Does Culture Pay? Compensating Differentials, Job Satisfaction, and Organizational Practices

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In Review

Abstract

Work-place practices are becoming an increasingly important mechanism for retaining and motivating employees. Using a new survey tool in partnership with PayScale.com between 2014 and 2016, I first document new facts about the dispersion of employee engagement and organizational practices in the labor market, and, secondly, recover a willingness to pay for these amenities. I show that the provision of these amenities creates a time-varying, firm-specific rent that amplifies traditional selection problems. My identification strategy exploits variation in employees' outside option, which is uncorrelated with contemporaneous organizational factors, but still capitalizes work-place amenities. My estimates imply that employees are willing to pay 2% of their earnings for a standard deviation rise in organizational practices. Through a back-of-the-envelope calculation, I show that these amenities have a benefit-cost ratio of 1.4.

Keywords: Organizational practices, job satisfaction, turnover, compensating differentials, productivity.

JEL: L20, M51, M52, M54, M55

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1. Introduction

> There are only three measurements that tell you nearly everything you need to know about your organization's overall performance: employee engagement, customer satisfaction, and cash flow. It goes without saying that no company, small or large, can win over the long run without energized employees who believe in the mission and understand how to achieve it. – *Jack Welch, former CEO of General Electric*

Researchers have long puzzled over the underlying determinants and quantitative effects of employee engagement. And yet, 78% of today's business leaders report employee engagement and retention of talent as one of their top concerns (Deloitte, 2016). Employee engagement has been linked with a greater sense of purpose at work (Amabile and Kramer, 2012), increased creativity (Amabile et al., 2004, 2005), performance (Harter et al., 2016), and even competitive advantages in the marketplace (Chatman and Jehn, 1994; Bennett and Pierce, 2016).[1]

While there is now clear evidence that management and human resource policies help explain the differences in firm productivity (Ichniowski et al., 1997; Bloom and Van Reenen, 2007; Bloom et al., 2012, 2013), a number of questions remain unanswered.[2] How do management practices affect employee engagement? What does the cross-section of engagement look like across the labor market? What are the specific mechanisms behind the black-box of "good management"?

This paper takes a step forward by bringing new data to the table through a unique partnership with the leading human capital valuation company, PayScale.com, to: (i) document new facts about the dispersion of job satisfaction, employee engagement, and organizational practices in the labor market, and (ii) estimate individuals' willingness to pay for an index of organizational practices.[3] Specializing in the valuation of human capital, they are a leading platform that individuals use to obtain information about current or prospective compensation (touting over 56 million salary profiles) and firms use to benchmark their practices. Users visit their site, fill out a salary report, and receive a dollar value that corresponds with the market value of their human capital.[4] While users tend to be more educated and cluster in more services-related industries,

[1] For a more in-depth view of the nature of creativity in organizations, see Hennessey and Amabile (2010) for a survey.

[2] See Bloom et al. (2014) for a survey of the literature.

[3] While organizational practices will be defined shortly, they are a combination of work-place amenities, including the degree of pay transparency, clarity of communication, development and training opportunities, sense of appreciation, and relationship with management.

[4] PayScale obtains the prediction by applying proprietary machine learning algorithms to the user's inputted information, ranging from educational attainment (e.g., school and degree) to industry and occupation to location.

the sample is remarkably representative of the U.S. labor force.

Using this data, the first part of the paper documents patterns in the labor market over job satisfaction, organizational practices, and compensation. Organizational practices are defined as an aggregate index that is the sum of five self-reported scores on different questions relating to respondents' perceptions of the work-place: pay transparency (of one's own pay), clarity of communication, degree of appreciation for one's contribution, quality of the relationship with one's manager, and development and training opportunities. Each component explains variation in employee engagement and turnover, but appreciation explains roughly twice the variation as the others.[5] Turning towards the cross-section, I show that organizational practices are highest in occupations with high cognitive and social skill intensities, but low in manually intensive occupations. I also show that organizational practices are higher in larger metropolitan areas, in more educated areas, and in areas with lower unemployment rates.

To understand why these empirical findings matter, I introduce a simple principal-agent model where organizational practices behave as mechanisms for firms to reduce moral hazard problems among employees. Since employees can shirk at any time, investing in organizational infrastructure that reduces the employee's disutility of work can raise attentiveness and, therefore, labor productivity. Depending on the way that labor supply enters preferences, creating a better work-place culture might be more cost-effective for firms relative to simply paying each employee more in performance pay. I derive a simple equilibrium relationship that relates explicit forms of financial compensation (e.g., bonus income) with organizational practices. Under regularity assumptions, bonuses and organizational practices are complements and increases in organizational practices are associated with increases in employee effort and firm labor productivity.

Unfortunately, it is precisely this channel that poses an additional empirical problem for recovering a marginal willingness to pay for these amenities.[6] While lack of available data and the presence of unobserved heterogeneity have long been empirical roadblocks in this area, the incentive effects of organizational practices creates a second endogeneity problem. Put simply, by raising employee engagement and effort, and under the assumption that firms capitalize labor productivity into earnings, then standard hedonic regressions will be even further upwards biased since the firm-specific rent is correlated with the provision of these amenities.

[5] It is, however, much more tractable and clear to focus on an aggregate index, rather than the different components, especially since organizations tend to bundle amenities together.

[6] The purpose of the model is not to develop a comprehensive and realistic characterization of the work-place, but rather illustrate an important mechanism that creates an endogeneity problem for recovering a marginal willingness to pay estimate.

My identification strategy exploits a unique feature of PayScale's business model—predicted compensation *as if* an employee were not in their current company—as a proxy for employees' outside option and control for their current compensation to remove unobserved heterogeneity. My results suggest that workers are willing to pay (WTP) approximately 2% of their earnings for an additional standard deviation rise in their firm's organizational practices, i.e., moving from a company in the 25th percentile, such as McDonalds or CVS, to the 75th percentile, such as Exxon Mobile or Starbucks. While the implied WTP may seem small relative to the 20% in Mas and Pallais (2016) for avoiding unpredictable work schedules, it is important to keep in mind that organizational practices are a non-rival good within the firm and, therefore, can convey larger benefits for larger firms. In fact, a back-of-the-envelope calculation suggests that a standard deviation rise in organizational practices conveys a net benefit of $48,348 per worker.[7]

The foundation of the paper is built upon contributions from personnel economics (Lazear and Shaw, 2007), empirical management (Bloom et al., 2014), and relational contracts (Gibbons and Henderson, 2012), as well as a historically long link among job satisfaction, performance, and turnover among organizational behavior researchers (Lawler and Hall, 1970; Lawler and Porter, 1967; Staw et al., 1994; Sheridan, 1992). While results from Bloom and Van Reenen (2007) and Bloom et al. (2012) underscore the important contributions of management to firm-level productivity, the underlying mechanisms behind management remain unexplored. This paper opens up the black-box of management by delving into the role of organizational practices as relational contracts, their impact on employee engagement and performance, and how employees value the provision of these amenities. These results relating organizational practices with employee engagement also build upon an older literature on organizational capital, which helps solve coordination problems in the firm (Prescott and Visscher, 1980; Andrew and Kehoe, 2005).

Closely related to this paper is a large literature on compensating differentials (Rosen, 1986), which recognizes that these types of amenities do not come for free. The alternative view in the literature is that these amenities are rents that some workers are able to capture over others; see, for example, Postel-Vinay and Robin (2002) for a model where rents are the leading drivers behind dispersion in earnings. Disentangling compensating differentials from rents is challenging given assortative matching in the labor market (Card et al., 2013) and information asymmetries (Hwang

[7]The fact that the benefit-cost ratio is greater than one begs the question: why are companies not investing more in organizational practices? Although there is some evidence that companies are increasingly paying attention to it—for example, the share of non-wage benefits in total employee compensation has gone from 5% in 1969 to 29% in 2016 (https://www.bls.gov/news.release/ecec.nr0.htm)—I discuss several reasons later in the paper that might explain lack of and/or slow adoption of these practices.

et al., 1998). This paper proposes a strategy for recovering willingness to pay by exploiting an employee's outside option, which follows a conceptually similar strategy to Stern (2004). Other approaches, however, focus on using flows between workers and firms (Sorkin, 2015), explicit parameterizations of the sorting process (Bonhomme and Jolivet, 2009), and randomized experiments (Mas and Pallais, 2016) to recover causal estimates. Given that machine learning algorithms are becoming more applicable in economics (Athey and Imbens, 2017; Mullainathan and Spiess, 2017), and access to administrative datasets is opening up (Card et al., 2011), implementing variants of my identification strategy should become more viable in the years to come.

2. Why Do Organizational Practices Matter?

There is a large literature in organizational behavior and psychology that examines the determinants and importance of job satisfaction, beginning with Likert (1961) and McGregor (1960). Recent meta-analyses have emerged linking job satisfaction with performance (e.g., Harrison et al. (2006) and Riketta (2008)) and job turnover (e.g., Tett and Meyer (1993)). In turn, improved employee outcomes (e.g., greater human capital) will also influence organizational financial outcomes (Jiang et al., 2012). Firms also develop these processes and policies in part to provide incentives for high effort, skill accumulation, and honesty within their internal organization in the absence of a price system (Coase, 1937). When prices are either not available or not containing enough information to facilitate exchange, production in an organization is governed by contractual relationships (Williamson, 1981).[8]

If there are a set of best practices within organizations (Baligh and Burton, 1981, 1984), why do many firms fail to adopt them? Many of these reasons overlap with the emerging literature on management and productivity (see Bloom et al. (2014) for a survey), but there is an even stronger role of organizational inertia as the source of coordination problems when it comes to employment practices. Adjustment costs may vary based not only on the external environment (e.g., regulatory), but also internal environment: the degree of flexibility in an organization's coordinating structure.[9] For rigid organizations, innovation is difficult and costly because their internal processes are not agile enough to adapt to a changing environment. External factors, like the capital intensity of production, may also affect the underlying contracting structure (Gittleman

[8]See Williamson (2002) for a survey.

[9]The organizational behavior literature tends to call these "vulnerability costs". Malone (1987) argued that organizations incur different costs associated with adjustment based on their coordinating structures.

and Makridis, 2017), which in turn shapes the employment practices.

Since organizational practices are costly to implement, they may trade-off with other mechanisms firms can use to motivate employees (e.g., bonuses). The design perspective of management emphasizes that firms face different environments, which affects the returns to using different sets of practices (even if the practice itself were free). Companion work examines several channels that explain the adoption of non-wage benefits, which are conceptually similar to organizational practices (Liu et al., 2017). The two most relevant include: (i) labor market rigidities (e.g., marginal tax rates), which reduce the incentive effects of financial compensation, and (ii) motivating and retaining employees, which might be easier with non-wage amenities if there are volume discounts. Another possibility, based on early theoretical work from Milgrom (1988), is that it can be optimal for management to reduce the room for discretion among employees, which may be especially likely in settings where it is more costly to observe employee quality or trustworthiness.

And yet, management (Bloom and Van Reenen, 2007) and human resource policy (Ichniowski et al., 1997) are more than just practices that affect organizational productivity *directly* by altering the production process and technology set. Employment practices also *indirectly* shape the underlying mood or culture within an organization, which endogenously affects the production process and technology set. In the presence of principal-agent problems and subjective evaluations of employee performance—features of the vast majority of jobs (Prendergast, 1999)—employment practices serve an especially crucial role within an organization. When there is high trust within an organization and employees are engaged—that is, they agree with and understand their performance evaluations, they communicate well with their peers and managers, and so on—then incentives can operate powerfully. Organizational practices, in this sense, convey static and dynamic effects on firm outcomes.

3. Measuring Organizational Practices and Employee Engagement

3.1. Survey Tool

To measure employment practices in the work place, I partnered with PayScale (www.payscale.com), a crowd-sourcing company that uses frontier machine learning algorithms to provide better business intelligence for both companies and employees over a range of compensation issues, rang-

ing from actual pay to human resources. PayScale's specialization is human capital valuation. PayScale has compiled over 56 million salary profiles and is rapidly transforming the landscape of compensation analysis through their combination of data analytics with market analysis.

While they have both business and consumer oriented services, its consumer oriented services provide individuals with a predicted market wage and job suggestions based on an unusually detailed set of information that individuals provide, ranging from specific skills (e.g., Matlab, Python, or search engine optimization) to metropolitan area to the university that they earned their degree from. The survey tool was recently extended in 2014 to include measurements of perceptions of work-place practices, which are listed in Table 1. Individuals respond to these survey questions on a scale of one to five.[10] z-scores of these measures are created by normalizing each to have a mean of zero and standard deviation of one within each year.

The primary measure of organizational practices is as the sum of the scores on pay transparency, communication, training opportunities, appreciation, and managerial relationship; taking the sum of sub-indices has precedent from prior work (Bloom and Van Reenen, 2007).[11] While each of the measures of organizational practices matters (shown in the next sub-section), Appendix Section 8.1.1. documents, using principal-components analysis, that the first factor explains roughly 60% of the variation and the first two factors explain roughly 75% of the variation. Using a consolidated score helps reduce noise and multicollinearity, in addition to making the results more transparent. Although theory does not make clear which of the indices should be used in forming the overall score, the main results are robust to different variations of the aggregate index.

While these variables are "subjective" self-reported indices, it is precisely these perceptions that matter in the work-place—managers are held accountable to outcomes, which are influenced by employee perceptions even when the perceptions are "wrong".[12] Nonetheless, the survey tool also contains at least two advantages over standard publicly accessible labor market survey data: sample size and incentives to report truthfully.[13] First, the sample size allows PayScale to leverage the benefits of "wisdom of the crowds", famously introduced by Surowiecki (2004), which describes

[10] In ongoing work, we are adding additional content to the survey and working with companies to create a longitudinal structure.

[11] Hagerty and Land (2007) find that using equal weights over subset variables for these types of indices provides the greatest robustness and accuracy. The problem of potentially different weights also tends to be relatively innocuous of an assumption when all are highly positively correlated.

[12] Unfortunately, given the scale and breadth of the survey, there is no way to implement a double-blind interview process (as in Bloom and Van Reenen (2007).

[13] For example, traditional surveys, like as the Panel Study of Income Dynamics, are notorious for having large measurement error (Bound et al., 2001; Bound and Krueger, 1991; Duncan and Fields, 1985).

Variable	Score (1-5) in response to:
Intent to leave	In the next 6 months, I plan on actively seeking new jobs outside of my current company. (1/0 indicator)
Job satisfaction	I am extremely satisfied working for my employer.
Relative performance	I am the top performer at my company for jobs similar to mine.
Pay transparency	How pay is determined at my company is a fair and transparent process.
Employer rating	How did your employer rate you in your last review?
Communication	There is frequent, two-way communication between management and myself.
Training opportunities	My employer provides me with sufficient opportunities for learning and development.
Appreciation	I feel appreciated at work.
Future firm prospects	I am confident my employer has a bright future.
Managerial Relationship	I have a great relationship with my direct manager.

Table 1: List of Employee Sentiment Measures

Notes.–Sources: PayScale. The table documents the sentiment-related question text in the www.payscale.com survey tool.

how aggregating the opinions from a large number of individuals can produce more accurate forecasts than opinions from a much smaller group of experts.[14] While this paper only uses a subset of their entire database, their "big data" approach to human resource management enables them to create reliable predictions of an individual's earnings.[15] Second, individuals reached by PayScale have an incentive to report truthfully since the quality of their predicted market wage and job suggestions is governed by the accuracy of their own situation. The "give and get" nature of the survey builds in truth-telling from the start.

