recession, we drop firms in the construction (SIC 1500-1799) industry. Our results hold when including these industries as well. We also exclude observations with missing stock market data and missing or negative assets or sales.

3 Connectivity and Corporate Culture

3.1 Measuring Coworker Connectivity

In this paper, we focus on coworker connectivity as a way of quantifying corporate culture. This section outlines our approach to identifying the strength of this dimension using network-based metrics.

[3]More information is available at the site: http://fortune.com/best-companies/. The exact methodology changes year to year.

The link between culture and intrafirm networks follows a long tradition. Whether networks serve a role as a means of efficient communication (Bolton and Dewatripont 1994), information processing (Radner 1993) or efficient distribution of work (Garicano 2000), corporate culture manifests itself in the internal structure of firms' networks by informally and/or formally dictating norms and practices within the firm.

LinkedIn's data provide a particular lens into the firm's internal network, by capturing connections initiated by individuals on a professional platform. Many factors influence the formation of connections, but two are of particular interest to us. First, connections are more likely between individuals who have interacted in some way. Therefore all else equal, we argue that internal connections correlate positively with an integrated workplace. Second, employees' connection behavior on LinkedIn reflect their preferences regarding professional advancement. As a result we also argue that that employees who network within the firm are likely to view their relationship with the firm as a longer term objective.

Our analysis measures connectivity of firms' internal networks based on three different characteristics: (1) average connectivity, (2) internal-to-external connectivity, and (3) *absorption*.

Average connectivity is the average degree of the firm's network. Intuitively, this is the average number of within-firm connections for an employee of the firm. We compute average connectivity by summing the number of connections between employees of the same firm, and dividing by the number of employees who were in the network at the time (i.e., who were members of LinkedIn).[4] Two aspects guide this approach. First, as we need to make cross-sectional comparisons between firms based on connectivity, we need to take into account the high level of heterogeneity in terms of employee size. Using raw number of connections would be biased toward firms with more employees, as the number of potential connections exponentially increases with the number of employees. Second, we need to take into account potential diseconomies of scale in network connectivity as firm size increases. For example, alternative measures, such as network density (the number of connections normalized by *potential* connections), would be heavily biased toward smaller firms, for which all employees could be connected to each other. We further address concerns about firm size when we

[4]Although we observe the precise time and date when connections are formed, we use end-of-year connections to construct firm-level connectivity characteristics. This is mainly due to the coarseness of employment histories, which are mostly populated at an annual frequency.

describe results in Section 3.2, and through internal-to-external connectivity.

Internal-to-external connectivity captures the relative intensity of connections within the firm. This measure is a ratio of the number of connections between employees of the same firm, divided by the number of connections between these individuals and employees of other firms ("external" connections). This serves to capture a different dimension of connectivity from average degree. One concern with average connectivity is that some firms may have employees who are more prone to using LinkedIn, even after we condition on industry, year, and size. Taking the ratio of internal to external connections allows us to account for this firm-level heterogeneity in the intensity of LinkedIn presence. Moreover, this measure intuitively captures the relative importance of the firm in the employee's long-term professional objectives.

The third measure is what we call *absorption*. We define absorption as the intensity at which a network integrates new nodes into its network. In our setting, this is measured by observing the number of new connections formed with incoming employees in the year the join the firm, normalized by the number of new employees in that year. Absorption is aimed at capturing firms' capacities to integrate workers into its firm. For example, firms that have more active initiatives to match new employees with existing employees and create opportunities for new employees to engage with existing employees may foster a stronger corporate identity. As opposed to the first two measures, absorption aims at capturing a dynamic property of firms' networks. Although this measure is strongly correlated with average internal connections, it allows us to separate out those companies which may have strong internal connectivity as a legacy from a previous regime, from companies with strong internal connectivity that continues to be maintained.

From a practical standpoint, we face several challenges common to network-based analysis. First, even with normalizations, the relation between network quantities and other observable outcomes can be highly non-linear. Directly using quantities may yield results that are heavily driven by tails of the distribution, and fitting data ex-post to better understand the relation can complicate ex-ante inferences. Second, as discussed above, each measure alone may not critically distinguish strong employee culture by itself. An additional concern specific to our approach is that participation in LinkedIn's professional network may vary between industries due to industry-specific demand and network effects. While LinkedIn's data has broad coverage across all industries, it has the largest concentration in technological

industries.

Taking these into account, we create a final "combined connectivity" measure based on all three characteristics. For each measure, we classify firms as above or below median within their 2-digit NAICS industry code, in each year. This is similar to the approach much of the literature has taken to identify high R&D intensity, for example. We consider a firm to be strong connectivity (SC) if it is above median for all three measures. By using relative quantities, rather than absolute quantities, we avoid potential issues with non-linearities regarding network characteristics. Though remaining firms may rank high in one or two of the three factors, we refer to these firms as weak connectivity (WC) firms. As argued above, each measure captures distinct aspects of the network and offer strong complementarities for identifying culture. A measure based on firms that rank above the median for all three categories strengthens the idenification of firms with distinct corporate culture, above and beyond network connectivity. Going forward, we interchangeably refer to firms that have a high rank on all three categories as highly interconnected, or SC firms. We explore alternatives to our SC definition in the Appendix.

3.2 Employee Relations and Satisfaction

To understand whether our connectivity measures indeed capture a dimension of corporate culture, we examine the relationship between connectivity and two different measures of employee well-being at the firm: firm-employee relationships from KLD, and employee satisfaction from the BCW lists. Table 1 provides summary statistics for these outcomes.

Table 2 reports the correlation between each of our three connectivity measures and the net quality of employee relations, as measured by KLD. All three connectivity measures are statistically significantly correlated with the KLD measure, and this relationship remains stable when including industry by year fixed effects and size fixed effects.

In Appendix Tables A.1 and A.2, we report the break-out of the correlation with employee relations strengths and concerns. Our measures are positively correlated with strengths and negatively correlated with concerns, though the relationship is statistically stronger for strengths. This is expected, for two reasons. First, strength indicators more closely track measures related to employee relations, such as professional and human capital development, employee involvement, and employee relations. Concern indicators include negative union

relations and safety concerns. Second, there are more indicators for strengths than concerns, which leads to greater variation in the outcome variable for Tables A.1 than Table A.2.

Table 3 reports the correlation between the SC indicator and the net employee relations score from KLD. The results show that an indicator for being above median in all three metrics, relative to industry peers, is strongly statistically correlated with stronger firm-employee relationships.

As a second validation, we turn to whether connectivity relates to firms' presence on Fortune's Best Companies to Work For lists. These lists have been posited as a proxy for corporate culture (Edmans 2011). Importantly, the list of Best Companies to Work For are constructed entirely independently from the KLD data, as described in Section 2.3. Since there is a lot of persistence on the list, and the list is already small (100 companies each year), our outcome variable is an indicator for whether the company ever appears on the list of 100 Best Companies to Work For. The results in Table 4 indicate that each of our measures correlate positively with this proxy for employee satisfaction. Similarly, Table 5 shows that the combination of all three metrics, in the form of our SC indicator, correlates strongly with being a top company to work for.

