Do CEOs Know Best? Evidence from China*

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Preliminary and Incomplete. Comments Welcome.

Abstract

We analyze a new management survey for around 1,000 firms and 10,000 employees across two large provinces in China. The unique aspect of this survey is it collected management data from the CEO, a random sample of senior managers and workers. We document four main results. First, management scores, much like productivity, have a wide spread with a long left-tail of poorly managed firms. This distribution of management scores is similar for CEOs, senior managers and workers management, and appears broadly reasonably compared to US scores for similar questions. Moreover, for all groups these scores correlate with firm performance, suggesting all employees within the firm are (at least partly) aware of the their firms' managerial abilities. Second, the scores across the groups are significantly cross-correlated, but far from completely. This suggests that while different levels of the firm have similar views on the firms management capabilities, they do not fully agree. Third, we find that the CEO's management scores are the most predictive of firm performance, followed by the senior managers and then the workers. Hence, CEOs do appear to know best about their firms management strengths and weaknesses. Fourth, within-firm management score dispersion is negatively correlated with investment and R&D intensity, suggesting long-run planning is linked with greater consistency in management across levels in firms.

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1 Introduction

Recently there has been a surge of interests in management within economics (Roberts, 2018), building on a long-history of work in the field (e.g. Walker (1887)). This work has been heavily built on management surveys across tens of thousands of firms across dozens of countries. However, one limitation of this work is the focus on senior managers in providing managerial feedback in these surveys. But as is well known in the sociological literature there is often a wide spread of opinions between workers and CEOs within the same firm so that maybe workers' evaluation of their firms management can provide a valuable counterpart to their managers views (Ukko et al., 2007). Moreover, is managerial disagreement an important factor in shaping firm performance? Modern management practices have a heavy focus on standardization, which suggests alignment of management evaluations across the firm should be associated with superior performance. On the other hand more disagreement may highlight greater independence of workers' views, which is potentially associated with better firm performance.

The challenge of addressing these questions has always been how to get survey responses from representative samples of workers? Approaching firms and asking for a random sample of workers is not a realistic approach to eliciting random workers responses, since managers are unlikely to truly randomly select workers. Indeed, Enterprise Surveys (2018) by the World Bank long attempted to elicit survey responses from random samples of workers but gave up because managers typically referred workers with more favorable views on the firm.

This paper exploits a unique survey in China that collects data from up to 11 respondees per firm. In particular, it samples the CEO, a set of up to 3 randomly selected senior managers[1], and up to 7 randomly selected workers. The survey is run by a consortium of Chinese research institutes overseen by the Quality Control Institute in Wuhan University. This institute has close connections with the Quality Ministry in Beijing which provides mandatory quality licenses to all Chinese manufacturing firms. With the support of the Quality Ministry and the Institute's alumni the survey team is able to achieve not only an 86% survey response rate, but also obtain the employment registry at the firm in advance of these surveys so they can randomly select workers to interview. Hence, this survey is the first management survey that collects information from three groups - the CEO, a truly randomly sampled set of senior managers and workers. Furthermore, it achieves this alongside an extremely high response rate of 86%, and extremely high quality survey data collected by teams of 300 enumerators that visit firms to ensure high quality responses.[2] Thus, in summary, this is a unique survey in terms of coverage and quality.

The paper reports four key findings. First, management scores, much like productivity, have a wide spread with a long left-tail of poorly managed firms. This distribution of management scores is

[1]Senior managers are defined by the firm itself. Generally in small sized firms, senior managers are those in charge of general affairs of the firm, sometimes, the boss can also serve as the senior manager if there are so few senior managers. In large sized firms, senior managers are at least department directors.

[2]Given the oversight of the Quality Control Institute it is perhaps not surprising that the survey is extremely carefully executed. See, for example, http://www.whu.edu.cn/en/info/1031/1104.htm

similar for CEOs, senior managers and workers, and appears broadly reasonably compared to US scores for similar questions. Moreover, for all groups these scores correlate with firm performance, suggesting all employees within the firm are (at least partly) aware of the their firms' managerial abilities. Second, the scores across the groups are significantly cross-correlated, but far from completely. This suggests that while different levels of the firm have similar views on the firms management capabilities, they do not fully agree. Third, we find that the CEO's management scores are the most predictive of firm performance, followed by the senior managers and then the workers. Hence, CEOs do appear to know best about their firms management strengths and weaknesses. Finally, the management scores from different people of a firm allows us to test how disagreement among them (measured by the within-firm management score dispersion) affects firm performance. We find the dispersion of management score is negatively correlated with investment and R&D intensity, suggesting some degree of consistency of management practices within the firm is helpful for long-run investment.

The paper is structured with a data description in section 2, a summary of the key results in section 3 and concluding thoughts in section 4.

2 Data

The China Employer-Employee Survey (CEES) is a new longitudinal study of manufacturing firms and workers in China. The CEES was initiated in 2014 by Hong Cheng at Wuhan University, Yang Du at the Chinese Academy of Social Sciences, Hongbin Li at Stanford University (then Tsinghua University), and Albert Park at the Hong Kong University of Science and Technology. The four founders are also principal investigators (PIs) of the CEES project. The project is administered by the China Enterprise Survey and Data Center (CESDC)[3] at Wuhan University headed by Hong Cheng and Hongbin Li.

Because China is the world's second largest economy and often called "the world's factory", economists and policy makers around the world have a keen interest in better understanding the determinants of firm performance in China. To date, the lack of high-quality, in-depth data on firms and workers has prevented systematic study of important issues facing China's manufacturers. Existing firm datasets have limited information or/and fail to acquire a representative sample of firms and workers. The CEES project seeks to provide a new data source that can overcome these limitations. The missions of CEES are to conduct the world's most comprehensive employer-employee survey of China, to create a longitudinal dataset that tracks changes in the situation of

[3]CESDC was under Wuhan University Institute of Quality and Development Strategy (WHU-IQDS), which was co-founded in 2007 by Wuhan University and the General Administration of Quality Supervision, Inspection and Quarantine of China (AQSIQ), the supreme regulatory agency for both internationally traded and domestically sold products in China. Hong Cheng is the founding Dean of WHU-IQDS. The Institute provides training for AQSIQ officials at all administrative levels, and has alumni in more than half of all prefectural cities and counties in China. Over 100,000 government officials and entrepreneurs in 18 provinces have attended lectures of IQDS.

both employers and employees, and to create a high-quality dataset that can provide a platform for evidence-based studies of the Chinese economy by economists and policy-makers worldwide.

2.1 Surveyed Provinces

CEES began in 2015 with a survey of firms and workers in China's most important industrial province, Guangdong, located on China's coast near Hong Kong. To capture differences with China's rising central region, a second province, Hubei, was added in 2016. The firms and workers surveyed in Guangdong in 2015 were followed up in 2016, with new workers added to the employee sample.

In 2015, Guangdong accounted for more manufacturing firms (0.3 million) and manufacturing workers (9.3 million) than any province in China. The sampled districts account for 90% of gross industrial output and 86 of employment in Guangdong's manufacturing sector. Hubei Province has the highest manufacturing output per capita, and employed 3.4 million manufacturing workers in 2015. The CEES surveyed districts accounting for 90% of employment in Hubei's manufacturing sector. In 2017, Guangdong ranks first among all Chinese provinces for GDP, export volume, and manufacturing employment according to China Statistical Yearbook (table A4), whereas Hubei ranks 7th in GDP, 16th in export volume, and 7th in manufacturing employment. In 2018, CEES plans to expand to include three more provinces in regions throughout the country, including Liaoning in the Northeast, Sichuan in the West, and Jiangsu in the East.

2.2 Stratified Sampling

Firm lists from the 3rd National Economic Census conducted in early 2014 were used as a sampling frame. Sampling was conducted in two stages, each using probability proportionate-to-size sampling, with size defined as manufacturing employment. Thus, the firm sample is representative in terms of employment size in China. In the first stage, 20 county-level districts were randomly sampled in each province, with probabilities proportionate to manufacturing employment in each district. In the second stage, 50 firms were sampled in each district as a target sample, again with probabilities proportionate to employment in each firm. Enumerators then visited the 50 firms in sequence, and attempt to survey the first 36 eligible firms (have production activities in the sampled district).

Employees are also randomly selected with stratification. We first asked the firm to provide a list of all employees enrolled at the end of the previous year, with middle and high level managers separately listed. We then randomly selected 10 employees (besides the CEO) in each firm ($6-9$ for smaller firms), among which 3 (2 for smaller firms) are middle and senior managers. If selected employees cannot participate (e.g., not working on site during the survey period), they were replaced with the closest name on the list of workers, until the targeted number of sampled employees is reached.