While the section that follows provides a wide array of stylized facts about the cross-section of these organizational practices, job satisfaction, and compensation, Appendix Section 8.2.1. reports some aggregate descriptive statistics separating individuals out based on whether they report a high level of an organizational state (a four or five out of the five-point scale) versus a low level (a one, two, or three out of the five-point scale). The results are documented in Table 8 in full, but, broadly speaking, they show that individuals reporting higher organizational practices have systematically higher earnings. However, they are not much more likely to be more educated, nor are they more likely to receive performance pay. These latter facts are consistent with the claim

[14]These insights led the Intelligence Advanced Research Projects Activity to launch the Good Judgment Project: an initiative to recruit many individuals with an interest over security policy to produce forecasts.

[15]PayScale's proprietary machine learning algorithms flexibly account for differences across metropolitan areas, occupations, industries, different quantities and qualities of educational attainment, job characteristics, and demographics to produce accurate predictions (after undergoing a data-cleaning process).

that reverse causality arising from, for example, just receiving a bonus is not a first-order threat to identification.

3.2. Data Validation

There are two potential concerns remain involving the representativeness of the sample. The first concern is that the sample of workers in PayScale's database is systematically different than the U.S. population, which would imply that the results are not externally valid. To address this concern, my first exercise compares the PayScale data with the Current Population Survey (CPS) between 2014 and 2016. Figure 1 plots the share of workers who are white, average age, average educational attainment, and average earnings at a two-digit occupation level between the two datasets. Although PayScale tends to over-sample college degree workers, it does remarkably well at matching nationally representative data from standard labor market surveys.

The second concern is that these indices are merely capturing noise and unobserved heterogeneity in preferences, which would invalidate them as underlying measures of organizational practices. To address this concern, my second exercise examines the conditional correlations between firm output (e.g., sales) and organizational practices. Given a simple Cobb-Douglas production function of the form

$$y_{ft} = \alpha^l l_{ft} + \alpha^k k_{ft} + \alpha^m m_{ft} + \gamma O_{ft} + \epsilon_{ft} \tag{1}$$

where y denotes logged firm revenue, l denotes logged employment, k denotes logged capital, m denotes logged materials, O denotes organizational practices, then the estimated coefficient on γ will provide insight into whether the underlying individual data is capturing meaningful variation.[16] Estimating Equation 1 is possible to do for a subset of employees in my sample working in a publicly traded companies. I manually matched them to Compustat, producing 1,997 unique companies, although roughly 50% of these are firms with less than 10 respondents.

These results are documented in Table 2. The unconditional correlation suggests that a unit rise in a firm's measure of organizational practices is associated with a 0.075% rise in their revenue. The gradient rises once the sample is restricted to firms with over 10 respondents, which suggests that

[16]These results are robust to using other firm outcomes, like total factor productivity (TFP). Computing TFP remains an active area of inquiry in the literature; see, for example, Ackerberg et al. (2015). These results are robust to several different methods of computing TFP, but the baseline approach here is to simply take the residual from a regression of logged sales on logged employment, capital, and materials.

using small sample sizes to produce firm averages produces attenuation bias. Once demographic controls are introduced—that is, education, age, gender—the gradient declines marginally to 0.118. Interestingly, however, the inclusion of logged employment actually raises the gradient. It is not until capital and inventory are introduced as controls that the gradient on organizational practices becomes less precisely estimated.

Table 2: Validating Organizational Practices, Compustat Firms

Dep. var. =	ln(firm revenue, Compustat)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
org practices	.075***	.156***	.118***	.129***	.052*	.058	.014
	[.027]	[.042]	[.044]	[.026]	[.028]	[.048]	[.026]
ln(employment)				.867***			.537***
				[.045]			[.039]
ln(capital)					.713***		.355***
					[.029]		[.033]
ln(investment)						.696***	.056*
						[.061]	[.031]
R-squared	.01	.01	.05	.72	.69	.68	.92
Sample Size	1439	771	771	756	753	272	266
Controls	No	No	Yes	Yes	Yes	Yes	Yes
Sample Selection	All	>10	>10	>10	>10	>10	>10

Notes.–Sources: Payscale and Compustat, 2014-2016. The table reports the coefficients associated with regressions of logged firm revenues on an index of organizational practices and demographic controls of the individuals used to produce the average index, including age, education, and gender. The sample restriction after column 1 is to firms with at least 10 respondents. Standard errors are clustered at the firm-level.

The results from Table 2 are merely conditional correlations—they are not intended to be causal elasticities of the returns to organizational practices, although doing so would be an interesting road for future research. In Appendix Section 8.1.2., I also plot measures of job satisfaction and organizational practices at the state-level with measures of life satisfaction from Gallup's U.S. Daily tracker poll. While life satisfaction is capturing something distinct from job engagement, they should be correlated since employment is an important determinant of overall well-being. Indeed, these measures are highly correlated.

3.3. Do Some Practices Matter More than Others?

Before turning to the baseline empirical results, it is useful to examine the relative contribution of each organizational practice towards job satisfaction and turnover. Do some practices explain more variation in engagement and turnover than others? Table 3 documents these results by

regressing (standardized) job satisfaction on demographic controls and (standardized) measures of job satisfaction, together with year, quarter, occupation, and industry fixed effects.

Starting with demographic characteristics, it is interesting to note that males generally have 2% lower job satisfaction, relative to females. Although Figure 5 showed that they have more unconditionally, once heterogeneity in perceptions are controlled for via the work-place practices, the coefficient becomes negative. The coefficient provides some skepticism to popular press literature about self-esteem and "glass ceilings" holding back female engagement at work. Age and experience tend to enter positively, which captures the fact that skills are increasing as individuals encounter more situations and, as such, become more equipped to handle tasks at work. Much like gender, educational attainment surprisingly enters negatively after controlling for one or more of the work-place practices, despite the fact that unconditionally more educated workers have higher job satisfaction (see Figure 5).

The results in Table 3 also illustrate that each of the measures of organizational practices are important determinants of job satisfaction. For example, each of the coefficients have an elasticity between 0.48 (pay transparency and management) and 0.64 (appreciation). Once they are all included together, they still remain statistically and economically significant, although their magnitudes decline proportionately. Whether or not an individual feels appreciated remains the most economically significant of the measures. Put together, organizational practices explain 52% of the variation in job satisfaction. The fact that it is not higher illustrates that job satisfaction and these work-place practices are detecting different phenomena within organizations—that is, that an employee can be engaged, but hold a negative attitude about certain elements of the organization.

Importantly, these coefficient estimates are not causal elasticities. Rather, they convey how much variation in overall job satisfaction is explained by various sub-components. However, to illustrate that they are not completely contaminated by either measurement error and/or time-varying sources of endogeneity, Table 9 in Appendix Section 8.2.2. reproduces these results at the firm-level for a subset of the broader sample. Two insights emerge. The first is that changes in the demographic characteristics are not very heavily correlated with the changes in job satisfaction, suggesting that the measures are not tainted by composition effects. The second is that the coefficients are robust to the inclusion of firm fixed effects, which further suggests that the estimated gradients are not driven purely by selection.

Job satisfaction is an important outcome for at least two reasons. First, it helps explain the

Table 3: Job Satisfaction and Organizational Practices

Dep. var. =	job satisfaction, z-score					
	(1)	(2)	(3)	(4)	(5)	(6)
pay transparency	.142***	.479***				
	[.002]	[.002]				
communication	.169***		.555***			
	[.002]		[.002]			
development	.180***			.562***		
	[.002]			[.002]		
appreciation	.317***				.641***	
	[.002]				[.002]	
management	.091***					.481***
	[.002]					[.002]
male	-.026***	-.019***	.018***	.031***	-.017***	.024***
	[.003]	[.004]	[.004]	[.004]	[.004]	[.004]
age	.004***	.003***	.005***	.005***	.003***	.004***
	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]
experience	.001***	-.001***	-.000	.001***	.001***	.000
	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]
1[college]	-.051***	-.035***	-.027***	-.034***	-.059***	-.025***
	[.003]	[.004]	[.004]	[.004]	[.004]	[.004]
R-squared	.52	.24	.32	.33	.42	.25
Sample Size	235761	235761	235761	235761	235761	235761
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Occupation FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes.–Sources: Payscale. The table reports the coefficients associated with regressions of a standardized z-score for job satisfaction (index of one to five) on standardized measures of organizational practices, including pay transparency, communication, development/training opportunities, appreciation, and management, conditional on controls and fixed effects. All specifications include an indicator for gender, years of schooling, age, and labor market experience, as well as fixed effects on year, month, two-digit occupation, and industry. Standard errors are clustered at the firm-level.

variation in effort, creativity, and engagement. Second, it may help explain variation in employee turnover, which is a major organizational cost (Huselid, 1995). To better understand how each of the different organizational practices contribute to turnover, measured through an intent to leave indicator variable, I now consider probit regressions of intent to leave on each of the organizational practices, including job satisfaction.[17]

Table 4 documents these results. Interestingly, males are 12% more likely to express an intent to leave their company, which could reflect unobserved differences in preferences about the work environment or bargaining power. Age and experience affect intent to leave negatively, which may reflect the fact that employees accumulate firm-specific human capital, which reduces the returns to leaving since they would incur a wage reduction, all else equal. Workers with a college degree also tend to exhibit 2.5% greater turnover, reflecting the fact that their outside options are stronger.

Each of the organizational practices affects intent to leave in a similar pattern as they affected job satisfaction in Table 3. For example, a one unit increase in the standard deviation of pay transparency is associated with a 41% decline in the probability an individual reports that they intend to leave their firm in the next six months, whereas the coefficient is as high as 55% in the case of a standard deviation change in their perception of appreciation within their firm.[18] In additional exercises, I also examined whether there are non-linearities by including including higher-order terms of work-place practices as controls. Interestingly, they were neither statistically or economically insignificant, suggesting that the linear approximation here is sufficient.

3.4. Descriptive Cross-sectional Results

This section now characterizes the cross-sectional properties of organizational practices and job satisfaction across a number of dimensions. The measures in the plots that follow are means of *residualized* standardized organizational practices, job satisfaction, and compensation (using gender, experience, and educational attainment—except when the specific control is the object of interest).

[17] While intent to leave is not a perfect proxy for actual turnover, in robustness, I used the Longitudinal Employer-Household Dynamics (LEHD) data for a validation exercise. I found a correlation of 0.43 between actual turnover and my measure at a two-digit NAICS industry classification.

[18] If a linear probability regression were run in place of the probit for column 1, the R-squared would be 0.25, although the magnitudes of the coefficients are lower.

Table 4: Job Turnover and Organizational Practices

Dep. var. =	intends to leave w/in 6 months						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
satisfaction	-.515***	-.718***					
	[.004]	[.003]					
pay transparency	-.091***		-.412***				
	[.003]		[.003]				
communication	.025***			-.415***			
	[.004]			[.003]			
development	-.119***				-.485***		
	[.004]				[.003]		
appreciation	-.159***					-.555***	
	[.004]					[.003]	
management	-.035***						-.385***
	[.004]						[.003]
male	.123***	.095***	.116***	.076***	.075***	.115***	.071***
	[.007]	[.007]	[.006]	[.006]	[.006]	[.006]	[.006]
age	-.001***	-.000	-.002***	-.003***	-.004***	-.002***	-.003***
	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]
experience	-.005***	-.004***	-.003***	-.004***	-.004***	-.005***	-.004***
	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]
1[college]	.025***	.002	.029***	.021***	.031***	.055***	.020***
	[.007]	[.007]	[.006]	[.006]	[.006]	[.006]	[.006]
Sample Size	235761	235761	235761	235761	235761	235761	235761
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes.–Sources: Payscale. The table reports the coefficients associated with (probit) regressions of an indicator of intent to leave their job in the next six months on standardized z-scores for job satisfaction (index of one to five), pay transparency, communication, development/training opportunities, appreciation, and management, conditional on controls and two-digit industry and occupation and year / quarter fixed effects. All specifications include an indicator for gender, years of schooling, age, and labor market experience, as well as fixed effects on year, month, two-digit occupation, and industry. Standard errors are clustered at the firm-level..

3.4.1. Across Firms

Before turning towards a comparison of these measures across firms, it is useful to begin first by examining the incredible dispersion in organizational practices across firms. Figure 2 plots the distribution of perceptions over these practices pooling all workers together and for those workers with graduate degrees (masters, PhD, MD). The remarkable observation is that the distribution is not only heavily disbursed in general, but also much more disbursed for more educated workers by over a factor of two. While explaining why more skilled workers appear to have even more disbursed beliefs is beyond the scope of this paper, it is interesting to note that these differences in ratings over organizational practices are not driven by lower skilled workers in routine and mundane jobs.

Figure 3 now plots standardized job satisfaction, organizational practices, and compensation across a subset of firms. These firms are included because they all have over 150 respondents in the survey tool as a way of minimizing bias arising from a small sample and/or selection of a particular set of worker type. Interestingly, the correlation between compensation and both organizational practices and job satisfaction is weaker than in the individual data—between 0.22 and 0.31. In fact, some of the companies with the highest compensation have average engagement scores.

3.4.2. Across Industries and Occupations

Figure 4 begins by plotting heat maps of these three variables by industry-occupation pairs.[19] Perhaps not surprisingly, management as an occupation has the highest organizational practices, job satisfaction, and pay. However, moving towards professional services (e.g., business operators, scientists, engineers), they tend to report weaker organizational practices and job satisfaction, despite having higher pay. The professional services and finance industry has the highest, whereas the food / accommodation and trade / transport industries have the least.

Turning towards middle and low skilled jobs, educators, paralegals, and the arts tend to have below average job satisfaction and compensation, but average organizational practices. Since these are generally “office” environments, rather than manually intensive environments, it is likely that

[19]Looking at the two together is important in light of the heterogeneity of tasks within-industry. For example, dispersion in manufacturing is highly heterogeneous—managers reporting high organizational practices and production workers reporting low ones.

work-place practices are more structured and organized. For example, the professional services sector has slightly above average organizational practices in the educators, paralegals, and arts occupation, whereas the trade / transport industry has slightly below average. The worst organizational practices and job satisfaction are concentrated in the construction and manufacturing industries with production, construction, and repair workers. These are precisely where tasks are the most manual. However, they do exhibit slightly better compensation compared to, for example, those same occupations in the arts / food / accommodation and health / public sectors. In this sense, the plots provide a three-dimensional characterization of compensating differentials.

Appendix Section 8.2.3. correlates organizational practices with various measures of skill intensity at the three-digit SOC level using data from the 2010 O*NET and following a similar procedure as Acemoglu and Autor (2011). There is a remarkably strong positive gradient between organizational practices and both cognitive and social skills, reflecting the fact that these practices are concentrated in high skilled occupations—in part due to high skilled workers' demand for the and potentially due to the complementarity between work-place practices and skills. There is a negative gradient between organizational practices and manual skills, which is a predominantly low skill occupation, and a positive, but slightly noisy, positive gradient with technical skills.

3.4.3. Across Space and Demographic Brackets

Figure 5 plots these measures by educational attainment / gender and MSA. Organizational practices and job satisfaction are unambiguously greater among more educated workers, especially those with doctorates or masters degrees. Interestingly, however, those with only some college score the worst—even relative to those with just high school degrees or little to no formal schooling. To the extent that a college education behaves in part as a signal of aptitude or productivity (Spence, 1973), then failing to finish college may provide a worse signal than someone who did not even attempt it to begin with.

Turning towards the dispersion across metro areas, San Francisco and San Diego dominate as the areas with the greatest organizational practices and job satisfaction. Interestingly, although organizational practices are quite high in Seattle and Washington D.C., job satisfaction is much lower. Pittsburgh and Baltimore score the lowest. These patterns are consistent with the validation exercises presented earlier that locations with greater organizational practices and job satisfaction also have greater real output & employment and lower turnover.