Taken together, these results illustrate a systematic relationship between connectivity and corporate culture, in the form of positive employee relations and satisfaction. Interestingly, these results indicate cohesion between three very distinct sources of information on corporate culture: 1) a revealed-preference measure (connectivity); 2) a survey-based measure (BCW lists); 3) an external examiner and news-based measure (KLD indicators). In the following section, we turn our attention to what corporate culture means for the firm, in terms of governing relationships between the employees and the firm.

4 Corporate Culture as an Implicit Contract

4.1 Background

One of the original theoretical motivations for corporate culture is the idea that strong cultural ties can act as implicit contracts in environments with incomplete contracting (Kreps 1996). For example, Hermalin (2001) (building on Crémer (1993)) proposes that culture may act as a substitute for explicit communication, by not only creating a shared knowledge of

norms but also effectively creating a common language. Similarly, Bull (1987) and Baker et al. (2002) argue that intrafirm reputation creates self-enforcing implicit contracts between workers and firms, and these are valuable in that they facilitate long-term relationships, which cannot otherwise be achieved via explicit contracts due to asymmetric information or incomplete contracts.

In this paper, we test a particular application of this concept: we examine whether firms with strong connectivity are more resilient to shocks to employment contracts. The intuition is that, if culture serves as an implicit contract, then changes to *explicit* contracts should not matter as much for firms with strong culture. Here, the particular dimension of corporate culture we focus on pertains to employees' relationship with the firm, and therefore the explicit contracts we wish to examine are employment contracts.

While complete employment contracts are not available on a large scale, we identify a series of state-level changes to NC provisions in employee contracts. Previous work has shown that these provisions are binding (Garmaise 2009, Starr, Balasubramanian and Sakakibara 2014), and that state-level changes to the enforceability of these provisions have large effects on employee mobility (Marx, Strumsky and Fleming 2009), particularly in knowledge-intensive occupations common on LinkedIn (Jeffers 2018). We hypothesize that these explicit contract changes should primarily impact WC firms – dependent on explicit contracts – but not SC firms – where implicit contracts should mitigate the effect.

NCs are governed at the state level, which lends to heterogeneity between states. For example, while California largely does not recognize or enforce NCs, most other states enforce NCs, with some states such as Florida enforcing NCs even for workers who are laid off. Enforceability of NCs is determined at the state level by a combination of state laws and court rulings. Key dimensions of NC enforceability, as highlighted by the legal literature, include the employer's burden of proof, the existence of a state statute, the definition of protectable interest for the employer, and whether courts are allowed to modify the contract to be suitable for enforcement (Bishara 2010).

We expect NCs to impact mobility through the changes in enforceability of explicit contracting terms. This hinges on an underlying assumption that the average firm is affected by changes in the ability to use NCs. But the fact that increases in enforceability can improve employee retention also reveals the incompleteness of the contracting environment. In an incomplete contracting environment, a hold-up problem may arise, which can stifle long-term

investments by firms. Potential gains from long-term human capital-intensive investments may be forgone by firms that are contractually limited from retaining key workers.

As a remedy, firms may foster a corporate environment that enhances long-term incentive-compatibility for key employees. Put differently, firms may build strong corporate culture as an implicit contract to reinforce long-term firm-employee relationships, that cannot otherwise be sufficiently specified using explicit contracts. If firms with strong corporate culture have a stronger implicit contract with their workers, we expect that shocks to the explicit contracting environment should have a significantly lower impact on their employee dynamics. In our setting, we expect changes in NC enforceability to be associated with a significant difference in impact on employee mobility between SC and WC firms.

4.2 Empirical Methodology

Our identification strategy uses state-level staggered rulings on NCs as employed in Jeffers (2018).[5] Table *A*.5 outlines decisions used to identify changes in the enforceability of NCs, which are comprised of seven state supreme court decisions and one legislative change between 2009 and 2013.[6] Court decisions apply to both existing and future contracts with NCs. This provides an attractive setting to analyze whether certain firms are more or less likely to be affected by changes to the contracting environment.

In order to compare the response of SC and WC firms, we need to fix the indicator prior to these changes. Since all but one of the changes take effect in 2011 or later, we use the 2010 value of the indicator for the majority of the sample. The exception is Wisconsin firms, where NC enforceability changes in 2009. For these firms, we use the 2008 value of the indicator.

Table 6 provides summary statistics for both sets of firms. Examining observable firm characteristics of our sample between SC and WC firms, we see that SC firms tend to be larger than WC firms. Average departure rates are close, though SC firms appear to have higher median departures rates. Return on assets and market-to-book values are instead similar in the medians, but with much more variation in the group of WC firms (which

[5]Several existing studies study the implications of changes in non compete enforceability. For example, see Marx et al. (2009),Garmaise (2009), andConti (2014).

[6]For decisions that took place in the last quarter of a given year, the following year is assigned as the year of change.

is larger in sample size). Baseline differences in levels are not a concern, as long as the differences are not trending differentially leading up to the NC enforcement changes. We show these "parallel trends" indeed hold, in Table 8.

Our baseline specification is a difference-in-differences regression, comparing departure rates of firms in treated and untreated states, after NC enforceability changes relative to before NC enforceability changes. For company i in industry j, state s and year t, we write the following:

$$Departure\ Rate_{ijst} = \alpha + \beta_1 Treated_s * Post_t + \gamma_i + \theta_{jt} + \kappa_{it} + \epsilon_{it} \quad (1)$$

$Treated_s * Post_t$ is our main explanatory variable of interest, taking the value 1 for an increase in enforceability, -1 for a decrease in enforceability, and 0 otherwise. We include company fixed effects γ_i and industry-year fixed effects θ_{jt} in all regressions, with industry defined as four-digit NAICS code. These subsume the need for separate Treated and Post indicators. Whenever appropriate, we include connectivity-year fixed effects κ_{it}. Errors are clustered at the state level, to reflect the level of treatment. Time-varying firm controls are excluded to avoid potentially inconsistent estimates (see Gormley and Matsa (2014)).

In addition, in order to compare the response of SC and WC firms, we specify a "triple difference" regression, which interacts the difference-in-differences from equation 1 with the ex-ante SC indicator.

$$Dep.\ Rate_{ijst} = \alpha + \beta_1 Treated_s * Post_t * SC_i + \beta_2 Treated_s * Post_t + \gamma_i + \theta_{jt} + \kappa_{it} + \epsilon_{it} \quad (2)$$

The coefficient estimate on $Treated_s * Post_t * SC_i$ captures the additional change in SC firms relative to WC firms in treated states relative to untreated states, following a change in NC enforcement. The main assumption underlying this approach is that absent the NC enforcement changes, the difference in change between SC and WC firms would have been the same in both groups of states. We provide evidence of parallel trends between SC and WC firms in Table 8, Panel B.

4.3 Differential Impact on Employee Mobility

Table 7 presents our main results. In Panel A, we present the estimation results for equation 1 in the sample of WC firms and SC firms, separately. An increase in NC enforceability leads to a decrease of 60 basis points in the targeted departure rate at WC, almost 50% relative to the average departure rate of 1.22 percentage points. In contrast, the decline in SC firms is not statistically different from zero.