2.3 Response Rates and Sample Sizes

In total, we collected data from 573 firms in Guangdong in 2015, and 1,122 firms from two provinces (Guangdong and Hubei) in 2016 (Table A1), with high response rates in both years. Among 696 firms that are eligible to be surveyed in Guangdong in 2015, the response rate in the firm baseline survey was 82% (or 573 firms) in Guangdong in 2015. Out of the firms surveyed in 2015 in Guangdong, 85% (or 487 firms) were successfully followed up in 2016.[4] In 2016, attempts were made to survey some firms from the original target sample that did not participate in the 2015. This effort led to an additional 50 firms participating in the survey, yielding a total sample of 537 firms in Guangdong in 2016. In 2016, we started our survey in Hubei, and successfully collected data from 585 out of 703 targeted firms, with a response rate of 83%. Combining the samples in both provinces, 84% of the firms were successfully interviewed in 2016.

The baseline surveys included 4,838 workers in Guangdong in 2015 and 4,114 workers in Hubei in 2016 (Table A1). In both provinces, about 90% of initially sampled workers participated. In 2016, 53% of the workers surveyed in Guangdong in 2015 were successfully re-interviewed; the relatively low follow-up rate reflected firm attrition and high worker turnover rates. Based on the turnover rate in each firm, a sample of new workers were added to the Guangdong worker sample, in addition to replacement samples of workers from the replacement firm sample (50 firms added to our Guangdong sample in 2016).

As we sampled from the Third Economic Census conducted in 2013, CEES sample is representative of the census. In Table A2, we list a few attributes of manufacturing firms in the two sampled provinces for three datasets, the Third Economic Census, the Statistical Yearbook, and CEES. For the average number workers per firm, CEES (weighted) average is 62, which is close to that from the census.[5] For the level of asset and ownership distributions the CEES also closely resembles the census.

2.4 Questionnaire Design

The firm and worker questionnaires were designed by the four Principal Investigators, the international advisers, together with a team of over 30 researchers. The 2016 firm questionnaire includes seven modules and 1,030 variables, covering basic situation (including firm accounting data), firm head characteristics, management, production, sales, innovation, quality control, and human resources. The employee questionnaire includes five modules and 443 variables, covering personal background, current job, work history, social insurance, and personality traits. In 2016, CEES

[4] Of the 15% attrition, 10% was due to refusal and 5% was due to exit or relocation.

[5] In contrast, the reported number from the yearbook is a much larger 307. This is because the yearbook (as well as many recent studies such as Hsieh and Klenow (2009)) uses the sample from the Annual Survey of Industrial Firms (ASIF) conducted by the National Bureau of Statistics (NBS), which only include firms with annual sales above 20 million RMB and State-Owned Enterprises (SOEs). As a result the ASIF only covers 56 thousand firms, which is less than 10% of all firms in the two provinces.

questionnaires included a management module, which came from the World Management Survey, itself based on Bloom and Van Reenen (2007) and Bloom et al. (2018). As noted above, a key innovation is that CEES asks both the CEO and a random sample of employees about the firm's management practices. In 2018, CEES plans to asks both the CEO and randomly selected employees about firm's business expectations, based on Bloom et al. (2017), which are extremely helpful for understanding firm investment plans and actual investment (e.g. Gennaioli, Ma and Shleifer, 2016).

2.5 Implementation and Quality Control

The survey was implemented by CESDC with a team of over 300 enumerators, mainly staffs and graduate students from Wuhan University. Each of the two rounds of the survey was completed in three weeks in the summer (June-July) of 2015 and 2016.

CEES has established a series of protocols to ensure high academic value and survey quality. First, local government officials issued endorsements encouraging local officials and enterprise managers to participate in CEES. In return the CEES research team has provided local governments and firms with analytical reports based on pooled - and hence anonymized - survey data from each region. Second, the survey team was extensively trained with one week of initial training and ongoing training throughout the survey process. This was critical for ensuring standardization across the survey teams. Third, the CEES has established a management system for questionnaire design, data collection, data cleaning, and conducts strict quality checks at every stage of data collection and entry. For example, every enumerator was asked to install the specialized cellphone app which enables online real-time monitoring of the progress of the surveys. Finally, an Advisory Committee was established to help provide advice on survey design and execution.[6]

2.6 Summary Statistics of the Sample

In this paper, we use a sub-sample of CEES in 2016 that report the management scores. We summarize some basic characteristics (unweighted) of this sub-sample of 906 firms in Table 1. On average, a firm in this sample has 959 workers and is about 12 years old. About half (48%) of the firms export and 14% are state-owned enterprises. Out of the 906 firms, 6,692 managers and workers report management scores. They are 36 years old on average, and have high school education.

[6] John Abowd (Cornell University and US Census Bureau), David Autor (MIT), Nicholas Bloom (Stanford University), Loren Brandt (University of Toronto), Hong Cheng (WHU-IQDS), Josh Cohn (Apple University), Yang Du (CASS), Hanming Fang (University of Pennsylvania), Gordon Hanson (UCSD), Chang-Tai Hsieh (The University of Chicago), Hongbin Li (Stanford University), Albert Park (HKUST), Christopher Pissarides (LSE and HKUST), Mark Rosenzweig (Yale University), Shang-Jin Wei (Columbia University), and Lixin Colin Xu (World Bank).

3 Results

3.1 Management Scores

The management scores obtained from the CEES are generally comparable to those from the US or from different surveys in China. We start by showing in Figure 1 the distribution of management scores across the firms in China, pooling all interviews from all employees. We see a familiar wide distribution with a long-left tail, much like productivity distributions for China (e.g. Hsieh and Klenow, 2009) or management and productivity distributions for the US (e.g. Syverson 2004, Bloom et al. 2018). In particular, the mean and variance of this distribution is 0.58 and 0.13 which compare reasonably to the US values of 0.64 and 0.15, suggesting Chinese scores evaluated on a similar basis are significantly lower but with a similar (possibly slightly compressed) spread. Indeed, this also matches up with the results from Bloom, Sadun and Van Reenen (2017) in the World Management Survey, which, using a different telephone survey management scoring tool, also finds a higher and more dispersed US score than China.

Moreover, the distributions of scores for different types of workers and for different management practices are similar. In Figure 2 we plot the scores across the three main groups of practices - monitoring, targets and incentives - and for the CEO, workers and managers respectively. It is clear that, firstly, these three groups have incredibly similar distributions. There is some variation - in particular workers have slightly lower scores on monitoring and targets, while managers appear to have higher scores on incentives - but broadly speaking these line up closely (at least much more closely than any of the co-authors anticipated in advance).

Although the the CEO scores are highly correlated with those of managers and workers, they are far less than being perfectly correlated. In Figure 3 we examine the correlation between the individual scores of managers (y-axis) and that of the CEO (x-axis) for every firm-respondent pair in the left panel, and for the workers (y-axis) and CEO (x-axis) in the right panel. Because there were typically 8 respondents per firm (1 for the CEO, 2 for the managers and 5 for the workers) there are on average 2 data points per firm in the left panel and 5 in the right panel. What these two figures show is that, firstly, the multiple scores per firm are highly correlated: 0.267 (p-value of 0.000) for CEOs and managers and 0.237 (p-value 0.000) for CEOs and workers. Given the extensive noise in these surveys (for example, for repeat surveys in the US data we estimate a signal:noise ratio of 1:1) these correlations are high. However, they are still far from the value of 0.5 that would be implied by, for example, 50% noise in each response, so that there appears to also be some substantial variation between respondents.

3.2 Management and Performance

To evaluate the different informational content of the different response levels, in Table 2 we regress in columns (1) to (3) labor productivity (log valued added per employee) on the scores for the CEO,

manager and worker respectively. In all cases we include a set of province fixed effects to account for any systematic difference between Hubei and Guangdong province. Since there are multiple managers and workers responding per firm we also need to allow for different responses while keeping the sample sizes constant across the three columns. So we bootstrap these estimations 200 times, with in each bootstrap we take the CEOs score and randomly draw one managers score and one workers score, reporting the mean coefficient and its standard error.

Regression results reported in Table 2 show that management scores of all three types of employees are highly correlated with firm performance, and that of CEO seems to be most informative about performance. As we can see in columns (1) to (3) all three groups provide highly significant management scores, although the point estimate on the CEO's score is slightly larger. In columns (4) to (6) we report results for another performance measure - employment growth - and again find the CEO and managers responses are significant and very similar at the point estimate (that of the manager is slightly higher than CEO: 0.051 vs 0.050). Finally, in columns (7) to (9) we examine log(profit/sales) and see for this outcome the CEO's score is the most informative.