Appendix Section 8.2.3. correlates organizational practices with various measures of metropolitan outcomes, including logged population, the share of college (and advanced) degree workers, and the unemployment rate. There is a relatively strong inverse U-shape between organizational practices and population, but the gradient becomes strongly positive for metropolitan areas with a population over 450,000. There is also a very strong and positive gradient with educational attainment, which again reflects the fact that more skilled workers are likely to demand higher work-place practices and their tasks are likely to be more complementary to these amenities. There is a negative association with unemployment rates, which reflects the fact that more dynamic labor markets are more likely to produce and offer higher amenities.

Figure 6 plots these measures across experience and tenure brackets. The two are generally quite consistent with one another: job satisfaction is greatest in the early years of both one's job and tenure at a company, suggesting that there is an "honeymoon" phenomenon once an individual begins working for a firm. However, there are two significant differences in organizational practices—those between 1-3 years of tenure / experience and those with 15+ years. For example, organizational practices are above trend when aggregating by experience, but lower than trend when aggregating by tenure. One rationale for this observation is that workers with only 1-3 years of experience are more likely to be younger, whereas those with 1-3 years of tenure could pool together older workers too, which reconciles the facts since younger workers also report higher indices on average.

4. Theoretical Framework

Having discussed how organizational practices behave as a human resource policy mechanism, I now turn towards a simple model that reflects these features.[20] The goal is not to produce a quantitatively realistic model, but rather create a stylized model that behaves as a heuristic for understanding one reason companies might offer organizational practices.

Suppose employees have preferences over wage income, denoted w, organizational practices, denoted o, and effort, denoted e, with a constant absolute risk aversion (CARA) utility

$$U = -\exp\left[-\eta(w - v(e/o))\right]$$

[20] After producing an unpublished version of this paper, I discovered a related argument made by Ho (2013) with regards to an additional economic rent existing in the presence of moral hazard. Using the NLSY, he examines how a binary indicator over the quality of a job relating to riskiness translates into a compensating differential.

where η denotes the intertemporal risk aversion and $v(e/o)$ characterizes the disutility of work in such a way that increases in organizational practices reduce the disutility associated with work. In this sense, although working longer hours comes at a cost, firms can make the work environment more engaging and enjoyable by raising o. Now, consider the problem of the firm. Following Holmstrom (1979), suppose that output is linear in effort and effort is unobserved

$$y = e + \varepsilon$$

where $\varepsilon \sim \mathcal{N}(0, \sigma^2)$ denotes the noise associated with observing effort. Individuals now have a temptation to shirk since the firm cannot observe their actual effort—only an imperfect signal of it. Given that individuals have preferences over non-pecuniary job characteristics, in addition to wage income, firms now have additional options at their disposal for motivating employees. That is, firms not only have the option of designing performance pay contracts, which are assumed to contain a base (fixed) and performance (variable) component, but also of altering organizational practices. Suppose that firms can provide organizational practices at a cost ϕ such that they choose a combination of fixed pay, denoted f, variable pay, denoted b, desired effort, and organizational practices to maximize profits

$$\max E(y - w - \phi o)$$

subject to an incentive compatibility and individual rationality constraint[21]

$$e \in \arg\max_{e} E(-\exp\left[-\eta(w - v(e/o))\right])$$

$$E(-\exp\left[-\eta(w - v(e/o))\right]) \geq u(\overline{w})$$

where $u(\overline{w})$ denotes the reservation utility. For convenience, assume that $v(\cdot)$ is quadratic, i.e. $v(e/o) = \psi(e/o)^2$. Since preferences are CARA, then maximizing utility is equivalent to solving[22]

$$e \in \arg\max \left[f + be - \frac{1}{2}\psi(e/o)^2 - \frac{\eta}{2}b^2\sigma^2 \right]$$

which implies that $e = bo^2/\psi$. Not surprisingly, $\partial e/\partial o > 0$, i.e., as organizational practices

[21] That is, firms maximize $E(e - f - be - \phi o)$ with respect to e.
[22] See Bolton and Dewatripont (2005) for a summary.

improve, effort rises, capturing the hypothesis that better company-wide culture leads to greater employee engagement. Under the standard assumptions of the first-order approach, having solved for $e(b, o)$, the principal now solves

$$\max_{f,b,o} \left[\frac{bo^2}{\psi} - (f + b\frac{bo^2}{\psi}) - \phi o \right]$$

subject to the individual rationality constraint

$$f + b(\frac{bo^2}{\psi}) - \frac{1}{2}\psi(\frac{bo^2}{\psi})^2 - \frac{\eta}{2}b^2\sigma^2 = \overline{w}$$

The first-order condition on bonus compensation is given by[23]

$$b = \frac{o^2}{o^2 + \eta\sigma^2\psi} \tag{2}$$

Equation 2 produces a noteworthy predictions: $\partial b/\partial\sigma^2 < 0$, meaning that the incentive effects of bonus compensation are decreasing in the level of uncertainty—an issue examined in great detail by Prendergast (2000) and Prendergast (2002).[24] However, it is interesting to note the extent to which $\partial b/\partial\sigma^2 < 0$ varies depends on the level of organizational practices. In particular, since

$$\partial b/\partial o^2 = 1 - o^2/(o^2 + \eta\sigma^2\psi)$$

it follows that $\partial b/\partial o^2 > 0$ since $\eta\sigma^2\psi > 0$ and so $o^2/(o^2 + \eta\sigma^2\psi) < 1$. That means higher levels of organizational practices weaken the impact of uncertainty on bonus compensation. The refinement to the basic trade-off between risk and uncertainty is intuitive since organizational practices reduce the incentive to shirk, which is precisely the channel through which greater

[23] Taking the first-order conditions on b and o produces

$$b: \quad \frac{o^2}{\psi} - \frac{2bo^2}{\psi} + \lambda(\frac{2bo^2}{\psi} - b\frac{o^2}{\psi} - \eta b\sigma^2) = 0, \quad o: \quad \frac{2bo}{\psi} - \frac{2b^2o}{\psi} - \phi + \lambda(\frac{2b^2o}{\psi} - \frac{b^2o}{\psi}) = 0$$

where $\lambda = 1$ from the FOC on f. Notice that the objective function is derived by substituting $e = bo^2/\psi$ in place of $y = e$ (plus noise) net of compensation costs and organizational practices costs. The implied solution is $o = \phi\psi/[b(2 - b)]$, which means that $\partial o/\partial b > 0$ since $|b| < 1$.

[24] A second prediction, which is not explored in this paper, is that $\partial b/\partial o > 0$, meaning that firms can use organizational practices to further amplify the effectiveness of performance pay compensation (e.g., bonuses) as a means of decreasing employee's cost of effort—that is, raising employee engagement. The convexity of $v(\cdot)$ is important for this result. If the cost of effort is linear, then $b = \psi/o$ and $\partial b/\partial o$. As long as $v(\cdot)$ is not linear in e, then it appears that $\partial b/\partial o > 0$. If the cost of effort were linear, then changes in organizational practices would perfectly offset the disutility of working more, so the two would be substitutes. See Ryall and Sampson (2009) for empirical evidence behind the complementarity of formal and informal contract mechanisms.

uncertainty adversely affects labor supply. Even under high uncertainty associated, a good work-place environment behaves as a counteracting force that reduces the temptation to shirk.

The intuition behind the result that higher organizational practices reduce the disutility of effort can be traced to theories of relational contracts; see, for example, Baker et al. (2002). As Gibbons and Henderson (2012) explain, relational contracts provide greater credibility behind decisions within the firm. Take, for instance, an individual's compensation. If the worker does not understand why they are paid what they are paid, even if their salary is above competitive rates, their perception will nonetheless influence their engagement, impacting productivity and retention. However, managers who are able to communicate the rationale behind an employee's pay builds an inherent relational contract. At a more general level, engaging employees over executive compensation ("say-on-pay") can promote greater transparency and satisfaction among employees, in turn raising firm performance (Cunat et al., 2015).

Appendix Section 8.2.4. shows that individuals in performance pay jobs report higher organizational practices and job satisfaction (Figure 13), which is consistent with the theoretical prediction of complementarity between financial incentives and organizational amenities. However, these cross-sectional differences are contaminated by the potential for non-random sorting, so they represent only conditional correlations—not causal evidence. The remainder of the paper focuses on identifying compensating differentials consistent with the prediction that firms offer organizational amenities because employees want them.

5. Identifying Compensating Differentials

5.1. Overview

The standard approach in estimating compensating differentials involves regressing a measure of wages (e.g., hourly earnings or total compensation) on demographic characteristics and job-specific amenities; see, for example, Rosen (1974) and Viscusi (1980) for early applications. While the transformation of the work-place is now broadly recognized (Bidwell et al., 2013), there is little evidence on how much employees are willing to pay for non-pecuniary amenities.[25] However, identifying them is empirically difficult given the standard endogeneity problem that better workers

[25] See, for example, evidence from Sullivan and To (2014) that non-pecuniary amenities matter. However, they have no actual measure of these amenities.

are likely to get matched into better jobs, which are better on a number of dimensions, including work-place practices. For example, Figure 7 plots average z-score indices on job satisfaction, organizational practices, and compensation, showing that they are highly correlated and, taken at face value, would not be consistent with a theory of compensating differentials.

The section that follows begins by estimating a modified hedonic model that contains firm covariates to address the obvious endogeneity problem arising from non-random sorting into firms that offer better amenities and/or have cost efficiencies (Hwang et al., 1998). I also show that individual panel data does not allow for consistent estimation because of the presence of firm-specific rents induced by the presence of better organizational practices. Exploiting variation in employees' outside option, I propose a modified hedonic estimator that recovers plausible estimates of a marginal willingness to pay for organizational practices.

5.2. Empirical Setup

Before turning towards the preferred identification strategy, consider first a modified hedonic regression with firm-specific covariates

$$w_{ift} = \alpha X_{ft} + \beta D_{it} + \delta O_{ift} + \eta_f + \lambda_t + \epsilon_{ift} \tag{3}$$

where w denotes logged compensation, X denotes firm controls, D denotes individual (demographic) controls, O denotes organizational practices, and η and λ denote firm and year fixed effects. Identification of δ in Equation 3 requires that unobserved shocks to compensation are uncorrelated with individual perceptions of organizational practices, conditional on individual / firm covariates and firm fixed effects.

While the inclusion of these controls and firm fixed effects goes a long way in reducing the margin for bias on δ, it is still subject to at least two endogeneity problems. The first endogeneity problem is the presence of individual unobserved heterogeneity. There are several reasons that this might be the case. For starters, it is well-known that better workers will be matched into firms with better non-wage amenities; see, for example, Brown (1980) and Hwang et al. (1992). However, it is also possible that the idiosyncratic person-specific component in Equation 3 is correlated with person-specific heterogeneity in perceptions of organizational practices. These instances will produce upwards bias on δ.

The second endogeneity problem is that, if organizational practices raise labor productivity,

then higher earnings will partially capitalize the benefits of these practices. To the extent that some of the productivity benefits induced by greater employee engagement are contained within an employee's earnings, then the firm-specific rent will be correlated with and load onto organizational practices and bias δ upwards. This endogeneity problem is also closely related to the concern introduced by Hwang et al. (1998) that firms with greater cost efficiencies will not only offer more of the amenity, but also provide a higher value bundle of amenities to employees.

5.3. Gauging Unobserved Individual Heterogeneity

How important is the second endogeneity problem, relative to the first? Ideally, longitudinal data on individuals would be available to allow for identification of the returns to job satisfaction based on job-to-job transitions. While there are not yet enough repeat users on PayScale to exploit such longitudinal variation, I turn instead towards supplemental micro-data from the University of Minnesota Integrated Public Use Microdata Series (IPUMS) on higher education (https://highered.ipums.org/highered/). The IPUMS Higher Ed survey combines responses from three longitudinal panels: the National Survey of College Graduates (NSCG), the National Survey of Recent College Graduates (NSRCG), and the Survey of Doctorate Recipients (SDR). These surveys are funded by the National Science Foundation (NSF) and part of their Scientists and Engineers Statistical Data System (SESTAT).[26],[27] These surveys provide information on individuals educated or employed in a wide array of science, technology, engineering, and mathematics (STEM) fields. The most important features of the data (given the application here) are that it contains a panel of workers and information on their self-reported job satisfaction.

Table 5 estimates Equation 3 in both the PayScale ("PS") and Higher Ed ("NSF") datasets. There are two important observations. First, when separately estimating Equation 3, the coefficient on job satisfaction is remarkably similar: a standard deviation rise in job satisfaction is associated with a 0.043% and 0.046% increase in compensation in the PayScale and Higher Ed datasets, respectively. The fact that they are almost indistinguishable in magnitude is incredible, despite the fact that the two are very different samples—that is, a relatively representative sample

[26] While the NSRCG was discontinued after 2010, the other two surveys have continued and cover the entire college graduate population in the United States.

[27] 35% of the sample contains individuals observed once, 21% twice, 14% three times, 10% four times, 6% five times, 3.5% seven times, 2.3% eight times, and 1% nine times. Some individuals are observed more than nine times, but they consist of less than 1% of the sample.

from PayScale with a sample of graduate degree STEM workers from Higher Ed.[28]

Second, when person fixed effects are included in the Higher Ed dataset, the coefficient on job satisfaction declines in magnitude from 0.046 to 0.024, whereas, when organizational practices are included in the PayScale dataset, the coefficient declines in magnitude from 0.043 to 0.018. Since the specification in the Higher Ed data exploits individuals' switches from one job to another, I also include job-specific characteristics to help control for time-varying heterogeneity in the underlying tasks between one job and the other (which may also be correlated with job satisfaction).

Table 5: Hedonic Regressions of Job Satisfaction in the PayScale and Higher Ed Surveys

Dep. var. =	logged annual compensation			
	PS	PS	NSF	NSF
job satisfaction, z-score	.043***	.018***	.046***	.024**
	[.001]	[.002]	[.010]	[.010]
org. practices, z-score		.036***		
		[.002]		
job activities, employee rel			.050***	.053***
			[.013]	[.018]
job activities, computer apps			.203***	.051***
			[.013]	[.018]
job activities, supervise			.333***	.073***
			[.013]	[.025]
R-squared	.35	.35	.24	.95
Sample Size	137472	137472	83843	83843
Controls	Yes	Yes	Yes	Yes
Person FE	No	No	No	Yes
Year FE	No	No	No	Yes

Notes.–Sources: Payscale and IPUMS Survey of Higher Education. The table reports the coefficients associated with regressions of logged annual compensation on standardized job satisfaction, conditional on controls in both the PayScale and NSF datasets. The NSF dataset is a panel from 1993-2013 with individuals surveyed up to seven times. Controls in the PayScale regression include: standardized organizational practices, a quadratic in age, male, and indicators for seven buckets of educational attainment (high school, associates, some college, college, professional programs [MBA, health policy], and doctorate), and years of labor market experience. Controls in the NSF regression include: a quadratic in age, number of children, race (white, black, asian), and four buckets of educational attainment (college, masters, professional programs, and doctorate). Standard errors are clustered at the person-level for the NSF data and at the firm-level for the PayScale data.

[28]Moreover, the fact that the coefficients decline by a remarkably similar magnitude—by 48% in the Higher Ed data and 58% in the PayScale data—when introducing these controls suggests that workers are not "too different" in that all workers appear to care about meaningful work.

5.4. Measuring Firm-specific Rents

The theoretical model suggests that firms may offer organizational practices to reduce the temptation for employees to shirk. There are at least two reasons firms may decide to improve the work-place environment over offering greater financial compensation to employees. One reason is the presence of volume discounts. By investing in the corporate culture, firms create a non-rival amenity that everyone in the firm can enjoy. Another reason is the convexity of preferences over consumption and leisure. Depending on how much individuals prefer leisure over consumption, higher compensation might not be attractive past a certain point, whereas improving the work-place environment might still have bite.[29] For an examination of the relative channels explaining the provision of non-wage amenities, see Liu et al. (2017).