This is equally true when we restrict our sample to geographically concentrated firms, for which treatment is more precise. In order to assign a state of location to each firm, we use the state in which most of the firm's employees are located. We call this the firm's *principal state*. One potential concern with this is that the treatment applies only to employees located in the principal state, and not to employees located in other states. However, because we observe present-day location of employees, and we wish to include employees who move out of state, we cannot restrict our sample to principal state employees directly. What we are able to do instead is to separate out firms that are more geographically concentrated (at least 40% of employees in the principal state), as firms for which treatment is more precise. Columns 3 and 4 of Table 7 show that, if anything, results are stronger within this subset of geographically concentrated firms.

In order to determine whether the difference in SC and WC response is statistically significant, we pool observations into the same regression and estimate equation 2. Panel B reports the results. The difference in response between SC and WC firms is statistically significant. While WC firms experience declines on the order of 60 basis points in the full sample, and 70 basis points in the geographically concentrated sample, this effect dissipates almost entirely in SC firms.

These results support the hypothesis that firm-employee relationships in SC firms are less reliant on the explicit contracting setting. Even if all firms generally benefit from stronger contracting, firms that predominantly rely on explicit contracts to define firm-employee relationships should exhibit greater gains through explicit contractual deterrence of employee departures. This is what we see: WC firms experience a greater decline in employee departure rates relative to SC firms.

A key underlying assumption is that treated firms were not trending differentially from untreated firms prior to the NC enforcement changes, and that SC firms were not trending differentially from WC firms. To investigate this, we break out the main effect by year

relative to the timing of the change, and report the results in Table 8. Specifically, we examine the differential response in each year relative to one year prior to the change in NC enforcement. We omit $t-1$ rather than the first year of sample because our staggered treatment means that the first year of sample corresponds to a different time relative to treatment for each treated state (for example, 2008 would be $t-1$ for Wisconsin, but $t-5$ for Virgina). Omitting $t-1$ provides more consistency.

Our results show that the difference between $t-1$, $t-2$, and $t-3+$ are not statistically different from zero – in other words, we see no differential trends leading up to the treatment. However, in the year of change as well as in subsequent years, there is a statistically significant drop in the departure rate, particularly for WC firms. In Panel A, we see that there is an effect for SC firms when we restrict to the geographic concentrated sample, but the magnitude is much smaller than for WC firms. In Panel B, we confirm that this differential effect is statistically significant: the interaction of SC $*$ Treated t0 in Column (3) is positive. Results are particularly significant in the year following the one in which the NC change takes place (Treated t1). Overall, our results show that while departures systematically drop in WC firms following NC enforcement changes, the drop is systematically smaller in SC firms.

4.4 Alternative Mechanisms

The results from Tables 7 and 8 offer supporting evidence that SC firms have stronger implicit contracts, which make them less sensitive to changes in explicit contracts. There are, however, other channels through which SC firms may exhibit a differential response to WC firms. In this section, we evaluate the plausibility of other potential mechanisms.

One possibility is that SC firms have better firm-worker matches. Firms with better matches may have employees who are more similar, and for this reason are more internally connected. At the same time, these employees would be less productive at another firm, and for this reason would be more likely to stay, even after NC enforcement was relaxed. This mechanism would predict lower departure rates unconditionally for SC firms. This however does not appear to be true. Table 6 presents both the means and medians of departure rates for SC and WC firms. Departure rates do not appear to be meaningfully different between the two sets of firms, and if anything, median departure rates are somewhat higher in SC firms. This leads us to believe that better firm-worker matches alone cannot explain the

patterns we observe.

Similarly, we may be concerned that SC firms have longer-tenured employees ex-ante, but for reasons independent from implicit contracts. For example, it is possible that longer-tenured employees have more internal connections simply because they have been at the firm for a long time, and that they are also less likely to leave for other reasons (housing, vesting, family). We do not believe this explains our results, for two reasons. First, employees of SC firms do not on average have long tenure for our sample period. Second, our SC indicator specifically selects firms with high absorption, i.e., connections with new employees. This prevents our results from being driven by firms whose high connectivity stems only from long-tenure employees.

More broadly, we could be concerned about employee demographics as omitted variables. For instance, one might worry that younger employees, or employees who connect more in general, are also less likely to be subject to NCs. While this is certainly possible, several aspects of our empirical approach mitigate this issue. First, SC firms are those with higher than median internal-to-external ratios. This specifically takes into account that firms' employees may be heterogenous in the level of connection activity on LinkedIn. Since firms' connectivity classifications are made within-industry, a potential omitted variable concerning employee demographics would have to be a factor that is not dependent on industry. Second, our analysis is at the firm level, mitigating the influence of a particular subset of employees. Finally, we focus our analysis of departure rates on employees who are most likely to be subject to NCs, i.e. knowledge-intensive employees.

A last potential concern relates to the correlation between firm size and connectivity. Although our connectivity measures are designed to account for firm size in different ways, there could be concerns that connectivity still correlates with firm size, and that larger firms are more likely to enforce NCs. We test robustness to this in a few ways. First, in Tables 2-5, results are robust to including network size fixed effects (an indicator for the size of the network being big or small, i.e. above or below median). Second, we test an alternative definition of SC in Tables A.3 and A.4: instead of defining SC relative to all firms in the same industry, we define SC relative to firms in the same network size bucket in the same industry. Our results remain very similar.

4.5 Real Outcomes

Taken together, these results support our main hypothesis: explicit contract changes primarily impact WC firms (dependent on explicit contracts), but not SC firms (where connectivity creates an implicit contract that mitigates the effect). Taking a step toward understanding the implications of this pattern in terms of corporate outcomes, our final set of results consider how firms' prospects and decisions evolve in tandem with the change in explicit contracts.

The intent and purpose of NCs are to improve both firms' and workers' incentives to make long-term investments. By strengthening WC firms' ability to retain workers, an increase in NC enforceability should enable WC firms to invest in projects that depend on key human capital. As such, we expect to see an increase in investment in WC firms relative to SC firms following shocks that strengthen NCs.

At the same time, the overall effect of stronger NC enforceability on firm performance and value is unclear for two reasons. First, prospective workers, especially those with high-skill and talent, may be deterred from joining firms that not only use NCs, but are likely to enforce them. As such, strong enforceability can negatively impact WC firms' *future* labor market outcomes. To the extent that labor markets exhibit local competition, this could also mean that SC firms benefit, as prospective workers may find it more credible for them not to use NCs. Together this suggests that while WC firms benefit by retaining *existing* workers, they may be worse off in the long run.

Second, WC firms may experience short-run gains in profitability by improving the retention of workers. However, as NCs become more binding, enforcements and the threat of enforcement by WC firms may negatively impact employee morale. A long literature (e.g. Bertrand and Mullainathan (2003)) documents how employee attitudes directly affect productivity, and more specifically how labor market forces can affect productivity on the job (Cici, Kempf and Peitzmeier 2019). Retention is valuable only to the extent that retained workers remain productive and committed to firm objectives.