A horse race of management scores between different types of workers further shows that CEO scores are the most important. In the first three columns of Table 3 we re-run these regressions but include all three scores at the same time. We find across the columns that generally the CEO scores is the most informative (in all but the first column), the managers score is the second most informative, and the workers the least informative (in all but the fourth column). In columns (4) and (5), we also examine two more outcome variables including log(capital/employee) as a measure of capital intensity, and log(R&D/employee) as a measure of innovative intensity. Again, the CEO management score is the most important predictor for the capital intensity and R&D intensity measures. Hence, the evidence suggests CEOs management scores are potentially better predictors of firm performance than (a randomly chosen) manager or worker.

In Figures 4 and 5 we investigate this another way by breaking the CEO, manager and workers scores into deciles and plotting two basic performance measures - labor productivity and profit/sales - against the bins. Below these figures we also report the raw correlations. What we can see for these outcomes is that the CEOs scores are the most correlated - the CEO bars slope upwards the most steeply and have the highest correlation coefficient - followed by the managers and then the workers. In appendix figures A1 to A4 we show that the CEO score is also more informative about a range of other indicators, including sales per employee (A1), firm size (A2), employees education (A3) and R&D per employee (A4).

One follow-up question is whether managers or workers average scores are more informative than the CEO? That is, while the CEO can provide the singularly most informative management score, potentially groups of managers or workers can be more informative - a "wisdom of crowds" type hypothesis. In fact, we find this is usually not the case, as the correlations averaging across all respondents is typically no higher than for the CEO alone. For example, as shown by Figure 4, the correlation between value added per employee and CEO is 0.144, which is only slightly smaller than

its correlation with the average scores of the whole group (0.161 if equally weighted per employee; 0.160 if equally weighted at the group level). For the profit rate measure, the correlation with CEO is even larger than that with the whole group (0.108 vs. 0.061 or 0.084). Another minor point is that when we give more weight to non-CEO employees, i.e., from equal weight each group to equal weight per employee, the correlations tend to decline, suggesting non-CEO employees are less informative than CEOs.

Hence, in summary, the CEO management scores do seem the most correlated with a wide range of firm performance outcomes. In that sense CEOs do seem to "know better" about the management practices in their firm that are most predictive of firm performance.

3.3 Management Disagreement and Performance

Another natural question given our range of scores within the firm is whether disagreement over management scores is correlated with better or worse firm performance. On one hand disagreement might be a sign of a badly run firm, suggesting weak internal information sharing or employee disengagement. On the other hand more disagreement may also highlight greater independence of employee views, potentially associated with improved firm performance. So to investigate this empirically we develop two measures of management score disagreement. The first one measures the average absolute deviation of each employee's overall score from the firm mean:

$$D_{1i} = |m_{ij} - \bar{m}_{-ij}|, \tag{1}$$

where m_{ij} denotes the management score of employee i in firm j, and $\bar{m}_{-ij}$ denotes the average management score from all other employees excluding employee i in firm j. The second one is a similar concept, but executed in terms of the question level (rather than overall average management score) deviation from the rest of the firm. In particular, for each firm we measure employees' individual question score deviation from the firm mean averaged across all questions:

$$D_{2i} = \frac{1}{16}\sum_{k=1}^{16} |m_{ijk} - \bar{m}_{-ijk}|, \tag{2}$$

where m_{ijk} denotes the management score of question k from employee i in firm j, and $\bar{m}_{-ijk}$ denotes the average management score for question k from all other employees excluding employee i in firm j. In appendix figures A5 and A6 we show the distributions of the two dispersion measures.

Generally speaking, disagreement is not correlated with standard performance measures. In Table 4 we see that the first dispersion measure is negatively correlated with labor productivity (column (1)) but not significantly so. In columns (2) and (3) we see positive relationships with growth and profits, but again these are not significant. In columns (4) and (5) we see a significant negative correlation between disagreement and capital intensity and R&D intensity. In table 5 we run a similar analysis using the second measure of management disagreement and see similar results -

a lower capital and R&D intensity but no other significant relationship. Together, these results are somewhat surprising and hard to interpret. Our interpretation is that disagreement in the management score does not seem to have a strong correlation with performance overall, but does seem to suggest lower long-run investment in tangible and intangible capital. We hope to extend this analysis with the much larger sample from the 2018 survey wave.

However, disagreement seems to reduce the positive correlation between performance and management. In Tables 6 and 7, we include in the performance regressions the interaction term of management scores with the disagreement measures. Note that the interacting terms are negative in all cases and are significant at least at the 5% level in most cases, suggesting that the management-performance relationship is significantly weaker in firms with more management disagreement. This means that greater disagreement indicates a weaker signal value of management to performance, perhaps because the firms management practices are harder to evaluate, or perhaps because disagreement indicates a higher level of measurement error in the survey responses in the firm.

4 Conclusions

We analyze a new management survey for around 1,000 firms across two large provinces in China. The unique aspect of this survey is it collected management data from the CEO, senior managers and a random sample of workers. We find four main results. First, management scores, much like productivity, have a wide spread with a long left-tail of poorly managed firms. This distribution of management scores is similar for CEOs, senior managers and workers management, and appears broadly reasonably compared to US scores for similar questions. Moreover, for all groups these scores correlate with firm performance, suggesting all employees within the firm are (at least partly) aware of the their firms' managerial abilities. Second, the scores across the groups are significantly cross-correlated, but far from completely. This suggests that while different levels of the firm have similar views on the firms management capabilities, they do not fully agree. Third, we find that the CEO's management scores are the most predictive of firm performance, followed by the senior managers and then the workers. Hence, CEOs do appear to know best about their firms management strengths and weaknesses. Finally, disagreement between employees over management practices is negatively correlated with investment in R&D and physical capital, potentially indicating a less long-run focus of the firm. This survey highlights the importance of eliciting management evaluations from all employees across the firm, rather than just the CEO or senior management.

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Table 1: Descriptive Statistics

A. Management Descriptives	**Mean**	**S.D.**	**p(10)**	**p(25)**	**p(50)**	**p(75)**	**p(90)**
CEO	0.58	0.16	0.36	0.5	0.6	0.68	0.76
Manager	0.6	0.13	0.44	0.53	0.62	0.69	0.75
Worker	0.57	0.13	0.41	0.5	0.58	0.66	0.72
B. Firm Characteristics							
Firm size	959.33	2,990.39	40	72	210	659	2,093
Firm age	11.8	7.75	4	6	11	15	21
% of managers	0.08	0.06	0.02	0.03	0.07	0.1	0.16
% of union members	0.1	0.21	0	0	0.02	0.08	0.23
Exporter	0.48	0.50	0	0	0	1	1
High tech	0.3	0.46	0	0	0	1	1
SOE	0.14	0.35	0	0	0	0	1
C. Employee Characteristics							
Male	0.60	0.49	0	0	1	1	1
Party membership	0.17	0.37	0	0	0	0	1
Age	37.18	10.01	25	29	36	45	51
Education	4.71	1.58	3	3	5	6	7
Position	2.77	1.99	0	1	2	5	5
D. Sample Characteristics							
No. firms	906						
No. employees	6,692						

Notes: Summary statistics from CEES data are unweighted. The management score is the unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0-1 scale. The sample in all columns is all CEES firms in 2016 with at least 11 non-missing responses to management questions and from firms with positive value added, at least 20 employees, and positive capital. For the few cases where establishment characteristics had missing values, we replaced these with the means in the sample, so to keep a constant sample size. P(n) is the value at the n-th percentile, e.g. p(50) is the median value. The education levels are defined as 1 "no school", 2 "primary school", 3 "secondary school", 4 "high school", 5 "technical/vocational", 6 "junior college/diploma", 7 "undergrad/bachelor", 8 "master", 9 "graduate/phd". The employee positions are defined as 0 "CEO", 1 "Middle and senior manager", 2 "Other administrative staff (other office staff included)", 3 "Technician or design personnel", 4 "Sales personnel", 5 "Front-line worker", 6 "Other staff".

Table 2: Management Scores and Performance: Benchmark, Bootstrap

	Log(VA/Emp)			Emp. Growth			Profit/Sales		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
CEO Score	1.266***			0.050**			0.074**		
	(0.359)			(0.023)			(0.034)		
Manager Score		1.172***			0.051***			0.033	
		(0.289)			(0.018)			(0.026)	
Worker Score			1.119***			0.038*			0.025
			(0.320)			(0.020)			(0.031)
No. of Obs	748	748	748	803	803	803	820	820	820
Fixed Effects	Province	Province	Province	Province	Province	Province	Province	Province	Province

Notes: We categorize workers into manager (middle and senior manager) and non-manager (other administrative staff (other office staff included), and technician or design personnel, sales personnel, front-line worker, and other staff). Reported coefficients and standard errors in each column are computed as the mean and standard deviation of the regression coefficients across 200 bootstrap replicates. In each bootstrap replicate, we randomly draw one manager and one worker from each firm. For each of the dependent variables, we run three regressions by including the management score from each firm's CEO, manager and worker drawn separately. Significance levels: * 10%, ** 5%, *** 1%.