Taking the presence of organizational practices as a fact in the labor market, I examine the theoretical prediction from the model that these amenities are associated with improvements in labor productivity. While measuring productivity is inherently difficult given the absence of a well-defined output measure, I take two related strategies. The first strategy leverages self-reported information on employee ratings, intent to leave, and stress at work in the PayScale survey tool. Recognizing that these coefficients may be potentially biased, I also control for the employee's compensation to help proxy for unobserved heterogeneity.

Table 6 documents these results. A standard deviation increase in organizational practices is associated with a 0.19 standard deviation increase in employee performance (column 1), a 62% decline in the probability that an individual is looking for a job, and a 0.17 standard deviation decline in stress. These estimates are statistically indistinguishable when compensation is added as a control variable, but, due to the lack of quasi-experimental variation, should only be interpreted as conditional correlations that are consistent with the predictions from the theoretical model. Appendix Section 8.3. also presents results with productivity measured at the firm-level (e.g., revenue per worker and wages per worker) using the set of employees in publicly traded firms; these results are displayed in Table 10 and convey a similar and robust pattern.

[29] See Hall and Jones (2007) for a similar channel in the context of rising health expenditures per capita. In their model, individuals become saturated with non-health consumption, whereas health related consumption extends longevity and does not face the same diminishing marginal utility.

Table 6: Organizational Practices and Employee Outcomes: Performance, Turnover, and Stress

Dep. var. =	employee rating, z-score		looking for a job, 1/0		stress rating, z-score	
	(1)	(2)	(3)	(4)	(5)	(6)
org. practices, z-score	.19***	.18***	-.62***	-.61***	-.17***	-.18***
	[.00]	[.00]	[.00]	[.00]	[.01]	[.01]
ln(compensation)		.25***		-.17***		.28***
		[.00]		[.01]		[.01]
R-squared	.04	.05			.04	.06
Sample Size	270885	270885	270885	270885	28511	28511
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes.–Sources: PayScale. The table reports the coefficients associated with regressions of standardized self-reported employer ratings of the employee, an indicator for intent to leave within the next six months, and standardized employee stress on logged compensation and standardized organizational practices, conditional on controls, including: a quadratic in age, male, and indicators for seven buckets of educational attainment (high school, associates, some college, college, professional programs [MBA, health policy], and doctorate), and years of labor market experience. Standard errors clustered at the firm-level.

5.5. Identification Strategy

Why does the inclusion of person fixed effects not recover a marginal willingness to pay for organizational practices here, whereas it helped Stern (2004) do so? As the previous sub-section illustrates, the presence of these amenities confers a firm-specific rent in the form of higher labor productivity, which is capitalized in employee earnings. In contrast, the amenities examined by Stern (2004) do not necessarily have the same effect—for example, the fact that a job allows for more of a research focus in academia versus a client focus in industry may have a pure selection, rather than incentive, effect on employee behavior. In this sense, even the traditional ideal natural experiment of providing two observationally equivalent workers with two different jobs, which vary only in their organizational practices, would still fail to recover a reliable measure of willingness to pay since the two jobs, by construction, differ in their firm-specific rents.

Rather than trying to gather data on all the possible sets of measures for firm-specific rents, I take an alternative strategy that leverages variation in an employee's outside option, which is not contaminated by these firm-specific rents. I specifically use PayScale's measure of predicted compensation, which is based on a hierarchical Bayesian learning algorithm that incorporates information about their occupation, industry, job title, location, all full suite of demographic and education characteristics. While technical details are documented in Appendix Section 8.3. (see Figure 14 for a comparison of actual and predicted compensation), predicted compensation

explains a remarkably large amount of actual compensation—roughly 91%.[30]

Using this information, denote w^P as predicted logged compensation and w^A as actual logged compensation. Modifying Equation 3, then I can exploit variation in the individual's outside option by running regressions of the form

$$\tilde{w}_{ift} \equiv (w^P_{ift} - w^A_{ift}) = \alpha X_{ft} + \beta D_{it} + \delta O_{ift} + \eta_f + \lambda_t + \epsilon_{ift} \tag{4}$$

where the outcome variable is now logged predicted earnings net of actual earnings, representing the market's valuation of an employee's skill in excess (or shortfall) of their current compensation. Importantly, the outcome variable helps purge variation in unobserved person-specific ability and variation in firm-specific rents.

The intuition behind identification in Equation 4 arises from the fact that labor markets match workers and firms together such that the equilibrium induces a price on job characteristics and inputs. In this sense, the marginal willingness to pay for organizational practices, δ, is now identified by variation in how different workers are sorting into jobs that vary in the marketplace's valuation over the worker's skill / characteristics combination. Appendix Section 8.3. discusses the assumptions behind hedonic estimation and explains the credibility behind them in this setting. The procedure is conceptually similar to the application of multiple job offers (Stern, 2004) and the arrival process of jobs (Gronberg and Reed, 1994). Most applications are constrained in both of these dimensions, however, since publicly available individual micro-data lacks the specificity and breadth to model wages and/or control for firm characteristics. An equally interesting and useful approach is to estimate an equilibrium search model with longitudinal variation on workers as in Bonhomme and Jolivet (2009).

6. Recovering Marginal Willingness to Pay Estimates

Table 7 estimates both the standard hedonic model and Equation 4, which addresses the two endogeneity problems outlined above. Columns 1 and 2 show that, even with the inclusion of firm fixed effects, which raise the R-squared from 0.41 to 0.71, the gradient on organizational practices

[30] Although the high explanatory power might appear concerning at first, their business model is predicated on valuing human capital using an incredibly rich set of features and flexible machine learning algorithms. Traditional wage regressions generate an R-squared of 0.25, but they only include very crude covariates, namely: educational attainment, age, race, experience, and tenure. PayScale is able to combine information about not only standard covariates, but also typically unobserved covariates, including: the degree granting institution, employer, job-specific skills, and peer outcomes within local geographic, industry, and occupation cells.

is still positive and, therefore, inconsistent with models of compensating differentials.

Turning towards the preferred estimates, column 3 begins by regressing the logged predicted compensation net of actual compensation ("market earnings premium") on organizational practices, conditional on individual controls. In this specification, a standard deviation rise in organizational practices is associated with a 0.02% decline in the market earnings premium. Using the firm-specific average organizational practices, rather than individual, raises the magnitude to 0.03, which is reasonable in light of the potential for unobserved person-specific heterogeneity. Column 5 again uses the individual-specific measure, but introduces firm fixed effects to reduce the potential for time-invariant differences across firms. Column 6 subsequently restricts the sample to the set of employees in publicly traded firms and adds logged employment, assets, and capital as controls to mitigate any time-varying sources of unobserved heterogeneity.[31]

Table 7: Baseline Estimates for Willingness to Pay for Organizational Practices

Dep. var. =	ln(annual comp.)		ln(predicted comp.)-ln(actual comp.)			
	(1)	(2)	(3)	(4)	(5)	(6)
org. practices, individual	.055***	.045***	-.020***		-.017***	-.018***
	[.001]	[.001]	[.001]		[.001]	[.001]
org. practices, firm mean				-.026***		
				[.001]		
R-squared	.41	.71	.02	.02	.42	.15
Sample Size	127791	126704	127454	127454	126521	24263
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	No	Yes	Yes
Time FE	No	Yes	No	No	Yes	Yes

Notes.–Sources: Payscale and Compustat. The table reports the coefficients associated with regressions of logged predicted compensation net of actual compensation on standardized organizational practices, conditional on controls, including: a quadratic in age, male, and indicators for seven buckets of educational attainment (high school, associates, some college, college, professional programs [MBA, health policy], and doctorate), and years of labor market experience. Predicted compensation is generated through PayScale's proprietary machine learning algorithms that use their entire salary database of 56+ million individuals in North America. Column 6 also contains logged employment, logged assets, and logged capital for the set of employees in publicly traded firms. Standard errors are clustered at the firm-level.

Consistent with the intuition behind the stylized model, the returns to organizational practices are likely to be higher for workers who are working longer and/or more intense hours. While the survey does not contain a reliable measure of time use, I use income as a proxy and estimate Equation 4 separately by income bracket. Figure 8 examines this hypothesis directly and plots

[31]Unfortunately, there are not many comparable estimates of the value of work-place culture to benchmark these estimates. Felfe (2012), for example, finds that mothers are willing to pay roughly 32% of their earnings to have greater flexibility over their jobs.

the estimated coefficients on organizational practices, showing that the gradient is growing in absolute value for higher incomes. Intuitively, the marginal willingness to pay for organizational practices is close to zero at the bottom of the income distribution, which reflects the fact that these workers value financial compensation more than a "good" work environment.

To further illustrate the implications of these estimates, I conduct a simple back-of-the-envelope calculation. Under the assumption that employees value an additional standard deviation in organizational practices at 2% of their earnings, then a firm with N employees at a W will have $0.0173 \times N \times W$ in marginal benefits. For the subset of firms in the database in publicly traded companies, that is \$160,857 dollars on average ($= 0.0173 \times 134 \times 68,206$).[32] To approximate the costs of providing these amenities, one approach is to recover a crude elasticity between selling, general and administrative expenses (SGA) and organizational practices. Restricting the sample to those workers in Compustat-matched firms, a regression of logged SGA on organizational practices, conditional on individual controls and logged firm employment and assets, produces a gradient of 0.0135. Since SGA costs are roughly \$8,334,000 on average, then this amounts to \$112,509 dollars on average.

Putting these facts together, the net benefits of offering a standard deviation rise in organizational practices is \$48,348 per employee, which easily meets any cost-benefit analysis—a benefit-cost ratio of 1.43. Given that that net benefits will tend to increase in company size—unless there are non-standard non-linearities in employment costs that show up in providing better work-place practices—larger firms should have better organizational practices. Indeed, for the sample of individuals in Compustat firms, a regression of logged assets on organizational practices produces a coefficient of 0.06.[33] These results are also consistent with companion work that focuses on the provision of non-wage benefits, ranging from healthcare to perks (Liu et al., 2017).

6.1. Why Do Some Companies Have Bad Culture?

If organizational practices raise employee performance and reduce turnover, why do not all firms change their work-place practices? While it is beyond the scope of this paper to provide a microeconomic theory for the decisions of some firms to optimally invest in organizational practices, I

[32] Average employment among this set of Compustat firms is 134 and average total labor income among these workers (from the PayScale data) is \$68,206.

[33] The magnitude declines to 0.0177, however, once logged employment and individual demographics are included as a control.

provide a brief synthesis in light of the current results.

On one hand, some work-place practices are more useful in some settings than others (Gibbons and Roberts, 2013). For example, as discussed earlier in Appendix Section 8.2.3., I use data from the Occupational Task Network (O*NET) database—which surveys experts across six-digit occupation classifications over an array of skill intensities, education and experience requirements, and work environment characteristics—I find that occupations with higher organizational practices also have higher concentrations of non-routine and cognitive skill intensities. That is, the returns to employee engagement might be higher in occupations that have greater demands on skill since these are the jobs requiring greater coordination and cognitive processing among employees.

On the other hand, management might be a factor of production that enables greater coordination, meaning that production is strictly increasing in managerial capabilities (Bloom et al., 2015). For example, Bloom et al. (2015) augment a standard neoclassical model with management and show how doing so helps explain cross-country differences in productivity. In reality, both of these theories are at play: organizational practices raise employee engagement, but especially so in some settings. In this sense, one possible explanation for the wide dispersion in organizational practices is the fact that firms are subject to different distortions (e.g., regulations), market imperfections (e.g., asymmetric information between employees and employers), or organizational inertia (e.g., see Heath and Heath (2010)). Understanding the factors explaining dispersion in organizational practices is a fruitful area for further work.

7. Conclusion

Companies overwhelmingly report that employee engagement and retention is one of their top strategic concerns. Understanding the underlying determinants of engagement and retention is, therefore, an important objective for researchers. This paper introduces a new survey tool implemented between 2014 and 2016 through a partnership with PayScale (www.payscale.com), a leading data science company that values human capital, to measure and explain the cross-section of job satisfaction and organizational practices with respect to pay. After comparing the sample to the Current Population Survey and validating the data with financial records from Compustat, I document the incidence of job satisfaction and organizational practices across a number of labor market dimensions. I find, for example, that firms with better organizational practices are also more productive and have greater assets. Metropolitan areas with higher organizational practices

are more educated, have lower unemployment rates, and are larger. I also show that occupations with higher organizational practices have greater cognitive, social, and technical skill intensities.

Motivated by these empirical findings, I subsequently examine one reason companies may invest in organizational practices—to raise labor productivity by reducing the temptation for employees to shirk. Since labor supply produces disutility, anything in the work-place that makes it more enjoyable will raise engagement and, therefore, productivity. To examine whether the theoretical prediction is consistent with data, I estimate a marginal willingness to pay for organizational practices. I begin by providing empirical evidence that increases in organizational practices are associated with increases in effort and productivity (at both the individual and firm level), which will lead to higher firm productivity and, therefore, be capitalized into employee earnings. Using separate panel data on STEM workers, I show that this endogeneity problem is not overcome simply through the inclusion of person effects.

My identification strategy overcomes this time-varying endogeneity problem by exploiting variation in an individual's outside option. Specifically, I net out current compensation from the employee's predicted compensation, which is generated from PayScale. I find that individuals are willing to pay 2% of their earnings for a standard deviation rise in organizational practices. Although it may appear small, I conduct a simple back-of-the-envelope calculation that aggregates these benefits across workers in the average publicly traded firm within the PayScale dataset. Net benefits are roughly $48,348 per employee, which implies a benefit-cost ratio of 1.43.

These results also provide many new directions for future research. First, what are the specific types of behaviors that lead to, for example, low pay transparency or appreciation? Identifying the determinants of employment practices is fundamentally linked to the emerging literature on management as a technology (Bloom et al., 2015). Second, what role do peer effects play in the work place? Recent papers in the literature on peer effects have suggested that they play a role in increasing positive forms of social norms (Mas and Moretti, 2009), but they may also have adverse effects (Card et al., 2012). It will be important to control for the quality of peers, e.g., through the average years of schooling among peers within a branch, and so on. With the emergence of similar datasets, academic-industry partnerships can help accelerate our understanding of employee and firm productivity.

References

Acemoglu, D. and D. H. Autor (2011): "Skills, tasks and technologies: Implications for employment and earnings," *Handbook of Labor Economics*, 4b, 1043–1171.

Ackerberg, D. A., K. Caves, and G. Frazer (2015): "Structural identification of production functions," *Econometrica*, 83, 2411–2451.

Amabile, T. M., S. G. Barsade, J. S. Mueller, and B. M. Staw (2005): "Affect and creativity at work," *Administrative Science Quarterly*, 50, 367–403.

Amabile, T. M. and S. Kramer (2012): "How leaders kill meaning at work," *McKinsey Quarterly*.

Amabile, T. M., E. Schatzel, G. Moneta, and S. J. Kramer (2004): "Leader behaviors and the work environment for creativity: Perceived leader support," *Leadership Quarterly*, 15, 5–32.

Andrew, A. and P. J. Kehoe (2005): "Modeling and measuring organizational capital," *Journal of Political Economy*, 113, 1026–1053.

Athey, S. and G. Imbens (2017): "The state of applied econometrics: Causality and policy evaluation," *Journal of Economic Perspectives*, 31, 3–32.

Baker, G., R. Gibbons, and K. Murphy (2002): "Relational contracts and the theory of the form," *Quarterly Journal of Economics*, 117, 39–84.

Baligh, H. and R. Burton (1981): "Describing and designing organization structures and processes," *International Journal of Policy Analysis and Information Systems*, 5, 251–266.

——— (1984): "The process of designing organization structures and their information substructures," *Plenum Press, New York*.