Therefore, although we expect investment to increase, our expected impact on performance and value is unclear. Table 9 reports our results collapsing pre and post periods. First, we find that investment increases in WC firms, but less so in SC firms. This extends the results found in Jeffers (2018): it is, in fact, the firms in which departure rate is most reduced – WC firms – that see the largest increase in investment. Second, we consider the

impact on return on assets (ROA) as a measure of immediate profitability changes. The coefficient suggests a decline in ROA for WC firms, but not SC firms, although overall the estimates are not statistically different from zero.

Lastly, as a proxy for a firm's future prospects, we use the market-to-book ratio (MB) as a dependent variable. Our estimates indicate that MB is lower on average for WC firms following the enforceability changes, but this effect is reversed and in fact net positive for SC firms. This suggests that the market perceives more opportunities for SC firms, relative to WC firms, in the new environment.

To better understand the pattern of these results, we examine the time series in Table 10. The results indicate an immediate increase in investment for WC firms following the NC change, which is mitigated in SC firms. Interestingly, when we break out coefficient estimates year-by-year, we do see a statistically significant difference in ROA. WC firms see an immediate decline in ROA. This could be driven mechanically by greater salary expenses as a result of more employees staying, which would decrease the numerator (EBITDA). In contrast, SC firms do not experience this decrease in ROA, and in fact continue to see a relatively higher ROA in years following the NC change. Finally, there is an immediate increase in MB for SC firms following the NC change. The corresponding effect in WC firms is not statistically significant year-by-year. While more work remains to be done, these results suggest there may be important real implications for firms of sensitivity to explicit contract changes.

5 Conclusion

In this paper, we explore the role of corporate culture as an implicit contract. We first show that internal connectivity is strongly correlated with external ratings of employee relations and satisfaction. Using this network-based measure of employees' relationship with the firm, we then find that firms identified as strong in this dimension of corporate culture are significantly more resilient to shocks to the explicit contracting environment. We document that while changes in enforceability of NC contracts had a substantial impact on employee mobility in WC firms, the impact is significantly weaker for SC firms.

Our paper takes an ambitious step to using network analysis to infer intangible characteristics of firms, that are recognized as making an increasingly important contribution to

the growth and value of firms. In particular, we measure the connectivity of firms' internal networks in order to identify the strength of corporate culture. Our approach to analyzing network data to extract organizational properties that are difficult to observe serves as a direction for future research.

Though many studies offer a theoretical basis for the role of corporate culture in establishing strong firm-employee ties required for successful long-term investment, few studies have empirically established this function for culture. Our paper demonstrates this by showing a differential impact between firms of varying strengths of internal connectivity in a natural experiment that shocks the contracting environment.

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Table 1: Sample Firm Characteristics

This table reports connectivity and corporate culture summary statistics for the sample from 2008 to 2014.

	N	Mean	Std Dev	Median
Average connectivity	7,907	4.93	4.85	3.68
Internal/external ratio	7,907	0.05	0.04	0.05
Absorption	7,598	3.93	3.77	3.01
SC indicator	8,122	0.30	0.46	0.00
Emp. strengths net of concerns	3,888	0.14	1.00	0.00
Emp. Relations - Number of Strengths	3,888	0.36	0.89	0.00
Emp. Relations - Number of Concerns	3,888	0.22	0.48	0.00
Presence on BCW list	12,026	0.02	0.13	0.00

Table 2: Connectivity and Net Employee Relations Score

This table reports on the relationship between the strength of employee relations and the strength of internal connections. The dependent variable is KLD's net employee relations score. In Panel A, the variable of interest is average internal connections. In Panel B, we turn to the ratio of internal to external connections. In Panel C, we consider average internal connections of new employees. ***, **, and * denote statistical signifiance at the 1%, 5%, and 10% level, respectively. Standard errors in parentheses are clustered at the firm level. Industry is 4-digit NAICS.

Panel A: Average internal connections

	(1)	(2)	(3)	(4)	(5)	(6)
Avg connectivity	0.0671***	0.0425***	0.0427***	0.0461***	0.0378***	0.0459***
	(0.00772)	(0.00908)	(0.00941)	(0.0105)	(0.0103)	(0.0116)
Observations	3,834	3,834	3,827	3,551	3,834	3,551
R-squared	0.091	0.134	0.215	0.307	0.135	0.307
Year FE	N	Y	Y	N	Y	N
Industry FE	N	N	Y	N	N	N
Industry-Year FE	N	N	N	Y	N	Y
Network Size FE	N	N	N	N	Y	Y

Panel B: Internal/external connections

	(1)	(2)	(3)	(4)	(5)	(6)
Internal/external ratio	0.956*	2.778***	2.194***	2.485***	2.061***	2.245***
	(0.549)	(0.579)	(0.555)	(0.652)	(0.604)	(0.691)
Observations	3,834	3,834	3,827	3,551	3,834	3,551
R-squared	0.002	0.122	0.205	0.297	0.125	0.298
Year FE	N	Y	Y	N	Y	N
Industry FE	N	N	Y	N	N	N
Industry-Year FE	N	N	N	Y	N	Y
Network Size FE	N	N	N	N	Y	Y

Panel C: New employee connections

	(1)	(2)	(3)	(4)	(5)	(6)
Absorption	0.0706***	0.0324***	0.0251**	0.0290**	0.0228**	0.0236*
	(0.0101)	(0.0107)	(0.0109)	(0.0122)	(0.0110)	(0.0127)
Observations	3,792	3,792	3,786	3,507	3,792	3,507
R-squared	0.055	0.117	0.202	0.295	0.123	0.296
Year FE	N	Y	Y	N	Y	N
Industry FE	N	N	Y	N	N	N
Industry-Year FE	N	N	N	Y	N	Y
Network Size FE	N	N	N	N	Y	Y

Table 3: Combined Connectivity and Net Employee Relations Score

This table reports on the relationship between the strength of employee relations and the strength of internal connections. The dependent variable is MSCI's net employee relations score. The variable of interest is an annual indicator for strong connectivity, which is 1 if the firms is above median within its 2-digit NAICS code in all of the following three categories: 1) average internal connections, 2) ratio of internal to external connections, 3) average internal connections of new employees. ***, **, and * denote statistical signifiance at the 1%, 5%, and 10% level, respectively. Standard errors in parentheses are clustered at the firm level. Industry is 4-digit NAICS.

	(1)	(2)	(3)	(4)	(5)	(6)
Strong connectivity	0.0390***	0.0353***	0.0289***	0.0317***	0.0252***	0.0266***
	(0.00746)	(0.00744)	(0.00720)	(0.00833)	(0.00736)	(0.00831)
Observations	3,792	3,792	3,786	3,507	3,792	3,507
R-squared	0.014	0.120	0.205	0.297	0.124	0.298
Year FE	N	Y	Y	N	Y	N
Industry FE	N	N	Y	N	N	N
Industry-Year FE	N	N	N	Y	N	Y
Network Size FE	N	N	N	N	Y	Y

Table 4: Connectivity and Best Companies to Work For

This table reports on the relationship between employee satisfaction and the strength of internal connections. The dependent variable is an indicator for the firm's presence on Fortune's "Best Places to Work For" list. In Panel A, the variable of interest is average internal connections. In Panel B, we turn to the ratio of internal to external connections. In Panel C, we consider average internal connections of new employees. ***, **, and * denote statistical signifiance at the 1%, 5%, and 10% level, respectively. Standard errors in parentheses are clustered at the firm level. Industry is 4-digit NAICS.