Table 3: Management Score and Performance: Bootstrap

	Log(VA/Emp)	**Emp. Growth**	**Profit/Sales**	**Log(Capital/Emp)**	**Log(RND/Emp)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Management					
CEO	0.728***	0.038***	0.065***	1.526***	0.683***
	(0.114)	(0.007)	(0.011)	(0.101)	(0.046)
Manager	0.742**	0.022	0.019	0.226	0.363***
	(0.340)	(0.020)	(0.028)	(0.101)	(0.123)
Worker	0.682*	0.004	-0.010	0.371	0.269*
	(0.371)	(0.023)	(0.036)	(0.332)	(0.141)
No. of Obs.	748	803	820	840	773
Controls	No	No	No	No	No
Fixed Effects	Province	Province	Province	Province	Province

Notes: We categorize workers into manager (middle and senior manager) and worker (other administrative staff (other office staff included), and technician or design personnel, sales personnel, front-line worker, and other staff). Reported coefficients and standard errors in each column are computed as the mean and standard deviation of the regression coefficients across 200 bootstrap replicates. In each bootstrap replicate, we randomly draw one manager and one worker from each firm, and run a regression that includes the management scores from each firm's CEO, manager and worker drawn. Survey quality controls include: imputed survey duration, time of the day when survey started, survey day of the week, survey week of the year, respondent tenure and seniority. Significance levels: * 10%, ** 5%, *** 1%.

Table 4: Dispersion and Performance: Dispersion Measure 1

	Log(VA/Emp)	**Emp. Growth**	**Profit/Sales**	**Log(Capital/Emp)**	**Log(RND/Emp)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Log(Capital/Emp)	0.578***	-0.008***	0.003**		0.213***
	(0.013)	(0.001)	(0.001)		(0.005)
Log(Emp)	0.030**	0.004***	0.002	0.042***	0.080***
	(0.012)	(0.001)	(0.001)	(0.011)	(0.005)
D_1	-0.313	0.004	0.027	-0.527***	-0.153*
	(0.209)	(0.015)	(0.022)	(0.194)	(0.088)
Observations	6,740	7,291	7,384	7,390	6,939
Fixed Effects	Province	Province	Province	Province	Province
Adjusted R^2	0.282	0.060	0.023	0.105	0.256

Notes: We include CEOs, managers and workers in this regression. D_1 is our dispersion measure that measures the average absolute deviation of each employees overall management score from the firm mean. Survey quality controls include: imputed survey duration, time of the day when survey started, survey day of the week, survey week of the year. Standard errors are clustered at the province level. Significance levels: * 10%, ** 5%, *** 1%.

Table 5: Dispersion and Performance: Dispersion Measure 2

	Log(VA/Emp)	**Emp. Growth**	**Profit/Sales**	**Log(Capital/Emp)**	**Log(RND/Emp)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Log(Capital/Emp)	0.578***	-0.008***	0.003**		0.213***
	(0.013)	(0.001)	(0.001)		(0.005)
Log(Emp)	0.031**	0.004***	0.002	0.040***	0.079***
	(0.012)	(0.001)	(0.001)	(0.011)	(0.005)
D_2	-0.229	0.029*	0.030	-0.813***	-0.329***
	(0.225)	(0.017)	(0.024)	(0.212)	(0.095)
Observations	6,740	7,291	7,384	7,390	6,939
Fixed Effects	Province	Province	Province	Province	Province
Adjusted R^2	0.282	0.060	0.023	0.106	0.257

Notes: We include CEOs, managers and workers in this regression. D_2 is our dispersion measure that measures the average deviation of employees individual management question score from the firm mean averaged across all questions. Survey quality controls include: imputed survey duration, time of the day when survey started, survey day of the week, survey week of the year. Standard errors are clustered at the province level. Significance levels: * 10%, ** 5%, *** 1%.

Table 6: Dispersion and Performance: Dispersion Measure 1

	Log(VA/Emp)	**Emp. Growth**	**Profit/Sales**	**Log(Capital/Emp)**	**Log(RND/Emp)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Log(Capital/Emp)	0.574***	-0.009***	0.003**		0.209***
	(0.013)	(0.001)	(0.001)		(0.005)
Log(Emp)	0.025**	0.003***	0.001	0.016	0.073***
	(0.012)	(0.001)	(0.001)	(0.011)	(0.005)
D_1	0.443	0.167***	0.086	3.705***	0.797***
	(0.638)	(0.047)	(0.068)	(0.592)	(0.270)
Management	0.472*	0.093***	0.054**	2.407***	0.601***
	(0.248)	(0.018)	(0.026)	(0.227)	(0.104)
$D_1 \times$Management	-1.299	-0.284***	-0.089	-7.373***	-1.614***
	(1.144)	(0.083)	(0.122)	(1.058)	(0.483)
Observations	6,740	7,291	7,384	7,390	6,939
Fixed Effects	Province	Province	Province	Province	Province
Adjusted R^2	0.282	0.063	0.024	0.120	0.261

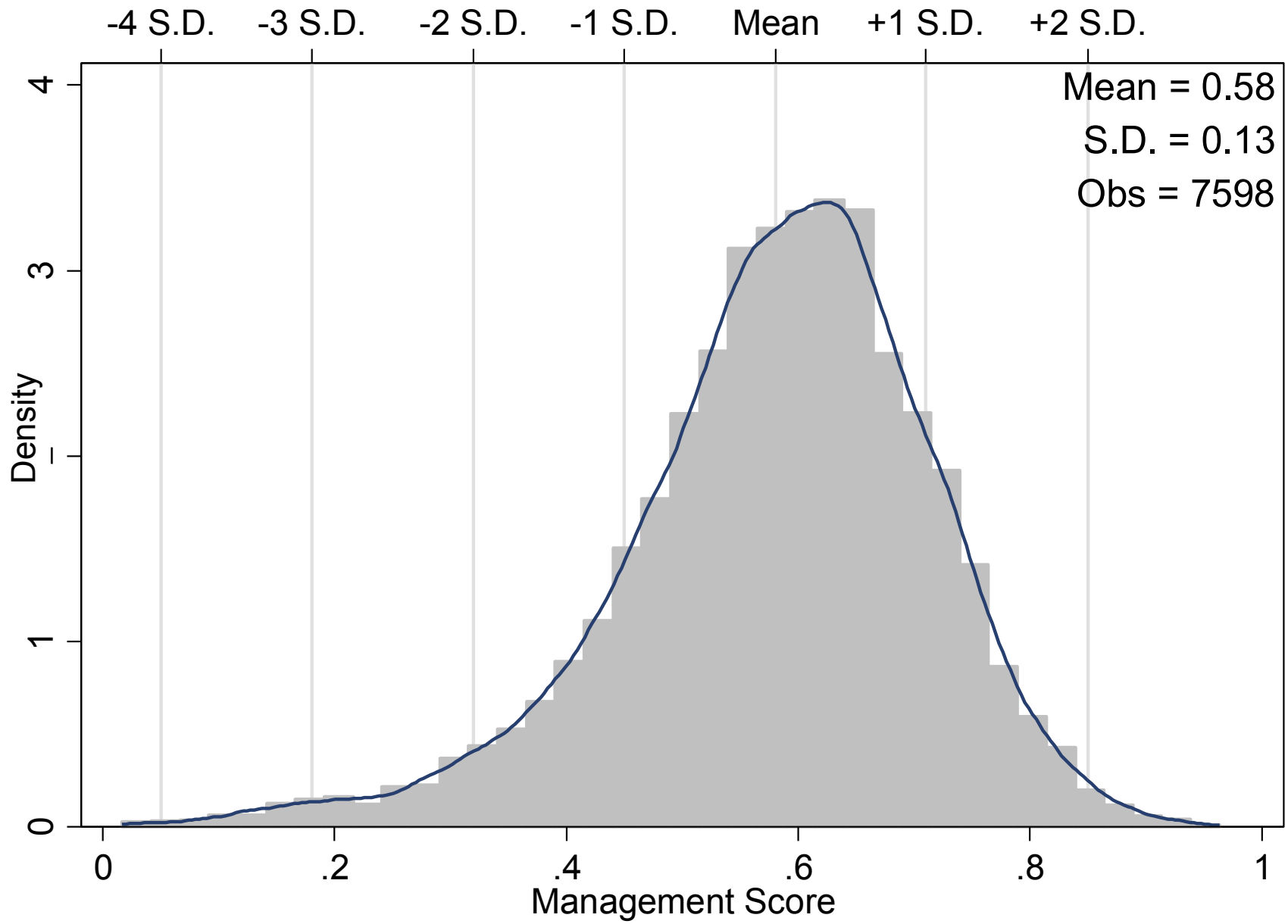
Notes: We include CEOs, managers and workers in this regression. Standard errors are clustered at province level. D_1 is our dispersion measure that measures the average absolute deviation of each employees overall management score from the firm mean. Survey quality controls include: imputed survey duration, time of the day when survey started, survey day of the week, survey week of the year. Significance levels: * 10%, ** 5%, *** 1%.