Bennett, V. M. and L. Pierce (2016): "Motivation matters: Corporate scope and competition in complementary product markets," *Strategic Management Journal*, 37, 1304–1315.

Bidwell, M., F. Briscoe, I. Fernandez-Mateo, and A. Sterling (2013): "The employment relationship and inequality: How and why changes in employment practices are reshaping rewards in organizations," *Academy of Management Annals*, 7.

Bloom, N., B. Eifert, D. McKenzie, A. Mahajan, , and J. Roberts (2013): "Does management matter: Evidence from India," *Quarterly Journal of Economics*, 128, 1–51.

Bloom, N., R. Lemos, R. Sadun, D. Scur, and J. Van Reenen (2014): "The new empirical economics of management," *Journal of European Economic Association*, 12.

Bloom, N., R. Sadun, and J. Van Reenen (2012): "The organization of firms across countries," *Quarterly Journal of Economics*, 127, 1663–1705.

——— (2015): "Management as a technology?" *Working paper*.

Bloom, N. and J. Van Reenen (2007): "Measuring and explaining management practices across firms and countries," *Quarterly Journal of Economics*, 3, 1560–1689.

Bockstael, N. E. and K. E. McConnell (2007): "Environmental and resource valuation with revealed preferences: A theoretical guide to empirical models," *Springer*.

Bolton, P. and M. Dewatripont (2005): *Contract theory*, MIT Press.

Bonhomme, S. and G. Jolivet (2009): "The pervasive absence of compensating differentials," *Journal of Applied Econometrics*, 24, 1099–1255.

Bound, J., C. Brown, and N. Mathiowetz (2001): "Measurement error in survey data," *Handbook of Econometrics*, 5.

Bound, J. and A. B. Krueger (1991): "The extent of measurement error in longitudinal earnings data: Do two wrongs make a right?" *Journal of Labor Economics*, 9, 1–24.

Brown, C. (1980): "Equalizing differences in the labor market," *Quarterly Journal of Economics*, 94, 113–134.

Card, D., R. Chetty, M. Feldstein, and E. Saez (2011): "Expanding access to administrative data for research in the United States," *Mimeo*.

Card, D., J. Heining, and P. Kline (2013): "Workplace heterogeneity and the rise of West German wage inequality," *Quarterly Journal of Economics*, 128, 967–1015.

Card, D., A. Mas, E. Moretti, and E. Saez (2012): "Inequality at work: The effect of peer salaries on job satisfaction," *American Economic Review*, 102, 2981–3003.

Chatman, J. A. and K. Jehn (1994): "Assessing the relationship between industry characteristics and organizational culture: How different can you be?" *Academy of Management Journal*, 37, 522–533.

Coase, R. H. (1937): "The nature of the firm," *Economica*, 4, 386–405.

Cunat, V., M. Gine, and M. Guadalupe (2015): "Say pays! Shareholder voice and firm performance," *Review of Finance*, 1–36.

Deloitte (2016): "Global human capital trends 2016: The new organization," *Deloitte University Press*.

Duncan, G. J. and G. S. Fields (1985): "An investigation of the extent and consequences of measurement error in labor economic survey data," *Journal of Labor Economics*, 3, 508–532.

Felfe, C. (2012): "The willingness to pay for job amenities: Evidence from mothers' return to work," *Industrial and Labor Relations Review*, 65, 427–454.

Gibbons, R. and R. Henderson (2012): "Relational contracts and organizational capabilities," *Organizational Science*, 23, 1350–1364.

Gibbons, R. and J. Roberts (2013): "The handbook of organizational economics," *Princeton University Press*.

Gittleman, M. and C. Makridis (2017): "Does "Performance Pay" Pay? Wage Flexibility over the Great Recession," *Working paper*.

Gronberg, T. J. and W. R. Reed (1994): "Estimating workers' marginal willingness to pay for job attributes using duration data," *Journal of Human Resources*, 29, 911–931.

Hagerty, M. R. and K. C. Land (2007): "Constructing summary indices of quality of life: A model for the effect of heterogeneous importance weights," *Sociological Methods Research*, 35, 455–496.

Hall, R. E. and C. I. Jones (2007): "The value of life and the rise in health spending," *Quarterly Journal of Economics*, 122, 39–72.

Harrison, D. A., D. A. Newman, and P. L. Roth (2006): "How important are job attributes? Meta-analytic comparisons of integrative outcomes and time sequences," *Academy of Management Journal*, 49, 305–325.

Harter, J. K., F. L. Schmidt, S. Agrawal, S. K. Plowman, and A. Blue (2016): "The relationship between engagement at work and organizational outcomes," *Gallup*.

Heath, C. and D. Heath (2010): "Switch: How to change things when change is hard," *Crown Business*.

Hennessey, B. A. and T. M. Amabile (2010): "Creativity," *Annual Review of Psychology*, 61, 569–598.

Ho, C. Y. (2013): "Compensating differentials and moral hazard in the labor market," *Unpublished*.

Holmstrom, B. (1979): "Moral hazard and observability," *The Bell Journal of Economics*, 10, 74–91.

Huselid, M. A. (1995): "The impact of human resource management practices on turnover, productivity and corporate financial performance," *Academy of Management*, 38, 635–672.

Hwang, H.-s., D. T. Mortensen, and W. R. Reed (1998): "Hedonic wages and labor market search," *Journal of Labor Economics*, 16, 815–847.

Hwang, H.-s., W. R. Reed, and C. Hubbard (1992): "Compensating wage differentials and unobserved productivity," *Journal of Political Economy*, 100, 835–858.

Ichniowski, C., K. Shaw, and G. Prennushi (1997): "The effects of human resource management practices on productivity," *American Economic Review*, 87, 291–313.

Jiang, K., D. P. Lepak, J. Hu, and J. C. Baer (2012): "How does human resource management influence organizational outcomes? A meta-analytic investigation of mediating mechanisms," *Academy of Management*, 55, 1264–1294.

Lawler, E. E. and D. Hall (1970): "The relationship of job characteristics to job involvement, satisfaction and intrinsic motivation," *Journal of Applied Psychology*, 54, 305–312.

Lawler, E. E. and L. W. Porter (1967): "The effects of performance on job satisfaction," *Industrial Relations*, 7, 20–28.

Lazear, E. P. and K. L. Shaw (2007): "Personnel economics: The economist's view of human resources," *Journal of Economic Perspectives*, 21, 91–114.

Likert, R. (1961): "New patterns of management," *McGraw Hill, New York*.

Liu, T., C. Makridis, P. Ouimet, and E. Simintzi (2017): "The cross-section of non-wage amenities: Who uses them and why?" *Working paper*.

Malone, T. (1987): "Modeling coordination in organizations and markets," *Management Science*, 33, 1317–1332.

Mas, A. and E. Moretti (2009): "Peers at work," *American Economic Review*, 99, 112–145.

Mas, A. and A. Pallais (2016): "Valuing alternative work arrangements," *American Economic Review, Review & Resubmit*.

McGregor, D. (1960): "The human side of enterprise," *McGraw Hill, New York*.

Milgrom, P. R. (1988): "Employment contracts, influence activities, and efficient organization design," *Journal of Political Economy*, 96, 42–60.

Mullainathan, S. and J. Spiess (2017): "Machine learning: An applied econometric approach," *Journal of Economic Perspectives*, 31, 87–106.

Postel-Vinay, F. and J.-M. Robin (2002): "Equilibrium Wage Dispersion with Worker and Employer Heterogeneity," *Econometrica*, 70, 2295–2350.

Prendergast, C. (1999): "The provision of incentives in firms," *Journal of Economic Literature*, 37, 7–63.

——— (2000): "What trade-off of risk and incentives?" *American Economic Review*, 90, 421–425.

——— (2002): "The tenuous trade-off between risk and incentives," *Journal of Political Economy*, 110, 1071–1102.

Prescott, E. C. and M. Visscher (1980): "Organizational capital," *Journal of Political Economy*, 88, 445–461.

Riketta, M. (2008): "The causal relation between job attitudes and performance: A meta-analysis of panel studies," *Journal of Applied Psychology*, 93, 472–481.

Rosen, S. (1974): "Hedonic prices and implicit markets: Product differentiation in pure competition," *Journal of Political Economy*, 82, 34–55.

——— (1986): "The theory of equalizing differences," *Handbook of Labor Economics*, 1, 641–692.

Ryall, M. D. and R. C. Sampson (2009): "Formal contracts in the presence of relational enforcement mechanisms: Evidence from technology development projects," *Management Science*, 55, 906–925.

Sheridan, J. e. (1992): "Organizational culture and employee retention," *Academy of Management Journal*, 35, 1036–1056.

Sorkin, I. (2015): "Ranking firms using revealed preference," *University of Michigan, job market paper*.

Spence, M. (1973): "Job market signaling," *Quarterly Journal of Economics*, 87, 355–374.

Staw, B. M., R. I. Sutton, and L. H. Pelled (1994): "Employee positive emotion and favorable outcomes at the workplace," *Organizational Science*, 5, 51–71.

Stern, S. (2004): "Do scientists pay to be scientists?" *Management Science*, 50, 835–853.

Sullivan, P. and T. To (2014): "Search and nonwage job characteristics," *Journal of Human Resources*, 49, 472–407.

Surowiecki, J. (2004): "The wisdom of crowds: Why the many are smarter than the few and how collective wisdom shapes business, economies, societies and nations," *Doubleday*.

Tett, R. P. and J. P. Meyer (1993): "Job satisfaction, organizational commitment, turnove intention and turnover: Path analysis based on meta-analytic findings," *Personnel Psychology*, 46, 259–293.

Viscusi, W. K. (1980): "Union, labor market structure and the welfare implications of quality of work," *Journal of Labor Research*, 1, 175–192.

Williamson, O. E. (1981): "The economics of organization: The transaction cost approach," *American Journal of Sociology*, 87, 548–77.

——— (2002): "The theory of the firm as governance structure: From choice to contract," *Journal of Economic Perspectives*, 16, 171–195.

8. Online Appendix (Not for Print)

8.1. Supplemental Data Details

8.1.1. Constructing Aggregate Organizational Practices

The main text uses an aggregate index of organizational practices based on the sum of pay transparency, communication, development/communication, appreciation, and managerial relationship indices. Creating a single index helps increase variation and reduce noise, especially given the correlation across each of the indices. A principal-components analysis suggests that the first four factors explain 60%, 74%, 84%, and 92% of the variation, respectively. Figure 9 plots the eigenvalue associated with the different factors, showing that it drops below one after the first factor. That is evidence that a single index suffices in explaining the variation across these dimensions of organizational practices

8.1.2. Additional Data Validation

Through a unique partnership with Gallup Inc., the leading polling service in the U.S., the second exercise compares job satisfaction and feeling of appreciation in PayScale with life satisfaction and feeling of trust within the organization using Gallup's U.S. Daily poll. Approximately 200 Gallup employees survey 1,000 adults (age 18 or over) in all 50 states and the District of Columbia each day on various political, economic, and well-being topics. Detailed location data, such as the zip-code and metro area, is also available with corresponding sample weights. Figure 10 plots the correlation between both life satisfaction & job satisfaction and perceptions of appreciation & feelings of trust within organizations at the state-level between the Gallup and PayScale datasets. The measures are highly correlated, providing further evidence that the PayScale sample provides a reliable sample for analysis.

8.2. Supplemental Descriptive Statistics

8.2.1. Summary Statistics

Table 8 documents a number of descriptive statistics separating out individuals based on their response to five different survey questions about their perceptions of organizational states (e.g., high job satisfaction, transparency in compensation, etc). While those reporting high levels have systematically higher earnings, and are much less likely to report that they plan to leave their company in the next six months, they are not more likely to be more educated or receive performance pay (either on the intensive or extensive margin). For example, the share of graduate-degree workers reporting high versus low job satisfaction is 71% and 70%, respectively. Looking across each of the other states—for instance, high/low levels of training/development opportunities—72% of those reporting high levels have a graduate degree versus 69% reporting low levels.

Turning towards the three measures of performance pay—bonus, commission, and profit sharing—there is no systematic difference between those reporting high/low levels. One of the endogeneity concerns is that an individual might receive a bonus and, therefore, be more willing to report higher levels of job satisfaction or organizational amenities. However, the fact that the probability of receiving performance pay is uncorrelated with levels of these amenities suggests that this form of reverse causality is not likely a first-order concern.

8.2.2. Conditional Correlations at Firm Level

The main text presents conditional correlations between job satisfaction and various inputs to organizational practices: indices of pay transparency, communication, training/development, appreciation, and management. However, one major concern is that, even though the results are merely a decomposition exercise, the estimated coefficients are based purely on measurement error and/or compositional effects. To address this concern, Table 9 estimates the regression at the firm-level for the set of firms that have at least five respondents in the survey. If measurement error at the individual-level was driven the results in the main text, then averages at the firm-level should be much more noisy. However, this is not the case.

Column 1 presents the raw unconditional correlation without demographic controls. Column 2 weights observations by the number of people observed in each firm from the survey. The fact that the conditional correlations remain highly significant is consistent with my claim that the results are not driven by measurement error; if they were, then sampling variability would be a

Table 8: Summary Statistics, Separately by High/Low Perceptions

	Job Satisfaction		Compensation		Development		Management		Firm Future	
	Bad	Good	Bad	Good	Bad	Good	Bad	Good	Bad	Good
Total earnings	54337	61014	56117	63891	54769	61149	55298	58805	55260	59320
Earnings, net of predicted	-0.06	-0.02	-0.05	0.01	-0.05	-0.02	-0.04	-0.03	-0.05	-0.03
Looking for job	0.75	0.31	0.59	0.32	0.67	0.37	0.72	0.45	0.73	0.40
College degree	0.70	0.71	0.70	0.72	0.69	0.72	0.69	0.72	0.70	0.71
Graduate degree	0.14	0.16	0.15	0.17	0.13	0.17	0.14	0.15	0.15	0.15
Age	37.1	37.8	37.4	37.5	37.9	36.9	38.0	37.2	37.4	37.5
Experience	9.4	9.8	9.5	9.9	9.9	9.3	9.9	9.5	9.6	9.6
Male	0.48	0.49	0.48	0.53	0.48	0.50	0.47	0.50	0.49	0.49
Black	0.07	0.06	0.07	0.07	0.07	0.07	0.08	0.06	0.07	0.06
White	0.74	0.75	0.75	0.72	0.74	0.74	0.73	0.75	0.73	0.75
Share receiving bonus	0.23	0.29	0.26	0.28	0.24	0.29	0.23	0.28	0.22	0.29
Share receiving sales commission	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Share receiving profit sharing	0.03	0.04	0.04	0.04	0.03	0.04	0.03	0.04	0.03	0.04
Bonus | x > 0	6567	8024	6862	9217	6620	8095	7014	7513	6920	7603
Sales commission | x > 0	14479	17383	14763	19829	15172	16750	14993	16280	15151	16389
Profit sharing | x > 0	4786	6478	5116	7792	5032	6380	5344	5923	5198	6003
Observations	160178	158512	255512	63178	174409	144281	104263	214427	130493	188197

Notes.–Sources: Payscale, 2014-2016. The table reports the averages across a set of demographic and labor market variables. Those with a graduate degree are those with a masters, PhD, MD, or law / MBA degree. The columns report different sample restrictions based on individual perceptions over the corresponding firm state. For example, "good" for job satisfaction reports the corresponding averages for individuals who report a four or five (out of a five-point scale) in response to the job satisfaction question in the survey, whereas "bad" is given by points one, two, or three (out of the five-point scale).

bigger concern, especially for larger companies. Column 3 adds compositional controls and shows that they only marginally affect the point estimates. Column 4 adds firm fixed effects. While pay transparency becomes statistically imprecise, it is still statistically greater than zero and the other coefficients remain quite significant.