Panel A: Average internal connections

	(1)	(2)	(3)	(4)	(5)	(6)
Avg connectivity	0.00538***	0.00643***	0.00581***	0.00614***	0.00619***	0.00598***
	(0.00115)	(0.00138)	(0.00119)	(0.00131)	(0.00157)	(0.00151)
Observations	11,504	11,504	11,504	11,168	11,504	11,168
R-squared	0.035	0.042	0.171	0.145	0.042	0.145
Year FE	N	Y	Y	N	Y	N
Industry FE	N	N	Y	N	N	N
Industry-Year FE	N	N	N	Y	N	Y
Network Size FE	N	N	N	N	Y	Y

Panel B: Internal/external connections

	(1)	(2)	(3)	(4)	(5)	(6)
Internal/external ratio	0.540***	0.570***	0.481***	0.498***	0.499***	0.446***
	(0.112)	(0.118)	(0.0999)	(0.107)	(0.123)	(0.118)
Observations	11,504	11,504	11,504	11,168	11,504	11,168
R-squared	0.028	0.030	0.164	0.137	0.031	0.137
Year FE	N	Y	Y	N	Y	N
Industry FE	N	N	Y	N	N	N
Industry-Year FE	N	N	N	Y	N	Y
Network Size FE	N	N	N	N	Y	Y

Panel C: New employee connections

	(1)	(2)	(3)	(4)	(5)	(6)
Absorption	0.00382***	0.00448***	0.00281***	0.00295***	0.00310***	0.00162
	(0.00101)	(0.00119)	(0.000941)	(0.00103)	(0.00112)	(0.00103)
Observations	10,903	10,903	10,902	10,574	10,903	10,574
R-squared	0.011	0.013	0.154	0.126	0.020	0.132
Year FE	N	Y	Y	N	Y	N
Industry FE	N	N	Y	N	N	N
Industry-Year FE	N	N	N	Y	N	Y
Network Size FE	N	N	N	N	Y	Y

Table 5: Combined Connectivity and Best Companies to Work For

This table reports on the relationship between the strength of employee relations and the strength of internal connections. The dependent variable is an indicator for the firm's presence on Fortune's "Best Places to Work For" list. The variable of interest is an annual indicator for strong connectivity, which is 1 if the firms is above median within its 2-digit NAICS code in all of the following three categories: 1) average internal connections, 2) ratio of internal to external connections, 3) average internal connections of new employees. ***, **, and * denote statistical signifiance at the 1%, 5%, and 10% level, respectively. Standard errors in parentheses are clustered at the firm level. Industry is 4-digit NAICS.

	(1)	(2)	(3)	(4)	(5)	(6)
Strong connectivity	0.00543***	0.00543***	0.00451***	0.00469***	0.00369***	0.00327***
	(0.00114)	(0.00114)	(0.000918)	(0.000990)	(0.00101)	(0.000920)
Observations	10,903	10,903	10,902	10,574	10,903	10,574
R-squared	0.015	0.015	0.159	0.132	0.020	0.134
Year FE	N	Y	Y	N	Y	N
Industry FE	N	N	Y	N	N	N
Industry-Year FE	N	N	N	Y	N	Y
Network Size FE	N	N	N	N	Y	Y

Table 6: Sample Firm Characteristics for WC and SC Firms

This table reports summary statistics for the sample from 2008 to 2014, for firms classified as WC and SC firms in 2010.

		N	Mean	Std Dev	Median
SC	Departure rate	2,466	5.36	4.00	4.39
	Upwardly mobile departure rate	2,466	1.28	1.18	1.02
	Num. employees (LinkedIn)	2,466	2,423.19	7,930.36	806
	Num. employees (Compustat)	2,330	6,225.08	13,845.85	1,898
	Num. on network	2,466	1,584.74	5,733.31	472
	ROA	2,395	0.07	0.26	0.11
	M/B	2,078	2.13	1.50	1.68
WC	Departure rate	5,533	5.47	7.23	3.70
	Upwardly mobile departure rate	5,533	1.22	2.53	0.53
	Num. employees (LinkedIn)	5,593	821.86	4,399.90	119
	Num. employees (Compustat)	5,003	3,093.29	9,372.42	497
	Num. on network	5,593	496.45	3,016.49	62
	ROA	5,306	-0.58	7.51	0.08
	M/B	4,863	6.14	53.90	1.56
Total	Departure rate	7,999	5.43	6.41	3.97
	Upwardly mobile departure rate	7,999	1.24	2.20	0.77
	Num. employees (LinkedIn)	8,059	1,311.85	5,763.50	235
	Num. employees (Compustat)	7,333	4,088.39	11,088.26	796
	Num. on network	8,059	829.46	4,076.95	132
	ROA	7,701	-0.38	6.24	0.09
	M/B	6,941	4.94	45.16	1.60

Table 7: NC Enforceability Impact in WC v. SC Firms

Panel A reports results from difference in difference regressions in the WC and SC samples separately, where the dependent variable is upwardly mobile departure rate for high NC occupations. Panel B reports results from a triple difference regression with all observations pooled, controlling for firm fixed effects, and industry-year fixed effects. The dependent variable is the same. ***, **, and * denote statistical signifiance at the 1%, 5%, and 10% level, respectively. Standard errors in parentheses are clustered at the state level. Industry is 4-digit NAICS.

Panel A: Subsamples

	All firms		Geographically concentrated	
	(1)	(2)	(3)	(4)
	SC	WC	SC	WC
Treated*Post	-0.0519	-0.595***	-0.141	-0.678**
	(0.124)	(0.181)	(0.125)	(0.261)
Observations	2,157	5,142	1,622	4,012
R-squared	0.505	0.392	0.465	0.395
Firm FE	Y	Y	Y	Y
Industry-Year FE	Y	Y	Y	Y

Panel B: Interacted

	(1a)	(1b)	(2a)	(2b)
SC*Treated*Post	0.546***	0.603***	0.610***	0.669***
	(0.127)	(0.138)	(0.132)	(0.155)
Treated*Post	-0.613***	-0.631***	-0.722***	-0.744***
	(0.138)	(0.142)	(0.190)	(0.198)
Observations	7,662	7,662	5,940	5,940
R-squared	0.387	0.388	0.383	0.384
Firm FE	Y	Y	Y	Y
Industry-Year FE	Y	Y	Y	Y
Connectivity-Year FE	-	Y	-	Y

Table 8: NC Enforceability Impact: Time Trends

This table breaks out the results from Table 7 by year to change. Year prior to change is our omitted category. Since NC enforceability changes occur at different points in the panel, we group together three years or more prior to change (t-3+) and three years or more after change (t3+).