Table 7: Dispersion and Performance: Dispersion Measure 2

	Log(VA/Emp)	**Emp. Growth**	**Profit/Sales**	**Log(Capital/Emp)**	**Log(RND/Emp)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Log(Capital/Emp)	0.574***	-0.009***	0.003**		0.209***
	(0.013)	(0.001)	(0.001)		(0.005)
Log(Emp)	0.025**	0.004***	0.001	0.021*	0.074***
	(0.012)	(0.001)	(0.001)	(0.011)	(0.005)
D_2	1.877**	0.260***	0.150*	2.712***	0.765**
	(0.797)	(0.058)	(0.085)	(0.743)	(0.337)
Management	1.319***	0.158***	0.095**	2.683***	0.809***
	(0.428)	(0.031)	(0.046)	(0.395)	(0.180)
$D_2 \times$Management	-3.735***	-0.395***	-0.193	-5.778***	-1.825***
	(1.417)	(0.103)	(0.151)	(1.316)	(0.598)
Observations	6,740	7,291	7,384	7,390	6,939
Fixed Effects	Province	Province	Province	Province	Province
Adjusted R^2	0.283	0.065	0.024	0.117	0.261

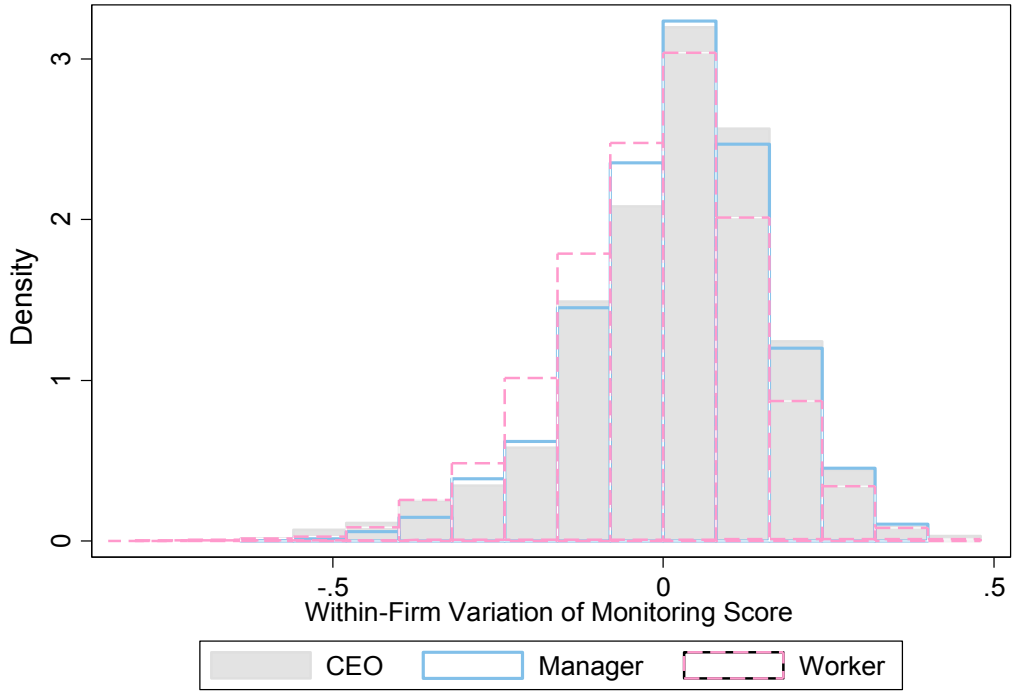
Notes: We include CEOs and managers and workers in regressions. Standard errors are clustered at province level. D_2 is our dispersion measure that measures the average deviation of employees individual management question score from the firm mean averaged across all questions. Survey quality controls include: imputed survey duration, time of the day when survey started, survey day of the week, survey week of the year. Significance levels: * 10%, ** 5%, *** 1%.

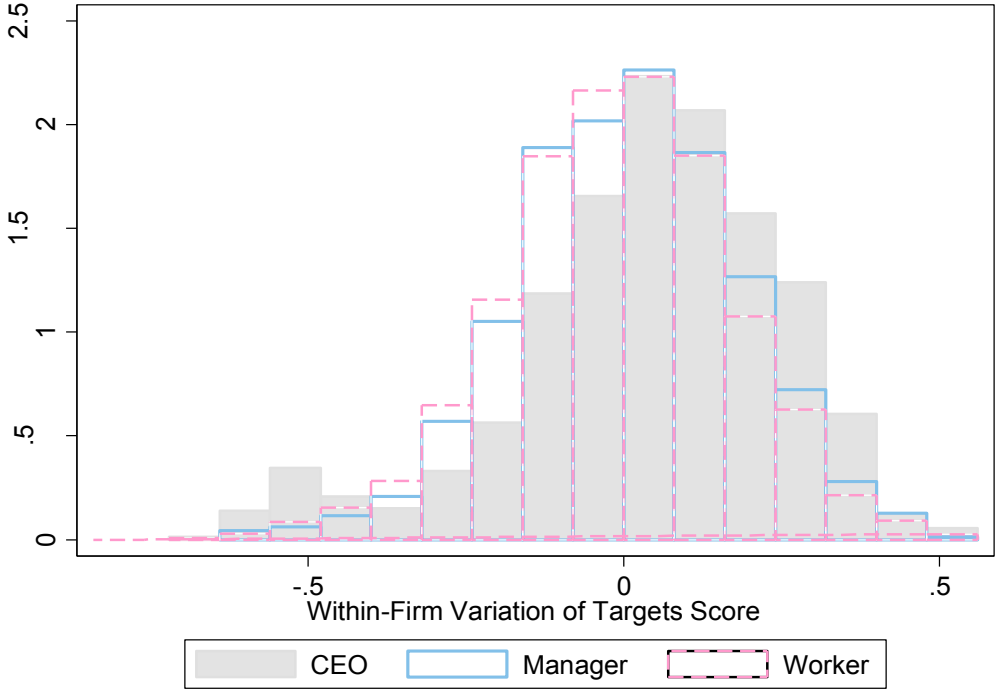
Figure 1: Distribution of Individual Management Score in 2016

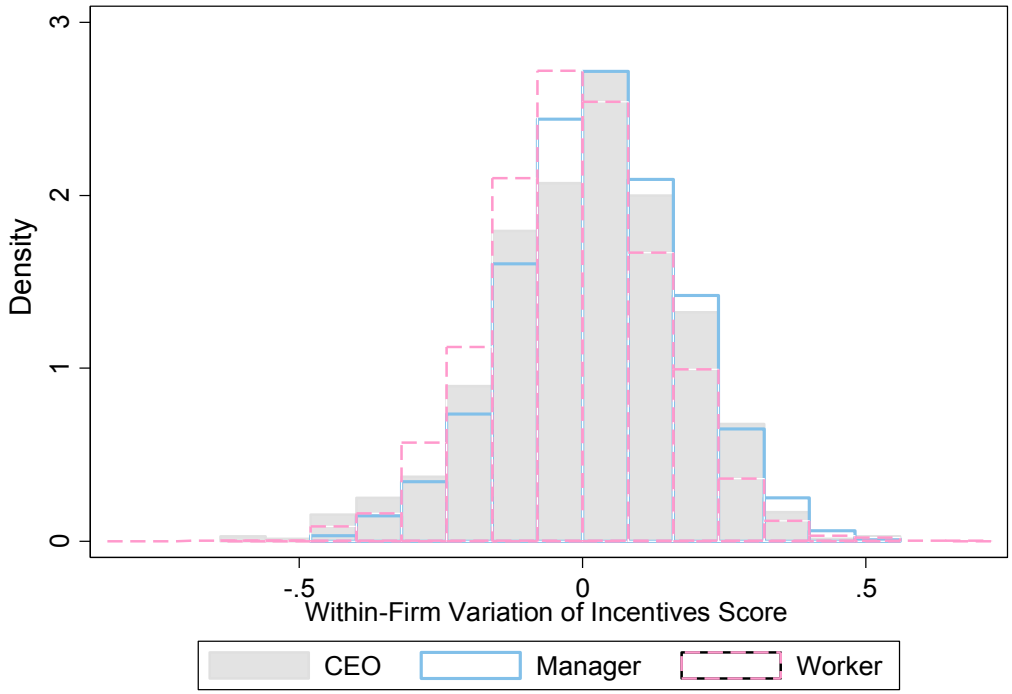


Notes: The management score is unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0-1 scale. The sample is all 2016 CEES surveyors with at least 11 non-missing responses to management questions and from firms with positive value added, at least 20 employees, and positive capital.