Table 9: Job Satisfaction and Organizational Practices at the Firm-level

Dep. var. =	job satisfaction, firm average z-score			
	(1)	(2)	(3)	(4)
pay transparency	.132***	.081***	.085***	.052
	[.010]	[.024]	[.025]	[.034]
communication	.187***	.216***	.229***	.244***
	[.013]	[.030]	[.030]	[.033]
development	.211***	.238***	.214***	.213***
	[.012]	[.031]	[.031]	[.037]
appreciation	.321***	.296***	.322***	.317***
	[.013]	[.032]	[.028]	[.032]
management	.047***	.065**	.058**	.065**
	[.011]	[.026]	[.027]	[.030]
male			-.045	-.053
			[.031]	[.048]
age			.004**	.003
			[.002]	[.003]
experience			.002	.002
			[.003]	[.003]
1[college]			.040	.072
			[.046]	[.061]
Sample Size	12162	12162	11865	11865
Controls	No	No	Yes	Yes
Has Weight?	No	Yes	Yes	Yes
Firm FE	No	No	No	Yes

Notes.–Sources: Payscale. The table reports the coefficients associated with regressions of a standardized z-score for job satisfaction (index of one to five) on standardized measures of organizational practices, including pay transparency, communication, development/training opportunities, appreciation, and management, conditional on controls and fixed effects. Controls include: share of males, average education, average age. These variables are all averages at a firm-level for the set of firms that have at least five respondents in the PayScale sample. Standard errors are clustered at the firm-level and observations are weighted by the number of workers observed in a firm from the sample survey.

8.2.3. Correlations with Other Characteristics

The main text presents several descriptive statistics about the dispersion of engagement, organizational practices, and compensation. One such disaggregation is spatial—across metropolitan areas. Figure 11 shows the gradient between organizational practices and three metropolitan outcomes:

logged population, college attainment (including advanced degrees), and the unemployment rate. While there is a positive gradient between population and organizational practices, it is only statistically significant for larger metropolitan areas. In fact, there is an inverse U-shape that suggests that in smaller cities, lower organizational practices might make more sense—potentially because finding and attracting talent is more costly.

Turning towards educational attainment, there is a very strong gradient between the share of college (and advanced) degree workers and organizational practices, which is consistent with the idea that better work-place practices are used to attract more skilled workers. These practices are unlikely to be purely about selection, however; they also raise labor productivity, as discussed in the main text. Finally, there is a negative relationship between the unemployment rate and organizational practices. Additional diagnostics suggest that more dynamic labor markets have better work-place cultures.

Turning towards heterogeneity across occupations, I match O*NET data on skill intensities following Acemoglu and Autor (2011) using the 2010 data. I consolidate all skills into six general categories—four of which I plot below in Figure 12, which shows the correlation with organizational practices at the three-digit level. There is a remarkably linear relationship between organizational practices and both cognitive and social skills, suggesting that these are jobs that require a high degree of skill and coordination to produce the tasks. There is a negative relationship with manual skills, which reflects the fact that lower skilled workers may also have a lower willingness to pay for work-place amenities. There is a positive, but somewhat noisy, gradient with technical skills (e.g., programming), reflecting the fact that many pure quantitative workers are not working in teams.

8.2.4. Heterogeneity in Performance Pay Jobs

Figure 13 finally examines the dispersion by major occupation (one-digit) and contract type: performance pay versus fixed wage schemes. Workers are classified as performance pay if they are in an industry and occupation that has over 50% of the labor force covered by performance pay contracts or receives a bonus, commission, or profit sharing within that year. The former part of the definition comes from the National Compensation Survey's three-digit occupation and two-digit industry administrative records, whereas the latter comes from measurements directly reported on in the PayScale data. Performance pay workers tend to have much greater organizational practices

and job satisfaction, relative to their counterparts, across the entire distribution of occupations. The only occupation that fares above average among fixed wage jobs is management, but even in management those with fixed wage contracts report about half as large magnitudes as those in performance pay jobs.

8.3. Supplement to Identifying Compensating Differentials

The main text presents evidence that increases in organizational practices are associated with significant increases in employee ratings, declines in intent to leave, and declines in employee-reported stress levels. However, these are not genuine measures of individual productivity, so I now turn towards more tangible firm outcomes for the set of employees who work at publicly traded companies. I specifically regress Compustat's revenue per worker and a measure of average wages on average standardized organizational practices, controlling for average employee compensation and other firm covariates, such as assets and capital.[34] In addition to these merely representing conditional correlations, the main limitation is that most employees in my data are not in publicly traded firms, which requires a large reduction in sample size.

Table 10 documents these results. Beginning with column 1, a unit rise in organizational practices is associated with an economically large $616 rise in revenue per worker. However, these estimates are heavily contaminated by the presence of omitted variables, so the point estimates decline significantly in magnitude and rise significantly in precision once both assets and capital are included as controls. In the preferred specification (column 5), a unit rise in organizational practices is associated with a $70 rise in revenue per worker. Turning towards the results with stock-based compensation per worker as the outcome variable, there is a similar and very strong positive gradient that is greater than unity across specifications. For example, a unit rise in organizational practices is associated with a $1.65 rise in stock-based compensation per worker. To the extent stock is distributed based on performance, the gradient suggests that productivity responds positively to organizational practices. Again, these are clearly not causal elasticities, but rather conditional correlations.

Figure 14 plots actual and predicted logged total earnings. Predicted earnings is derived from PayScale's proprietary machine learning algorithms. While the specifics of the algorithm are proprietary, it is worthwhile discussing the concept behind their strategy that enables such

[34]Stock-based compensation is used as the outcome variable, rather than staff expenses and salaries, since the latter is reported for roughly 1% of the companies, which would leave no variation in this sample dataset.

Table 10: Organizational Practices and Firm Outcomes: Revenue/Worker and Wages

Dep. var. =	revenue per worker					stock-based compensation per worker				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
org. practices	616.15	558.70	71.70***	83.49***	70.25***	2.27***	1.84***	2.39***	1.55***	1.65***
	[512.55]	[468.01]	[18.08]	[18.17]	[18.40]	[.52]	[.55]	[.80]	[.47]	[.50]
ln(assets)			44.84***		27.65			-2.40		.49
			[16.02]		[40.31]			[1.90]		[.61]
ln(capital)				30.30**	19.06				-.44*	-.78*
				[11.77]	[31.93]				[.23]	[.40]
R-squared	.00	.00	.05	.05	.05	.02	.04	.10	.07	.08
Sample Size	1221	1221	1132	1195	1125	1180	1180	1097	1158	1092
Controls	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes

Notes.–Sources: PayScale. The table reports the coefficients associated with regressions of revenue per worker and stock-based compensation per worker on average organizational practices, conditional on demographic controls of the respondents in the survey (age, education, and gender). Standard errors are clustered at the firm-level and observations are weighted by the number of respondents observed in the PayScale dataset to reduce attenuation bias arising from small sample bias used in producing the firm average organizational practice index.

accurate predictions. Broadly speaking, they fit pay at the job title/country level to a double-pareto log-normal distribution, with a fully Bayesian joint distribution specified through a belief network. The primary assumption (for computational tractability) is the conditional independence of certain variables. The model is fit using the expectation-maximization (EM) algorithm. Other variables, such as years of experience and education, are parameterized to different distributions (gamma, exponential, etc.). There is a subsequent k-nearest neighbor match among profiles that tends to pull 45 observations in the neighborhood. Each time the model is re-optimized, the distribution is also re-drawn to account for new profiles.

Three assumptions are required for consistent estimation of the hedonic price on organizational practices (Bockstael and McConnell, 2007). First, workers must possess accurate perceptions of organizational practices in different jobs. While there is a valid concern that this does not hold given massive heterogeneity in perceptions of similar events, the validation exercises show that these practices are correlated with traditional measures of firm-productivity. Second, workers are found in a wage-amenity equilibrium, which requires the assumption that workers are freely mobile. Despite the presence of transaction costs, within-metro labor market mobility is not an unreasonable assumption. Third, labor markets must be approximately competitive, conditional on observables. One way these imperfections are addressed is through the inclusion of location and/or firm fixed effects, which mitigates concerns about location-specific information problems.

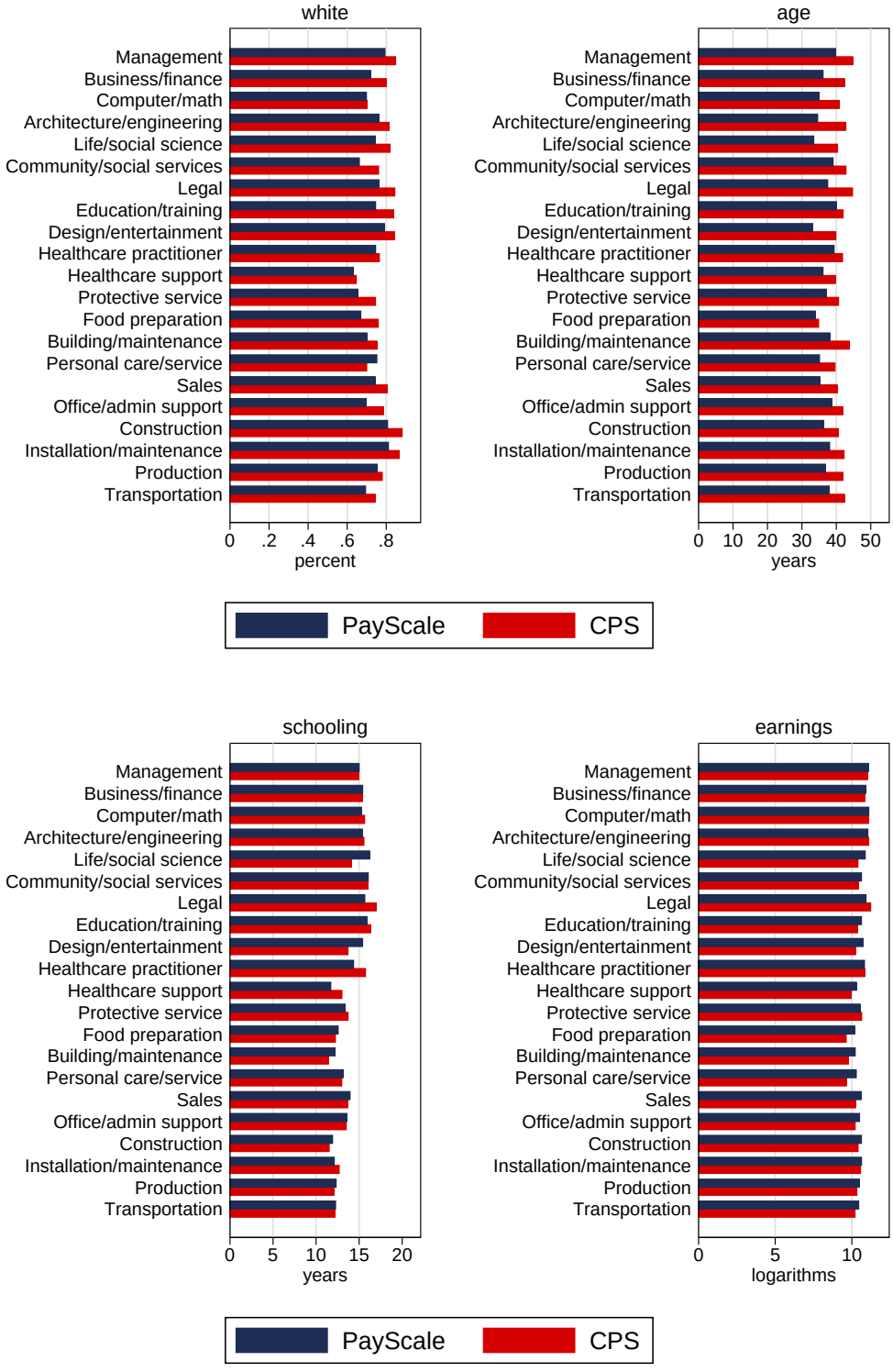

Figure 1: Comparison of Demographics between CPS and PayScale

Notes.–Sources: PayScale and Current Population Survey. The figure plots the average years of schooling and logged earnings in both datasets separately for each major SOC occupation code.

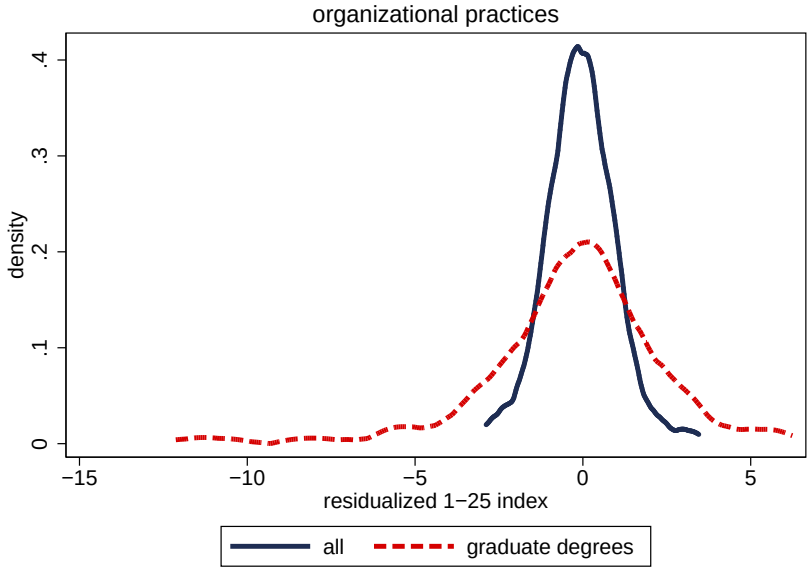

Figure 2: Distribution of Residualized Organizational Practices Across Firms

Notes.–Sources: PayScale. The figure plots the residualized value of organizational practices (using age, gender, and education as controls) for all workers pooled together and workers with a graduate degree (masters, PhD, MD). The sample is restricted to workers in firms with at least 50 respondents in the data.

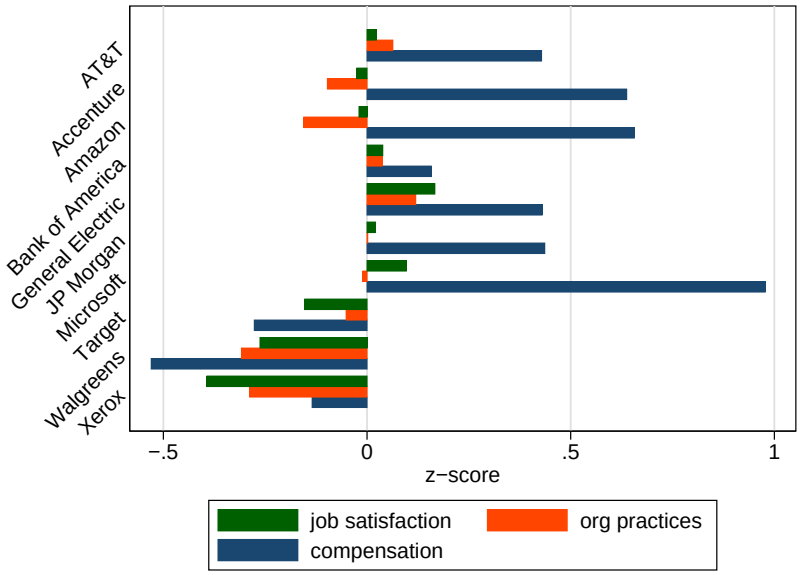

Figure 3: Job Satisfaction, Organizational Practices, and Pay, by Firm

Notes.–Sources: PayScale. The plot is the firm-specific average of (standardized) organizational practices, job satisfaction, and annual compensation. Organizational practices are measured as the sum of the scores across five categories: pay transparency, communication, managerial quality, development and training opportunities, and appreciation. Each score is weighted equally and the final measure is standardized. All observations in the plot come from firms with over 150 respondents in the survey tool.