Panel A: Subsamples

	All firms		Geographically concentrated	
	(1)	(2)	(3)	(4)
	SC	WC	SC	WC
Treated t-3+	-0.0852	-0.178	-0.0649	-0.0240
	(0.128)	(0.298)	(0.170)	(0.409)
Treated t-2	0.0221	0.0545	0.0517	0.0324
	(0.163)	(0.319)	(0.226)	(0.424)
Treated t-1	*omitted*	*omitted*	*omitted*	*omitted*
Treated t0	-0.0914	-0.540***	-0.233	-0.551**
	(0.137)	(0.183)	(0.149)	(0.214)
Treated t1	0.173	-0.518**	0.105	-0.555*
	(0.112)	(0.210)	(0.103)	(0.278)
Treated t2	-0.0296	-0.727**	-0.207	-0.700*
	(0.304)	(0.310)	(0.360)	(0.383)
Treated t3+	-0.0118	-0.553***	-0.0588	-0.584***
	(0.166)	(0.142)	(0.204)	(0.176)
Observations	2,157	5,142	1,622	4,012
R-squared	0.506	0.392	0.466	0.395
Firm FE	Y	Y	Y	Y
Industry-Year FE	Y	Y	Y	Y

Panel B: Interacted

	All firms		Geographically concentrated	
	(1)	(2)	(3)	(4)
SC*Treated t-3+	0.322	0.273	0.212	0.148
	(0.262)	(0.272)	(0.383)	(0.408)
SC*Treated t-2	0.125	0.218	0.156	0.288
	(0.214)	(0.248)	(0.370)	(0.398)
SC*Treated t-1	*omitted*	*omitted*	*omitted*	*omitted*
SC*Treated t0	0.501***	0.457**	0.435*	0.386
	(0.164)	(0.192)	(0.230)	(0.262)
SC*Treated t1	0.873***	0.953***	1.049***	1.123***
	(0.165)	(0.189)	(0.238)	(0.284)
SC*Treated t2	0.668*	0.799**	0.604	0.761
	(0.376)	(0.363)	(0.466)	(0.468)
SC*Treated t3+	0.410***	0.779***	0.388**	0.791***
	(0.124)	(0.175)	(0.170)	(0.197)
Treated t-3+	-0.251	-0.236	-0.151	-0.131
	(0.281)	(0.283)	(0.399)	(0.405)
Treated t-2	0.00947	-0.0195	-0.0336	-0.0762
	(0.269)	(0.272)	(0.387)	(0.389)
Treated t-1	*omitted*	*omitted*	*omitted*	*omitted*
Treated t0	-0.577***	-0.566***	-0.653***	-0.641***
	(0.157)	(0.164)	(0.188)	(0.199)
Treated t1	-0.605***	-0.627***	-0.686***	-0.711***
	(0.195)	(0.199)	(0.246)	(0.255)
Treated t2	-0.706**	-0.741**	-0.729*	-0.779**
	(0.314)	(0.308)	(0.385)	(0.379)
Treated t3+	-0.500***	-0.603***	-0.534***	-0.659***
	(0.107)	(0.122)	(0.139)	(0.156)
Observations	7,662	7,662	5,940	5,940
R-squared	0.387	0.388	0.383	0.384
Firm FE	Y	Y	Y	Y
Industry-Year FE	Y	Y	Y	Y
Connectivity-Year FE	-	Y	-	Y

Table 9: NC Enforceability and Firm Prospects, in WC v. SC Firms

This table reports results from a triple difference regression, where the dependent variable is natural log of market-to-book in columns (1) and (2), natural log of return on assets in columns (3) and (4), and the investment to net capital ratio in columns (5) and (6). ***, **, and * denote statistical signifiance at the 1%, 5%, and 10% level, respectively. Standard errors in parentheses are clustered at the state level. Industry is 4-digit NAICS.

$$100 * \frac{Departures}{Employees}_{ijst} = \alpha + \beta\{\text{treated}_s * \text{post}_t\} + \gamma_i + \theta_{jt} + \epsilon_{it}$$

	(1) I/K	(2) I/K	(3) Ln(ROA)	(4) Ln(ROA)	(5) Ln(MB)	(6) Ln(MB)
SC*Treated*Post	-0.0374**	-0.0299	0.160*	0.0605	0.321**	0.329**
	(0.0183)	(0.0206)	(0.0814)	(0.0996)	(0.153)	(0.160)
Treated*Post	0.0704***	0.0679**	-0.0868	-0.0543	-0.135**	-0.138*
	(0.0254)	(0.0264)	(0.0599)	(0.0624)	(0.0654)	(0.0687)
Observations	4,129	4,129	5,000	5,000	5,826	5,826
R-squared	0.544	0.545	0.643	0.644	0.761	0.762
Firm FE	Y	Y	Y	Y	Y	Y
Industry-Year FE	Y	Y	Y	Y	Y	Y
Connectivity-Year FE	-	Y	-	Y	-	Y

Table 10: NC Enforceability and Firm Prospects: Time Trends

This table breaks out the results from Table 9 by year to change. Year prior to change is our omitted category. Since NC enforceability changes occur at different points in the panel, we group together three years or more prior to change (t-3+) and three years or more after change (t3+).

	(1) I/K	(2) I/K	(3) Ln(ROA)	(4) Ln(ROA)	(5) Ln(MB)	(6) Ln(MB)
SC*Treated t-3+	0.0488	0.0438	0.0488	0.101	-0.161	-0.231
	(0.0369)	(0.0370)	(0.137)	(0.161)	(0.217)	(0.240)
SC*Treated t-2	0.00610	-0.00196	0.118	0.128	-0.102	-0.0512
	(0.0410)	(0.0465)	(0.113)	(0.113)	(0.177)	(0.175)
SC*Treated t-1	*omitted*	*omitted*	*omitted*	*omitted*	*omitted*	*omitted*
SC*Treated t0	-0.0607*	-0.0564*	0.248***	0.217**	0.294***	0.331***
	(0.0330)	(0.0328)	(0.0837)	(0.0999)	(0.105)	(0.109)
SC*Treated t1	-0.00689	0.00353	0.187***	0.0869	0.126	0.131
	(0.0364)	(0.0513)	(0.0636)	(0.0832)	(0.0940)	(0.123)
SC*Treated t2	-0.0734*	-0.0985*	0.232***	0.0993	0.171	0.150
	(0.0408)	(0.0522)	(0.0740)	(0.0959)	(0.179)	(0.182)
SC*Treated t3+	-0.00851	-0.0481	0.196**	0.0389	0.281*	0.200
	(0.0603)	(0.0773)	(0.0775)	(0.112)	(0.139)	(0.167)
Treated t-3+	0.0192	0.0214	-0.000424	-0.0134	0.256	0.278
	(0.0336)	(0.0303)	(0.0902)	(0.0923)	(0.171)	(0.175)
Treated t-2	0.0456	0.0487	-0.0209	-0.0229	0.114	0.0934
	(0.0330)	(0.0336)	(0.0907)	(0.0906)	(0.111)	(0.115)
Treated t-1	*omitted*	*omitted*	*omitted*	*omitted*	*omitted*	*omitted*
Treated t0	0.114***	0.114***	-0.214**	-0.203**	-0.1000	-0.115
	(0.0262)	(0.0273)	(0.0823)	(0.0841)	(0.0821)	(0.0870)
Treated t1	0.0800***	0.0771**	-0.00271	0.0301	0.135	0.129
	(0.0292)	(0.0295)	(0.0664)	(0.0692)	(0.0842)	(0.0939)
Treated t2	0.135***	0.145***	-0.0531	-0.00868	0.0561	0.0586
	(0.0298)	(0.0294)	(0.0631)	(0.0663)	(0.0741)	(0.0784)
Treated t3+	0.0553	0.0704*	-0.0434	0.0151	-0.0806	-0.0588
	(0.0343)	(0.0365)	(0.0885)	(0.0911)	(0.144)	(0.150)
Observations	4,129	4,129	5,000	5,000	5,826	5,826
R-squared	0.545	0.546	0.644	0.645	0.762	0.762
Firm FE	Y	Y	Y	Y	Y	Y
Industry-Year FE	Y	Y	Y	Y	Y	Y
Connectivity-Year FE	-	Y	-	Y	-	Y