Figure 2: Within-Firm Variation of Management Scores

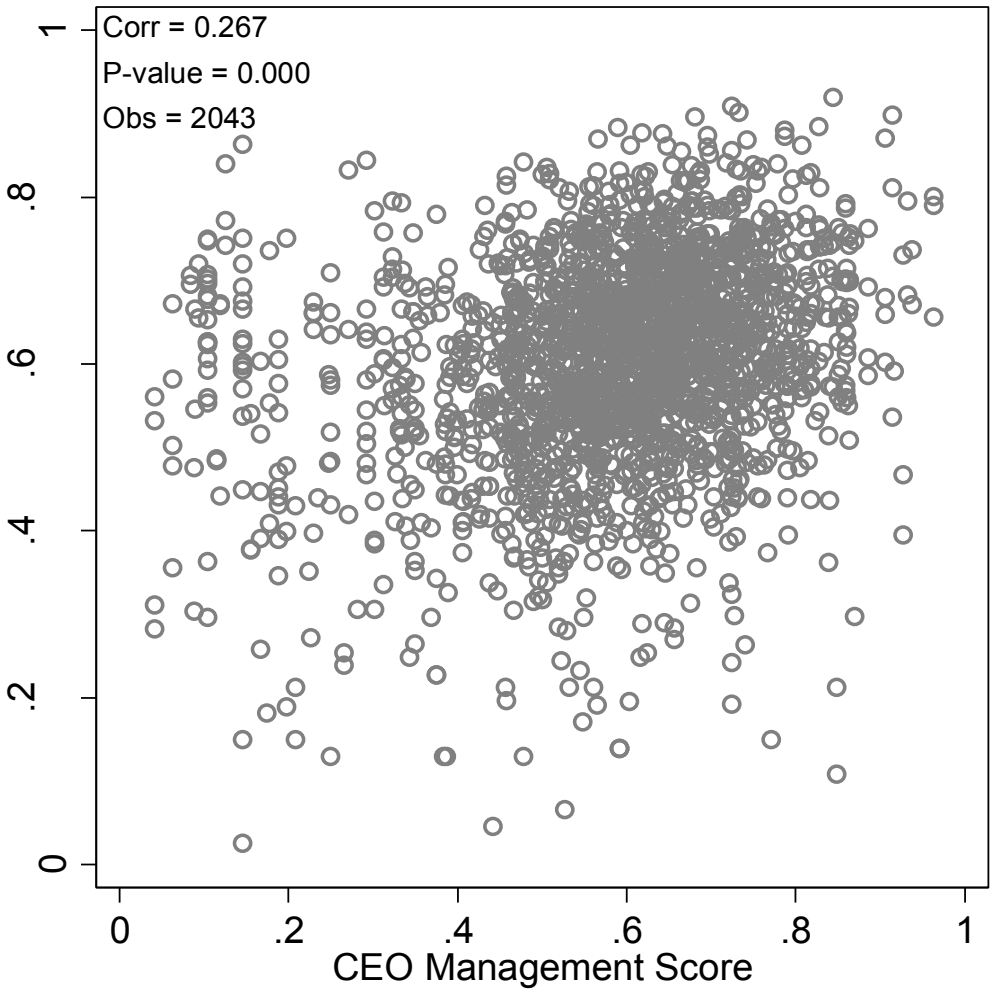


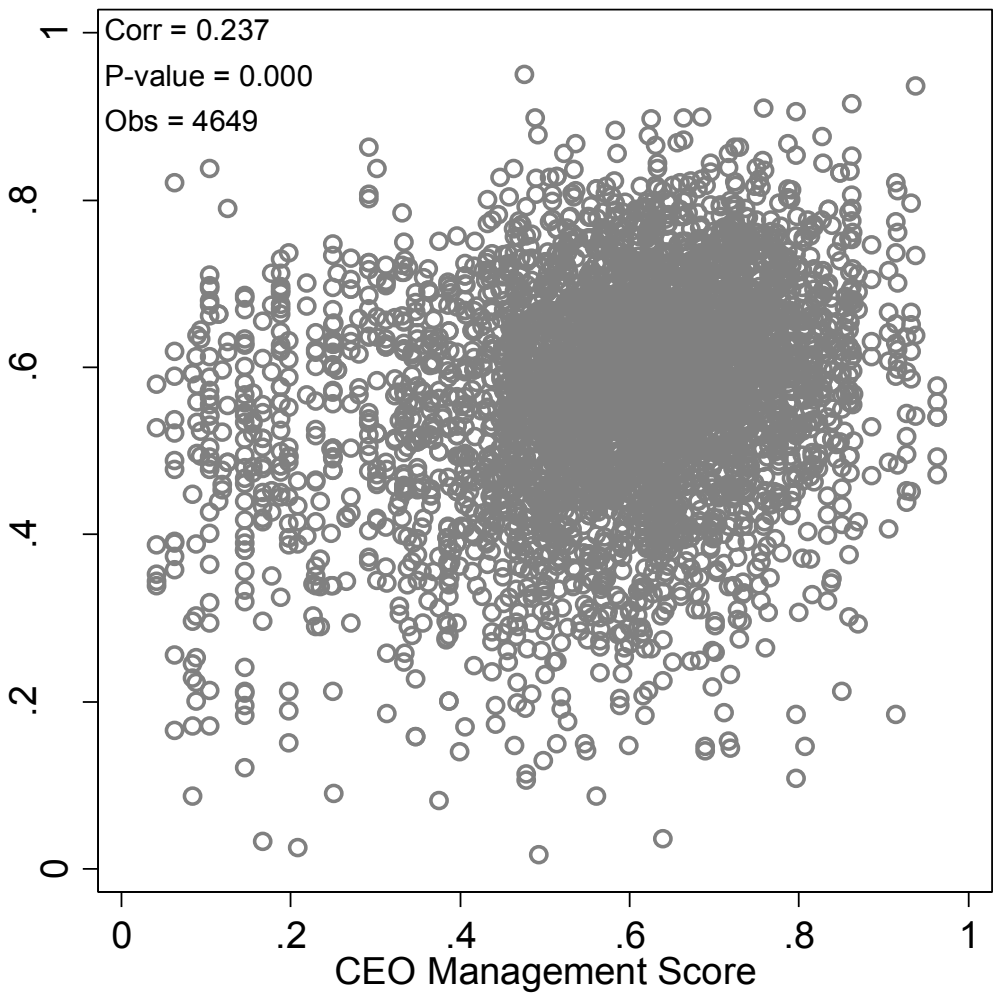




Notes: Monitoring score, targets score and incentive score are the unweighted average of the score for each of the questions in the monitoring section, targets section and incentive section respectively, where each question is first normalized to be on a 0-1 scale.