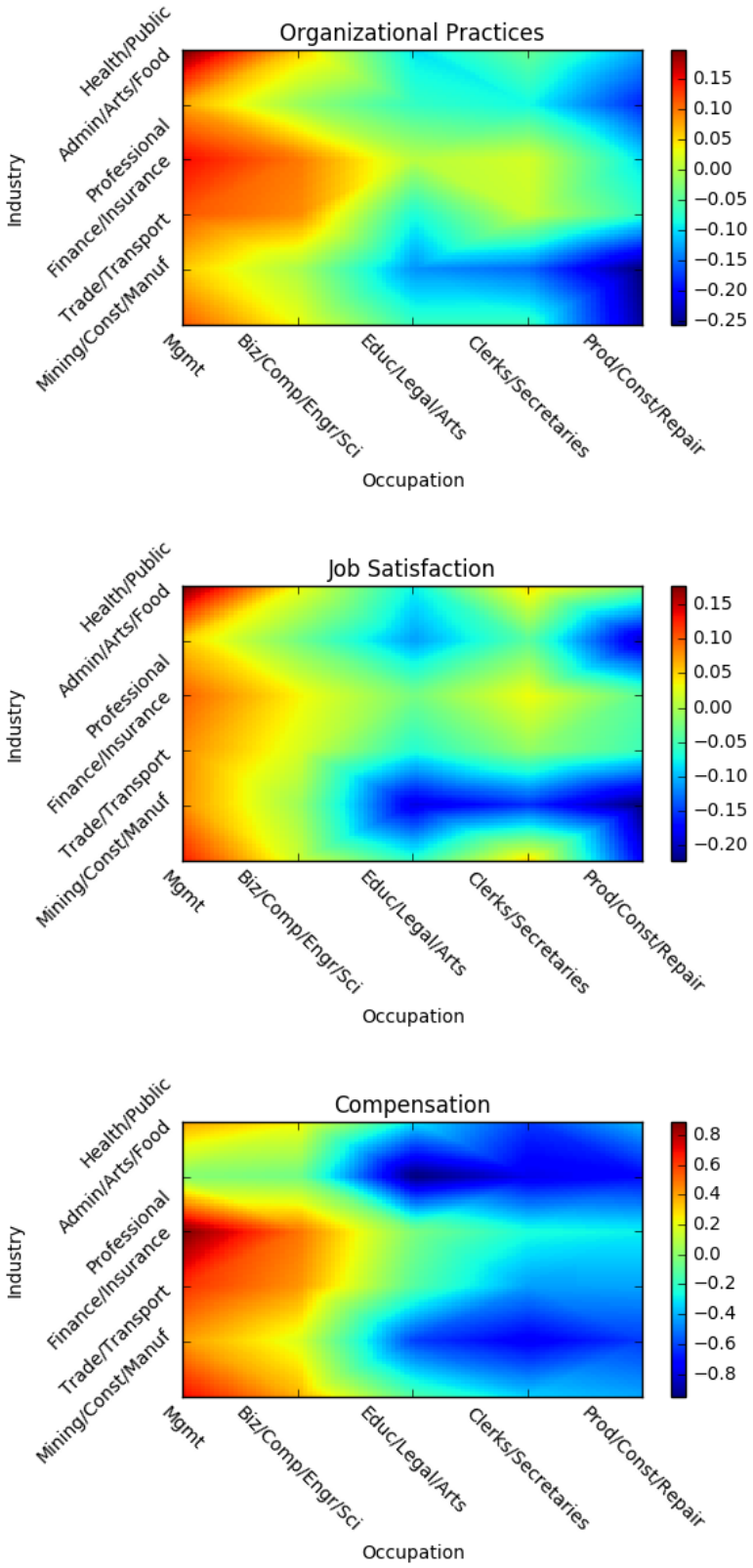

Figure 4: Organizational Practices, Job Satisfaction & Pay, by Industry and Occupation

Notes.–Sources: PayScale. The plot is the main industry-by-occupation matrix of (standardized) organizational practices, job satisfaction, and annual compensation. Organizational practices are measured as the sum of the scores across five categories: pay transparency, communication, managerial quality, development and training opportunities, and appreciation. Each score is weighted equally and the final measure is standardized.

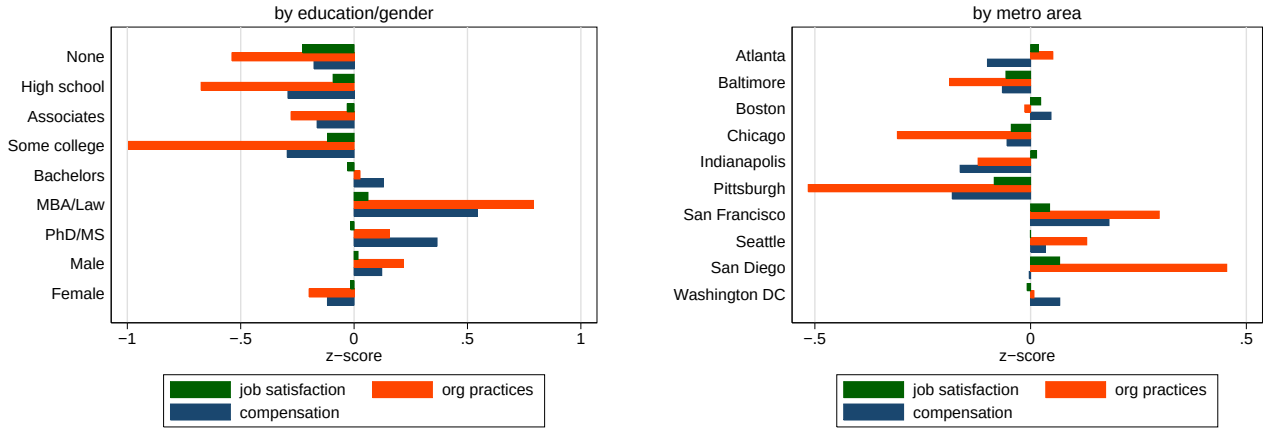

Figure 5: Job Satisfaction, Organizational Practices, and Pay, by Education, Gender, and Metro Area

Notes.–Sources: PayScale. The z-scores are created by first summing across each of the six sentiment indices (pay transparency, managerial relationship, communication, appreciation, development and training opportunities) and second standardizing across all individuals. The plots are educational attainment bins and 2013 metropolitan OMB definitions.

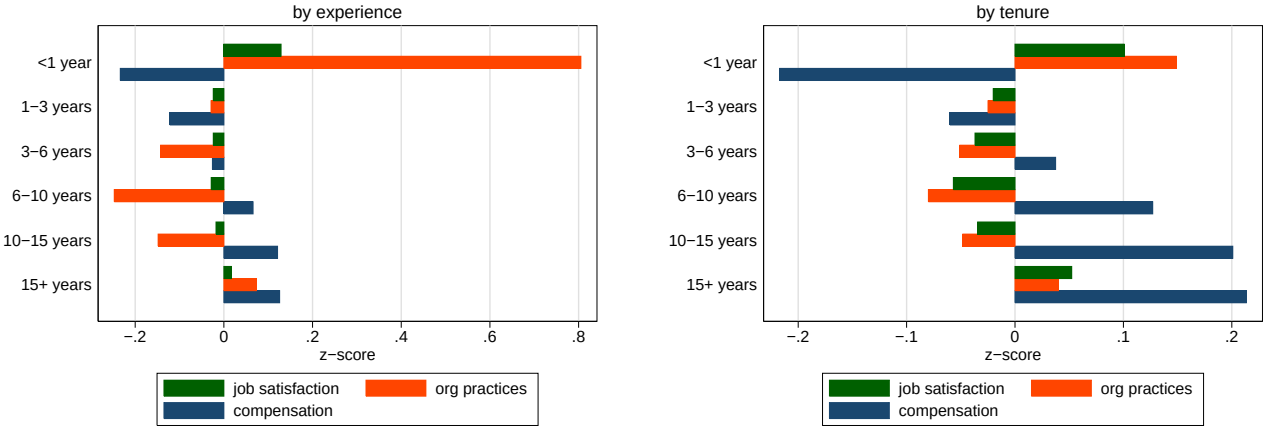

Figure 6: Job Satisfaction, Organizational Practices, and Pay, by Experience and Tenure

Notes.–Sources: PayScale. The z-scores are created by first summing across each of the six sentiment indices (pay transparency, managerial relationship, communication, appreciation, development and training opportunities) and second standardizing across all individuals. The plots are experience and tenure bins.

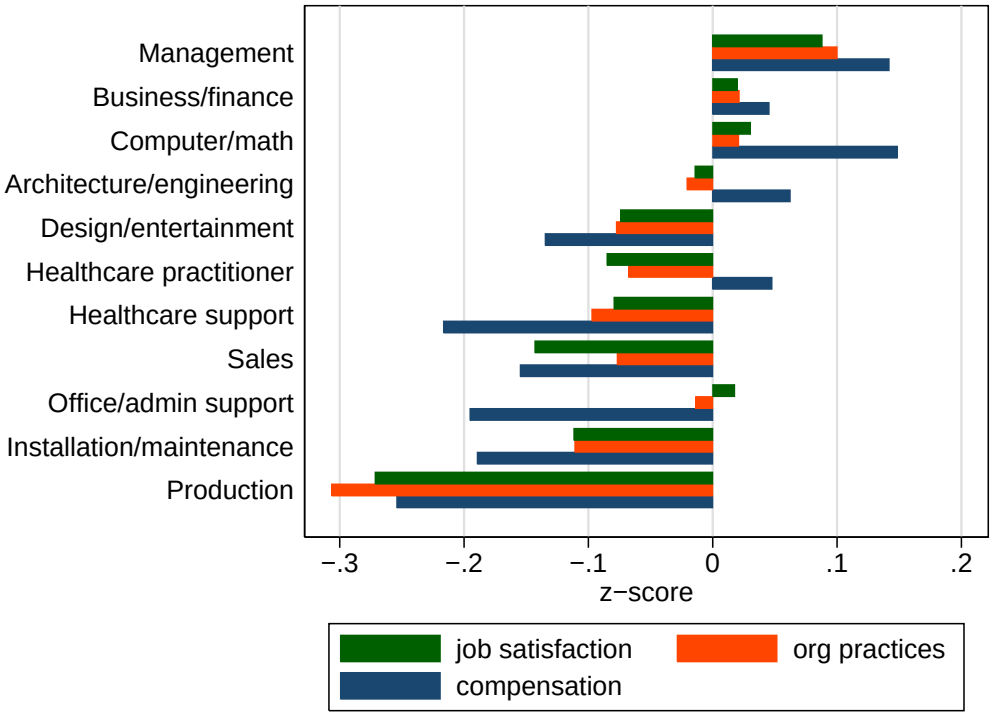

Figure 7: Cross-sectional Dispersion in Job Satisfaction, Pay, and Organizational Practices

Notes.–Sources: PayScale. The figure plots the standardized value of logged compensation (per year), organizational practices, and job satisfaction averaged across workers within major two-digit occupations. Only occupations with over 8,000 individuals are represented in the figure. The standardized z-score is taken after dropping workers with missing occupations, but before restricting to the set of only those occupations with over 8,000 sampled individuals.

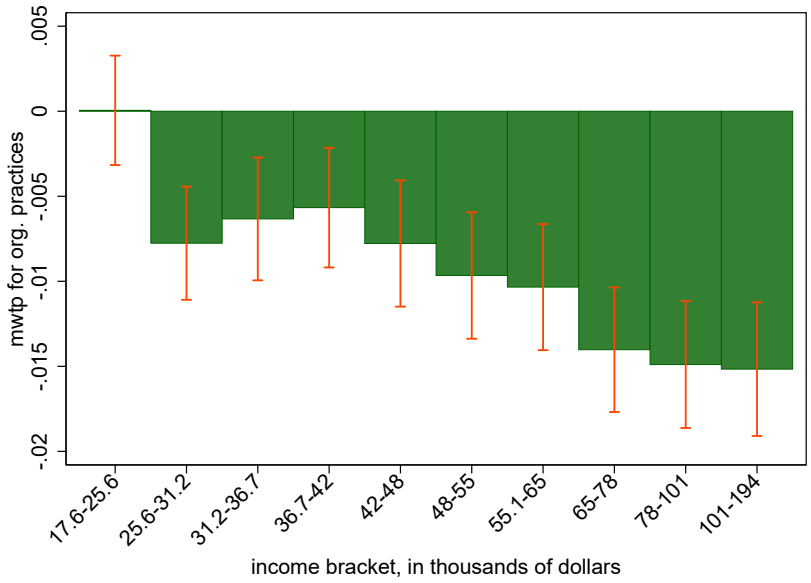

Figure 8: Heterogeneity in Marginal Willingness to Pay, by Income Bracket

Notes.–Sources: Payscale. The table reports the coefficients associated with regressions of logged predicted compensation net of actual compensation on standardized organizational practices, conditional on controls, including: a quadratic in age, male, and indicators for seven buckets of educational attainment (high school, associates, some college, college, professional programs [MBA, health policy], and doctorate), and years of labor market experience. These coefficients are estimated separately by income bracket. Predicted compensation is generated through PayScale's proprietary machine learning algorithms that use their entire salary database of 56+ million individuals in North America. Standard errors are clustered at the firm-level.

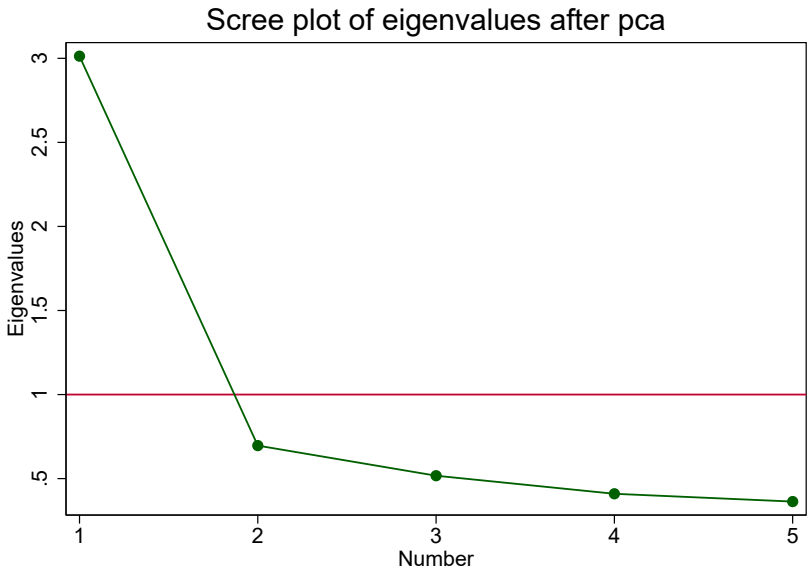

Figure 9: Evaluating the Relationship Among Organizational Practices Sub-Indices

Notes.–Sources: Payscale. The figure documents the scree plot of eigenvalues following a principal-components analysis on the five indices of organizational practices.