A Appendix

Table A.1: Connectivity and Employee Relations Strengths

This table reports on the relationship between the strength of employee relations and the strength of internal connections. The dependent variable is the total sum of strengths in MSCI's employee relations data. In Panel A, the variable of interest is average internal connections. In Panel B, we turn to the ratio of internal to external connections. In Panel C, we consider average internal connections of new employees.

Panel A: Average internal connections

	(1)	(2)	(3)	(4)	(5)	(6)
Avg internal connections	0.0454***	0.0361***	0.0454***	0.0480***	0.0289***	0.0447***
	(0.00743)	(0.00920)	(0.00950)	(0.0105)	(0.0105)	(0.0117)
Observations	3,834	3,834	3,827	3,551	3,834	3,551
R-squared	0.052	0.084	0.194	0.283	0.087	0.283
Year FE	N	Y	Y	N	Y	N
Industry FE	N	N	Y	N	N	N
Industry-Year FE	N	N	N	Y	N	Y
Network Size FE	N	N	N	N	Y	Y

Panel B: Internal/external connections

	(1)	(2)	(3)	(4)	(5)	(6)
Internal/external connections	1.631***	2.518***	2.254***	2.529***	1.655***	1.963***
	(0.479)	(0.518)	(0.479)	(0.575)	(0.540)	(0.608)
Observations	3,834	3,834	3,827	3,551	3,834	3,551
R-squared	0.007	0.075	0.179	0.270	0.080	0.271
Year FE	N	Y	Y	N	Y	N
Industry FE	N	N	Y	N	N	N
Industry-Year FE	N	N	N	Y	N	Y
Network Size FE	N	N	N	N	Y	Y

Panel C: New employee connections

	(1)	(2)	(3)	(4)	(5)	(6)
Avg int. conn. new employees	0.0432***	0.0225**	0.0247**	0.0271**	0.0112	0.0193
	(0.00931)	(0.0106)	(0.0108)	(0.0121)	(0.0111)	(0.0127)
Observations	3,792	3,792	3,786	3,507	3,792	3,507
R-squared	0.026	0.066	0.175	0.264	0.077	0.269
Year FE	N	Y	Y	N	Y	N
Industry FE	N	N	Y	N	N	N
Industry-Year FE	N	N	N	Y	N	Y
Network Size FE	N	N	N	N	Y	Y

Table A.2: Connectivity and Employee Relations Concerns

This table reports on the relationship between the strength of employee relations and the strength of internal connections. The dependent variable is the total sum of concerns in MSCI's employee relations data. In Panel A, the variable of interest is average internal connections. In Panel B, we turn to the ratio of internal to external connections. In Panel C, we consider average internal connections of new employees.

Panel A: Average internal connections

	(1)	(2)	(3)	(4)	(5)	(6)
Avg internal connections	-0.0217***	-0.00640***	0.00272	0.00189	-0.00884***	-0.00127
	(0.00228)	(0.00215)	(0.00229)	(0.00239)	(0.00291)	(0.00268)
Observations	3,834	3,834	3,827	3,551	3,834	3,551
R-squared	0.042	0.121	0.269	0.346	0.122	0.348
Year FE	N	Y	Y	N	Y	N
Industry FE	N	N	Y	N	N	N
Industry-Year FE	N	N	N	Y	N	Y
Network Size FE	N	N	N	N	Y	Y

Panel B: Internal/external connections

	(1)	(2)	(3)	(4)	(5)	(6)
Internal/external connections	0.675**	-0.260	0.0596	0.0444	-0.406	-0.282
	(0.289)	(0.296)	(0.288)	(0.326)	(0.348)	(0.353)
Observations	3,834	3,834	3,827	3,551	3,834	3,551
R-squared	0.004	0.119	0.268	0.346	0.120	0.348
Year FE	N	Y	Y	N	Y	N
Industry FE	N	N	Y	N	N	N
Industry-Year FE	N	N	N	Y	N	Y
Network Size FE	N	N	N	N	Y	Y

Panel C: New employee connections

	(1)	(2)	(3)	(4)	(5)	(6)
Avg int. conn. new employees	-0.0274***	-0.00988***	-0.000416	-0.00190	-0.0115***	-0.00425
	(0.00316)	(0.00262)	(0.00252)	(0.00266)	(0.00312)	(0.00275)
Observations	3,792	3,792	3,786	3,507	3,792	3,507
R-squared	0.036	0.122	0.270	0.349	0.123	0.350
Year FE	N	Y	Y	N	Y	N
Industry FE	N	N	Y	N	N	N
Industry-Year FE	N	N	N	Y	N	Y
Network Size FE	N	N	N	N	Y	Y

Table A.3: NC Enforceability Impact: Alternative SC Definition

This table mirrors results from Table 7, where SC is an annual indicator for strong connectivity, defined as 1 if the firms is above median relative to peers in all of the following three categories: 1) average internal connections, 2) ratio of internal to external connections, 3) average internal connections of new employees. In Table 7, the peer set is the firm's 2-digit NAICS code; in this table, the peer set is further refined to be small or large network size within the firm's 2-digit NAICS code.
Panel A reports results from difference in difference regressions in the WC and SC samples separately, where the dependent variable is upwardly mobile departure rate for high NC occupations. Panel B reports results from a triple difference regression with all observations pooled, controlling for firm fixed effects, and industry-year fixed effects. The dependent variable is the same. ***, **, and * denote statistical signifiance at the 1%, 5%, and 10% level, respectively. Standard errors in parentheses are clustered at the state level. Industry is 4-digit NAICS.

Panel A: Subsamples

	All firms		Geographically concentrated	
	(1)	(2)	(3)	(4)
	SC	WC	SC	WC
Treated*Post	-0.118	-0.523***	-0.180	-0.624*
	(0.103)	(0.174)	(0.133)	(0.310)
Observations	1,925	5,380	1,555	4,082
R-squared	0.491	0.387	0.474	0.389
Firm FE	Y	Y	Y	Y
Industry-Year FE	Y	Y	Y	Y

Panel B: Interacted

	(1a)	(1b)	(2a)	(2b)
SC*Treated*Post	0.456***	0.563***	0.513**	0.654***
	(0.100)	(0.118)	(0.215)	(0.239)
Treated*Post	-0.555***	-0.585***	-0.687***	-0.732***
	(0.139)	(0.142)	(0.234)	(0.242)
Observations	7,662	7,662	5,940	5,940
R-squared	0.387	0.387	0.383	0.384
Firm FE	Y	Y	Y	Y
Industry-Year FE	Y	Y	Y	Y
Connectivity-Year FE	-	Y	-	Y

Table A.4: NC Enforceability Impact Time Trends: Alternative SC Definition

This table breaks out the results from Table A.3 by year to change. Year prior to change is our omitted category. Since NC enforceability changes occur at different points in the panel, we group together three years or more prior to change (t-3+) and three years or more after change (t3+).