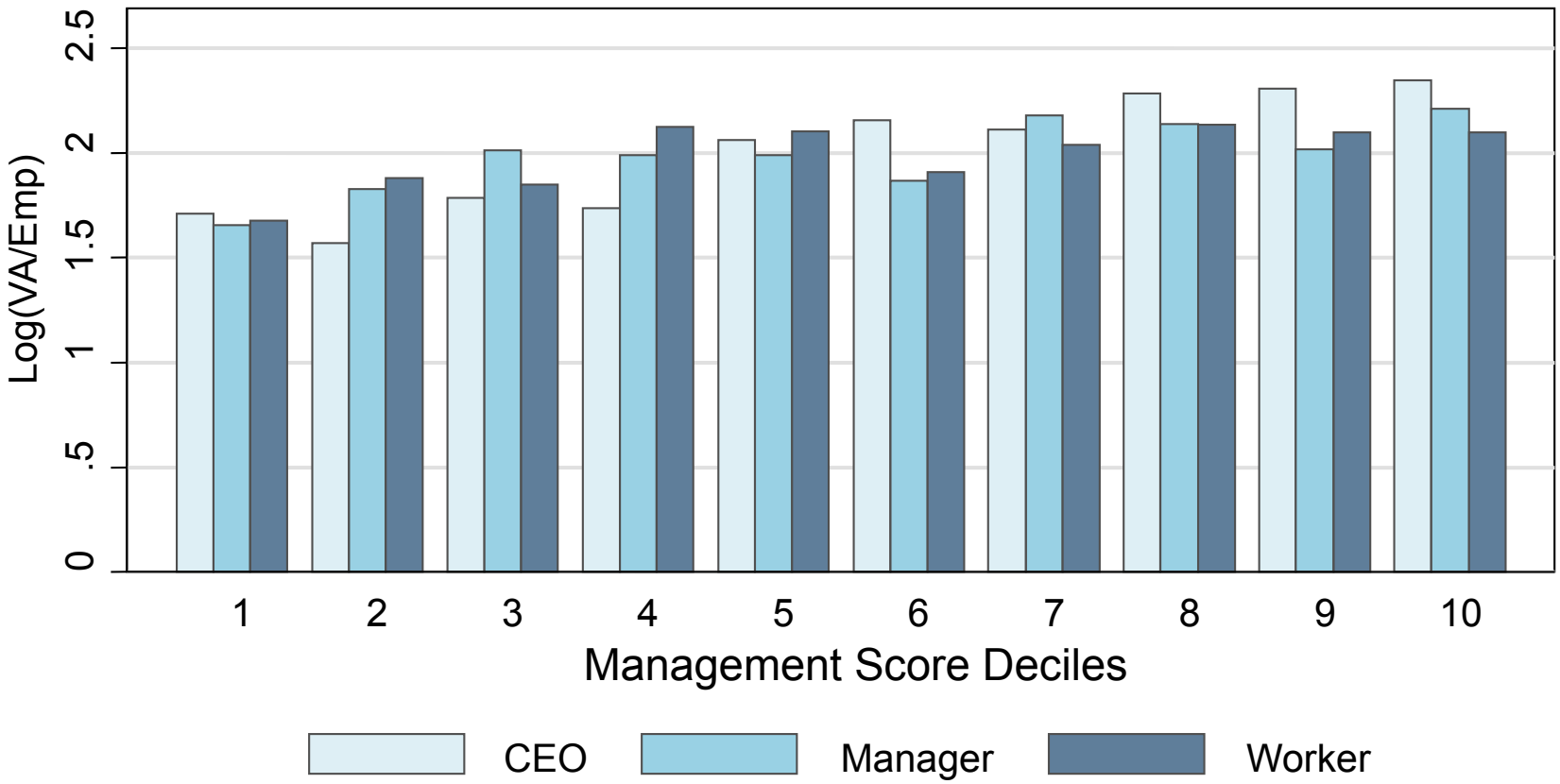
Figure 3: Comparison of Management Scores by Position in 2016





***Notes*:** The management score is unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0-1 scale. The sample is all 2016 CEES surveyors with at least 11 non-missing responses to management questions and from firms with positive value added, at least 20 employees, and positive capital. We further categorize surveyors into *CEOs*, *managers* and *workers*. Managers include all middle and senior managers. Workers include administrative and office staff, technician or design personnel, sales personnel, front-line workers, and other staff.

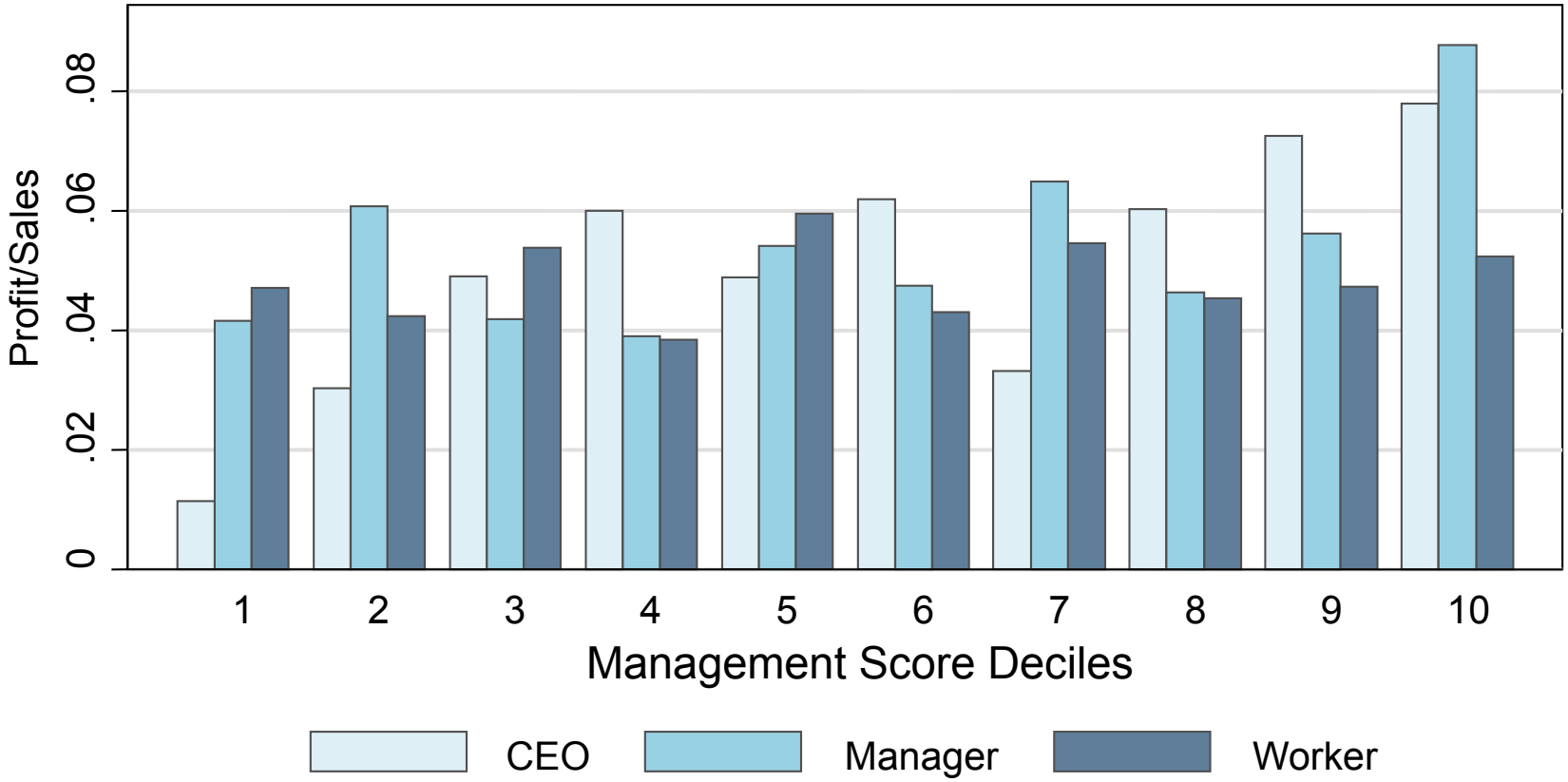
Figure 4: Firm Value Added/Employee vs. Management Score in 2016



CEO: Corr = 0.144, P-value = 0.000, Obs = 806
Manager: Corr = 0.094, P-value = 0.000, Obs = 1816
Worker: Corr = 0.077, P-value = 0.000, Obs = 4118
Avg (Equal wgt each survey response): Corr= 0.161, P-value= 0.000, Obs= 6740
Avg (Equal wgt each group): Corr= 0.160, P-value= 0.000, Obs= 806

***Notes*:** The management score is unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0-1 scale. The sample is all 2016 CEES surveyors with at least 11 non-missing responses to management questions and from firms with positive value added, at least 20 employees, and positive capital. The management deciles are calculated using the scores for CEOs, managers and workers separately. We report the correlation between firms' value added per employee and above and individual management scores of CEO, manager and worker respectively, as well as the average management scores at firm level, where we either weigh the employees within a firm equally or weigh the average management scores from CEO, managers and workers within a firm equally.

Figure 5: Firm Profit/Sales vs. Management Score in 2016



CEO: Corr = 0.108, P-value = 0.001, Obs = 880
Manager: Corr = 0.042, P-value = 0.062, Obs = 1993
Worker: Corr = 0.008, P-value = 0.569, Obs = 4511
Avg (Equal wgt each survey response): Corr= 0.061, P-value= 0.000, Obs= 7384
Avg (Equal wgt each group): Corr= 0.084, P-value= 0.012, Obs= 880

Notes: The management score is unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0-1 scale. The sample is all 2016 CEES surveyors with at least 11 non-missing responses to management questions and from firms with positive value added, at least 20 employees, and positive capital. The management deciles are calculated using the scores for CEOs, managers and workers separately. We report the correlation between firms' profits per sale and above and individual management scores of CEO, manager and worker respectively, as well as the average management scores at firm level, where we either weigh the employees within a firm equally or weigh the average management scores from CEO, managers and workers within a firm equally.