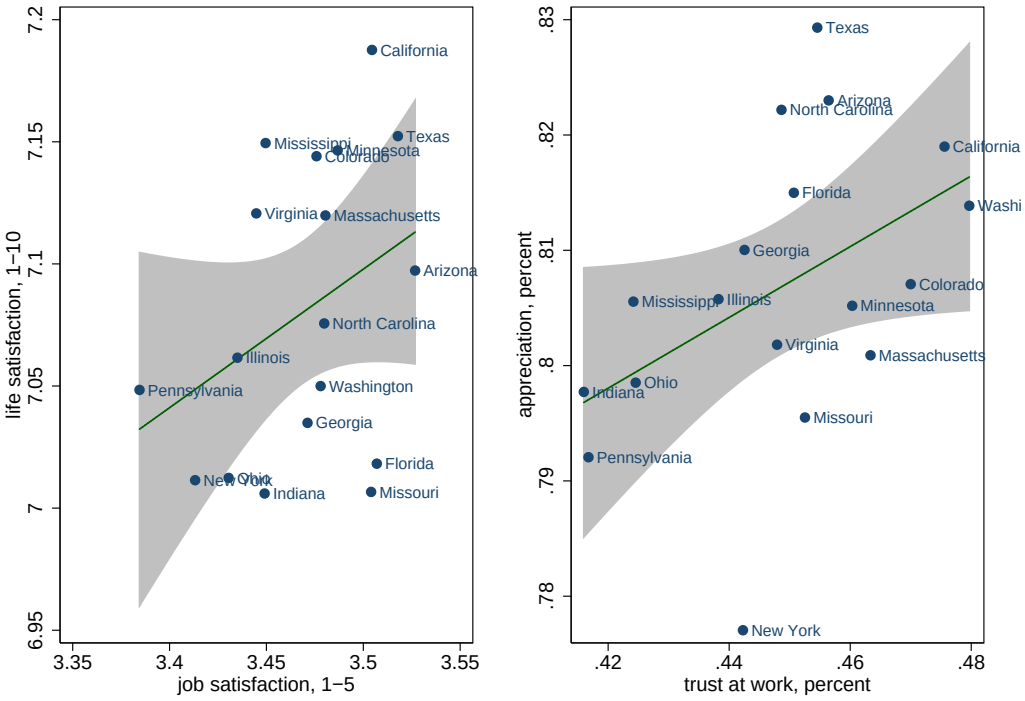

Figure 10: Comparison of Perception Indices between Gallup and PayScale

Notes.–Sources: PayScale and Gallup U.S. Daily. The figure plots life satisfaction on a 1-10 scale with job satisfaction on a 1-5 scale, as well as the fraction of people reporting high trust at work and the fraction of people reporting appreciation at work. These are all done at the state-level for states in the PayScale sample with over 5,000 individuals.

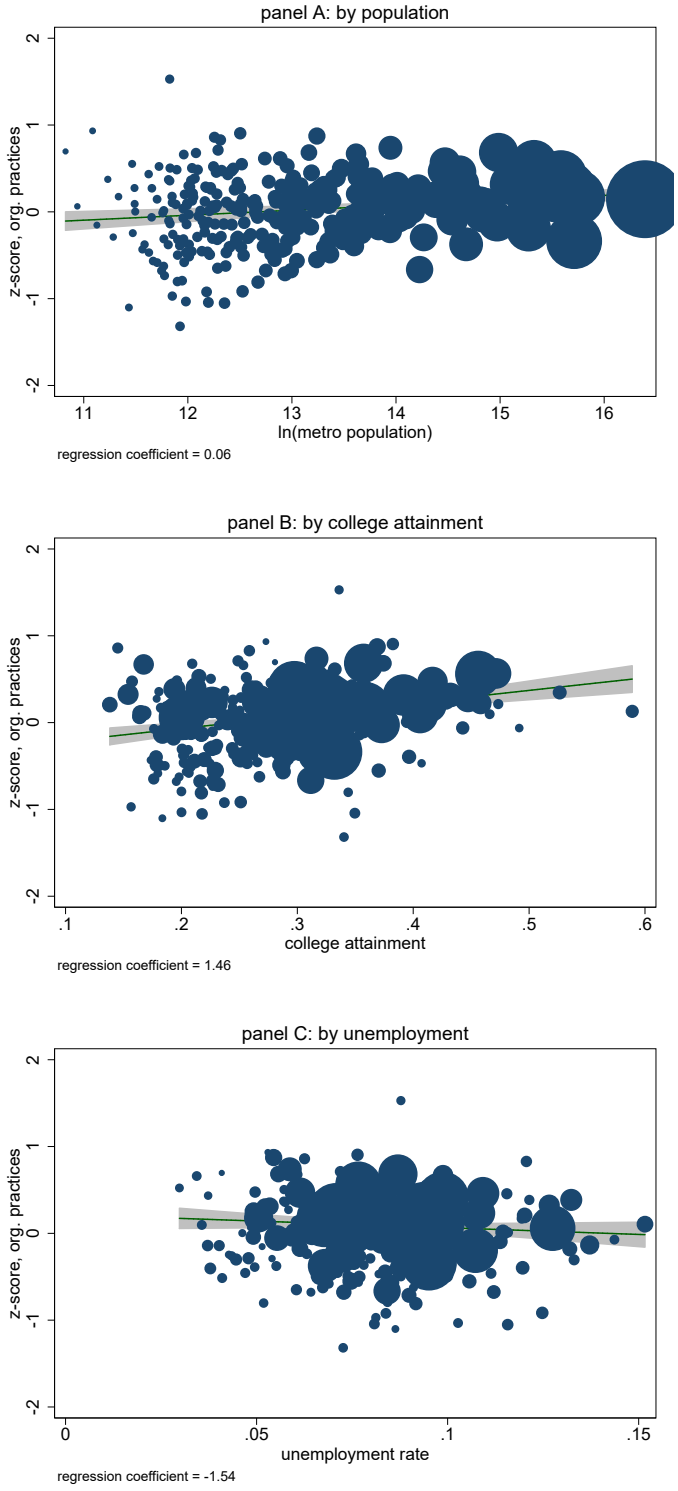

Figure 11: Metropolitan Cross-sectional Variation in Organizational Practices

Notes.–Sources: Payscale and Census Bureau. The figures plot the correlation between organizational practices (standardized on the set of metropolitan areas in the PayScale data with at least 100 respondents) and various metropolitan outcomes: logged population, college attainment (including advanced degrees), and the unemployment rate.

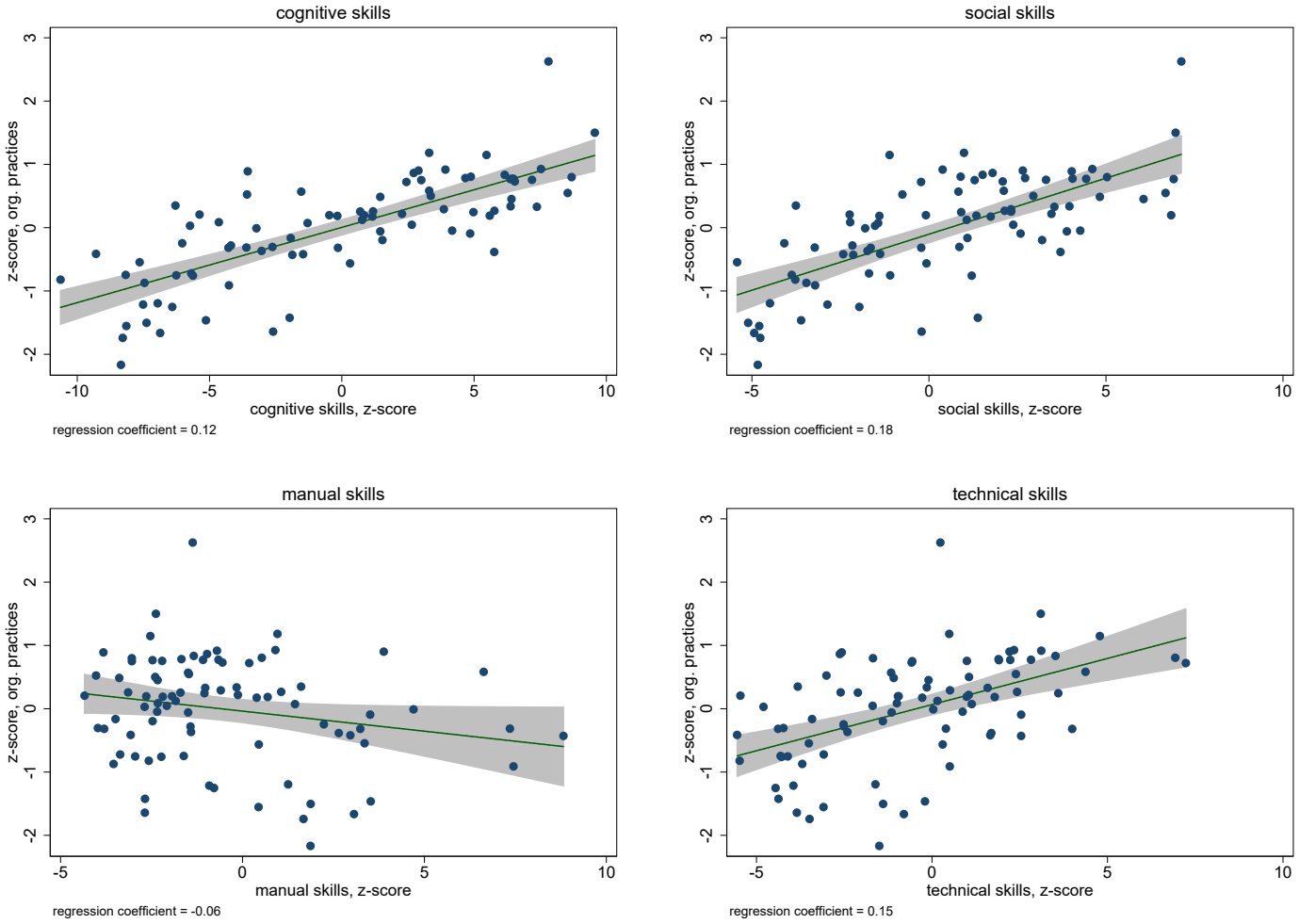

Figure 12: Occupational Cross-sectional Variation in Organizational Practices

Notes.–Sources: Payscale and O*NET. The figures plot the correlation between organizational practices (standardized on the set of metropolitan areas in the PayScale data with at least 100 respondents) and various measures of three-digit SOC skill intensities (cognitive, social, manual, and technical). The skill groups are as follows: (1) cognitive skills (decision making, learning strategies, listening, learning, problem solving, coordination, and critical thinking), (2) manual (repairs, equipment maintenance, equipment selection, installation, instruction), (3) technical (programming, quality control analysis, systems analysis, systems evaluation, technology design), (4) social (persuasion, social, speaking, negotiation), (5) service (management of financial resources, of material resources, of personnel resources, monitoring, service, operations control, operations monitoring, operations analysis, troubleshooting), and (5) general (math, writing, time management, reading, science). The ONET skill data is available from 2010-2014 and is made to have a mean zero and variance of 1. All occupations are harmonized to the 2010 SOC codes.

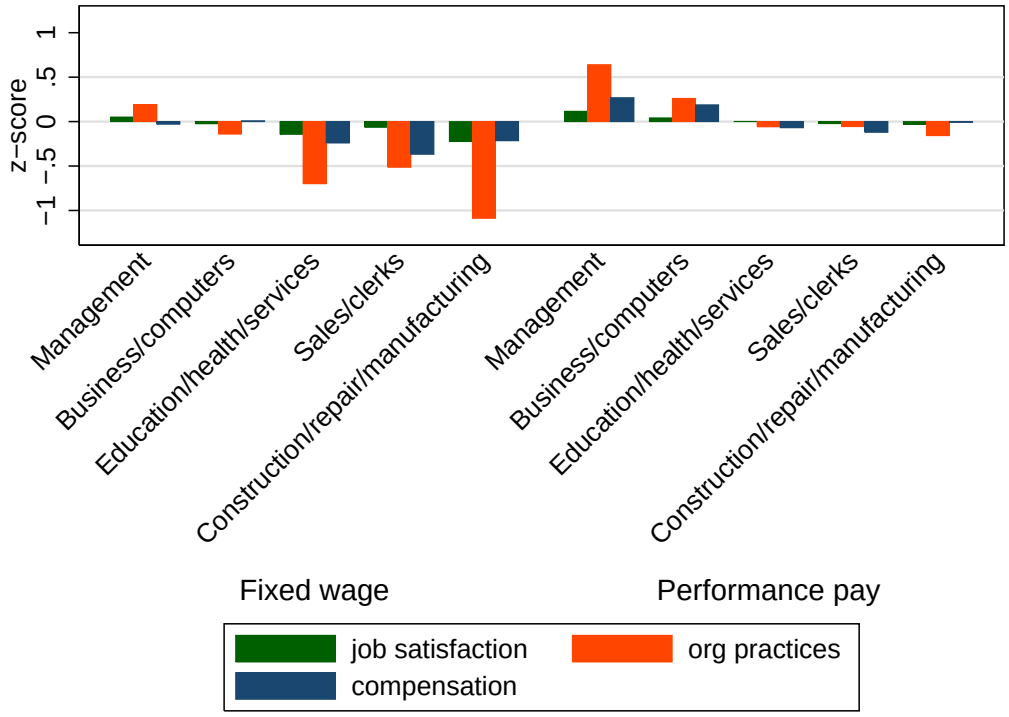

Figure 13: Job Satisfaction, Organizational Practices, and Pay, by Occupation and Performance Pay

Notes.–Sources: PayScale. The z-scores are created by first summing across each of the six sentiment indices (pay transparency, managerial relationship, communication, appreciation, development and training opportunities) and second standardizing across all individuals. The plot is over one-digit industry and occupation bins separated for performance pay and fixed wage industries. Performance pay workers are tagged as such if they are in a three-digit occupation and two-digit industry both with over 50% of the work force covered by performance pay contracts (obtained from the National Compensation Survey) or if they receive a bonus, commission, or profit sharing income (obtained from the PayScale data).

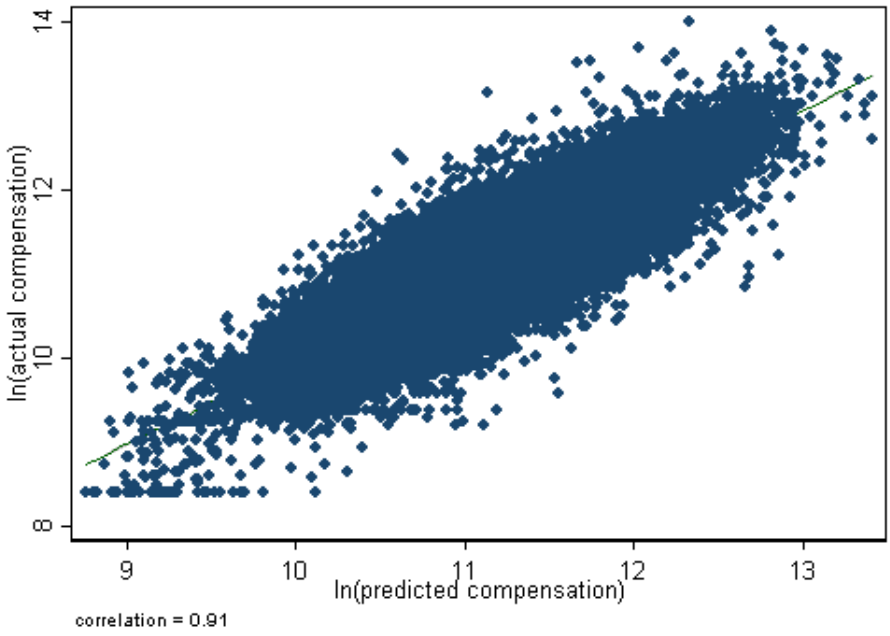

Figure 14: Comparison between Actual and Predicted Pay in PayScale

Notes.–Sources: PayScale. The figure plots actual and predicted logged compensation where predicted compensation is generated through PayScale's proprietary machine learning algorithms that uses information on the location and characteristics of individuals in their 56+ million salary database. Observations are the average at an age-bracket (young = under 45 years old), graduate education, experience bracket (13 bins), and gender level. No weights are used