Panel A: Subsamples

	All firms		Geographically concentrated	
	(1)	(2)	(3)	(4)
	SC	WC	SC	WC
Treated t-3+	-0.264	-0.0155	-0.0827	0.132
	(0.349)	(0.256)	(0.386)	(0.320)
Treated t-2	-0.0802	0.186	0.0559	0.210
	(0.260)	(0.304)	(0.313)	(0.433)
Treated t-1	*omitted*	*omitted*	*omitted*	*omitted*
Treated t0	-0.183*	-0.409**	-0.302**	-0.425*
	(0.107)	(0.179)	(0.143)	(0.240)
Treated t1	0.135	-0.440**	0.255	-0.484*
	(0.148)	(0.199)	(0.189)	(0.259)
Treated t2	-0.0172	-0.551*	0.0988	-0.509
	(0.308)	(0.291)	(0.397)	(0.359)
Treated t3+	-0.0701	-0.427***	-0.0282	-0.445**
	(0.144)	(0.144)	(0.159)	(0.214)
Observations	1,925	5,380	1,555	4,082
R-squared	0.492	0.387	0.475	0.389
Firm FE	Y	Y	Y	Y
Industry-Year FE	Y	Y	Y	Y

Panel B: Interacted

	All firms		Geographically concentrated	
	(1)	(2)	(3)	(4)
SC*Treated t-3+	-0.0461	-0.176	0.127	-0.0282
	(0.392)	(0.382)	(0.406)	(0.396)
SC*Treated t-2	-0.351	-0.188	-0.183	0.0127
	(0.244)	(0.266)	(0.393)	(0.405)
SC*Treated t-1	*omitted*	*omitted*	*omitted*	*omitted*
SC*Treated t0	0.200	0.263*	0.243	0.330
	(0.143)	(0.136)	(0.248)	(0.231)
SC*Treated t1	0.618**	0.773***	0.840**	1.026***
	(0.250)	(0.228)	(0.397)	(0.368)
SC*Treated t2	0.401	0.645*	0.527	0.811
	(0.367)	(0.380)	(0.498)	(0.498)
SC*Treated t3+	0.190	0.517**	0.351**	0.680***
	(0.150)	(0.192)	(0.165)	(0.222)
Treated t-3+	-0.129	-0.0953	-0.128	-0.0874
	(0.227)	(0.231)	(0.324)	(0.330)
Treated t-2	0.160	0.108	0.0704	-0.00177
	(0.252)	(0.255)	(0.372)	(0.374)
Treated t-1	*omitted*	*omitted*	*omitted*	*omitted*
Treated t1	-0.489**	-0.535**	-0.627**	-0.692**
	(0.206)	(0.199)	(0.285)	(0.273)
Treated t2	-0.594**	-0.665**	-0.706*	-0.800**
	(0.284)	(0.286)	(0.368)	(0.369)
Treated t3+	-0.406***	-0.506***	-0.518***	-0.632***
	(0.117)	(0.121)	(0.147)	(0.157)
Observations	7,662	7,662	5,940	5,940
R-squared	0.387	0.388	0.383	0.384
Firm FE	Y	Y	Y	Y
Industry-Year FE	Y	Y	Y	Y
Connectivity-Year FE	-	Y	-	Y

Table A.5: Changes in NC Enforceability

State	Case	Enforcement Direction	Nature of Change
WI	Star Direct, Inc. v. Dal Pra. (2009)	↑	Supreme Court allows modification
SC	Invs, Inc. v. Century Builders of Piedmont, Inc. (2010)	↓	Supreme Court rejects modification
CO	Lucht's Concrete Pumping, Inc. v. Horner (2011)	↑	Supreme Court allows continued consideration
TX	Marsh v. Cook (2011)	↑	Supreme Court changes requirements on business interests
MT	Wrigg v. Junkermier (2011)	↓	Supreme Court rejects application to terminated employees
IL	Fire Equipment v. Arredondo et al (2011)	↑	Supreme Court expands scope of interests
IL	Fifield v. Premier Dealer Services (2013)	↓	Supreme Court restricts standards
VA	Assurance Data Inc. v. Malyevac (2013)	↑	Supreme Court reduces automatic dismissals
GA	2011	↑	Legislature allows modification

Figure A.1: LinkedIn Coverage by Sector

This figure presents coverage rates for firms in merged sample of LinkedIn and Compustat data. Firms are categorized by their Global Industrial Classification (GIC) sector. Worker representation for each sector is given by the total number of LinkedIn members employed in each sector in 2014 divided by the employees reported in Compustat for 2014.

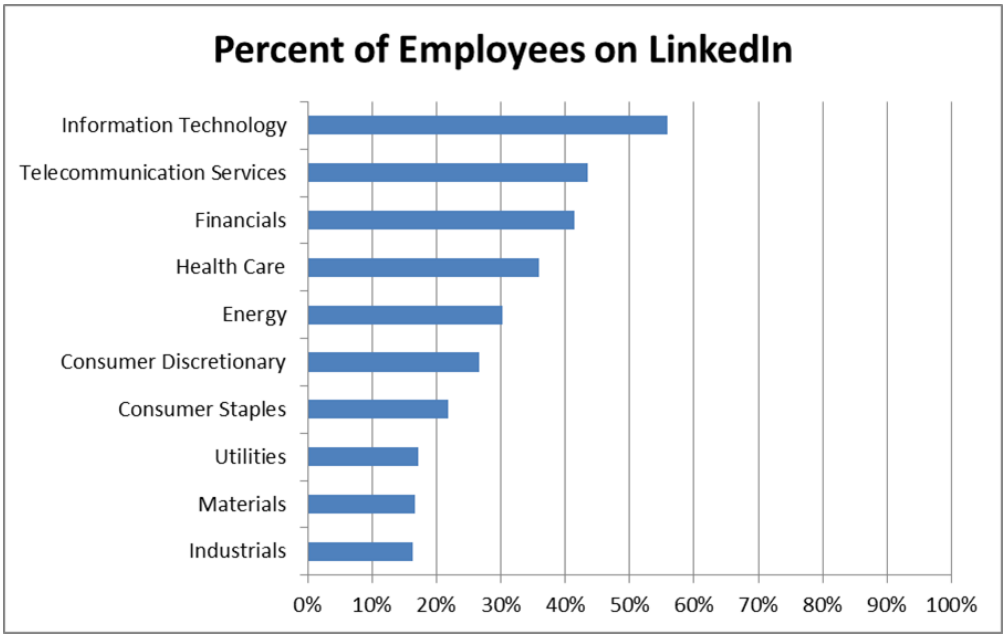


Figure A.2: Distribution of Connectivity Measures

This figure presents the distribution of each connectivity measure.