A Appendix Tables and Figures

Table A1: Sample Size and Response Rates of CEES Survey in Hubei and Guangdong Provinces of China

	Number of observations	**Response rate**
Firm survey 2015 (Guangdong only)	573	82%
Firm survey 2016	1,122	84%
New sample (Hubei)	585	83%
Follow up sample (Guangdong)	487	85%
New sample (Guangdong)	50	42%
Worker survey 2015 (Guangdong only)	4,838	88%
Worker survey 2016	9,103	80%
New sample (Hubei)	4,114	89%
Follow up sample (Guangdong)	2,575	53%
New sample (Guangdong)	2,414	94%

Table A2: Characteristics of CEES vs. the Census and Yearbook (Hubei and Guangdong provinces of China)

	The 3rd National Economic Census	**2016 Statistical Yearbook**	**2016 CEES (weighted)**	**2016 CEES (unweighted)**
No. of firms (thousand)	361.13	56.45	1.12	1.12
Employment (person)	69	307	62	827
Assets (million RMB)	30.5	197.7	52.1	769.9
Industrial output (million RMB)		281.1	50.3	803
Profit (million RMB)		15.9	3	46.7
Profit rate (profit/sales %)		5.5	6.5	6.2
Type of Registration (%)				
Domestic-funded firms	91	76	94	74
Hong Kong, Macao or Taiwan funded firms	6	16	4	17
Foreign-funded firms	2	8	2	9
Type of Ownership (%)				
State owned		3	2	6
Non-state owned		97	98	94
Type of Industry (%)				
Farm and sideline food processing	3	5	14	5
Food manufacturing	2	2	3	2
Wine, beverage and refined tea manufacturing	1	1	4	2
Tobacco Product Manufacturing	0.01	0.03	0.2	0.3
Textile Industry	3	4	5	6
Clothing	7	6	4	7
Leather, fur, feathers and footwear industry	4	4	2	4
Wood processing and wood product industry	2	1	1	1
Furniture manufacturing	3	3	1	2
Paper and paper product industry	3	2	2	1
Printing	4	2	2	3
Education, art, sport and entertainment product	4	3	1	2
Chemical industry	0.2	0.2	0	0.2
Chemical Materials and Product Manufacturing	4	6	2	3
Pharmaceutical industry	1	1	1	2
Chemical Fiber Industry	0.1	0.1	0.03	0.2
Balata and Plastic Product Industry	8	7	8	4
Nonmetallic mineral products industry	6	9	20	10
Ferrous metal industry	1	1	0.3	1
Nonferrous metal industry	1	1	1	2
Metal product industry	10	7	7	7
General equipment manufacturing industry	5	4	2	3
Special equipment manufacturing industry	6	4	4	4
Automobile manufacturing industry	2	4	5	6
Railway, ship and other transportation equipment manufacturing	1	1	0.4	1
Electrical machinery and equipment	9	9	5	9
Computer, communications and other electronic equipment	8	9	3	10
Instrument manufacturing industry	1	1	1	1
Others	1	1	0.2	0.5
Comprehensive utilization of waste resources	0.4	1	0.1	0.5
Metal products, machinery and equipment repair industry	1	0.1	0.2	0.4

Notes: Calculations from CEES data are weighted using both the firm size weight in a county (the probability of a firm being in a sample is proportional to its employment size) and the employment weight within a firm in 2013. Statistical Yearbook tabulations are based on *The Annual Survey of Industrial Firms (ASIF)* conducted by the National Bureau of Statistics (NBS) with SOEs and other firms having sales revenue exceeding 20 million RMB (USD 308,000). The Third National Economic Census (carried out in 2013) tabulations are from *The Statistical Bulletin for the Third National Economic Census*. Industries are classified according to the two-digit code of The Industrial Classification for National Economic Activities (GB/4754-2011), and we combine them into larger groups.

Table A3: Descriptive Statistics of CEO and Employees

	Average No. in Each Firm	**Average Management Score**	**Typical Job Title**
CEO	1.00	0.58	CEO
Manager	2.25	0.60	Middle and senior manager
Worker	5.13	0.57	Front-line worker

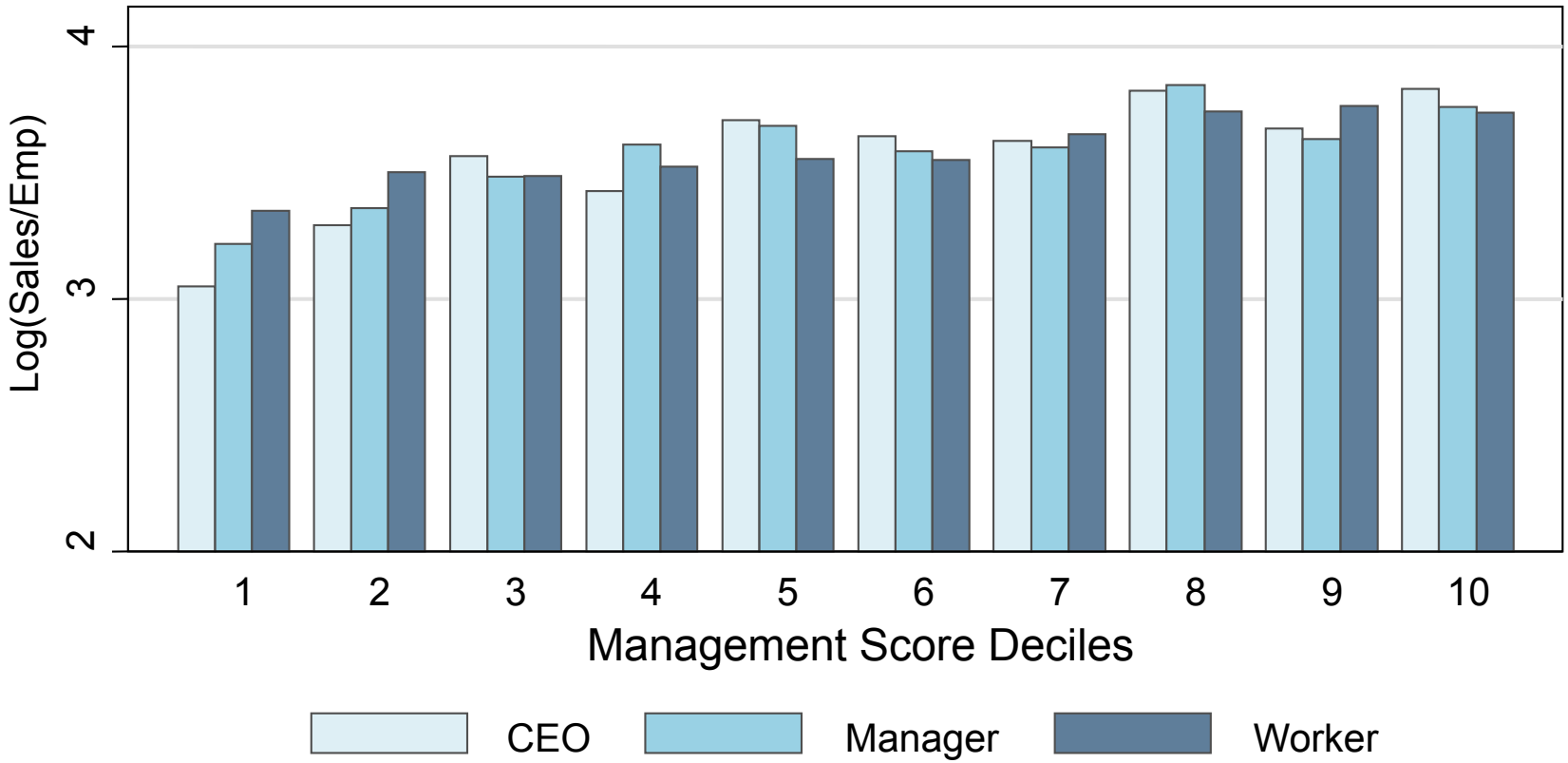
Notes: The management score is the unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0-1 scale. The sample in all columns is all CEES employees in 2016 with at least 11 non-missing responses to management questions and age 18-65. In this sample, we categorize employees into manager (middle and senior manager) and worker (other administrative staff (other office staff included), technician or design personnel, sales personnel, front-line worker, other staff). Average no. in each firm represents the average number of individuals across firms in each group. Average management score is the average management score of individuals in each group. Typical job title represents the most common job title in each group.

Table A4: GDP, Export and Manufacturing Employment by Provinces

Provinces	**GDP (Billion Dollars)**	**Export Volume (Billion Dollars)**	**Urban Employment of Manufacturing (Thousand)**
Guangdong	1,212.02	598.6	13,856
Jiangsu	1,160.05	319.05	11,689
Shandong	1,019.69	137.1	5,267
Zhejiang	708.3	267.86	7,323
Henan	606.67	42.81	4,577
Sichuan	493.69	27.95	2,387
Hubei	489.66	26.04	2,800
Hebei	480.74	30.58	1,986
Hunan	472.96	17.69	1,422
Fujian	431.87	103.68	3,543
Shanghai	422.4	183.35	2,325
Beijing	384.78	52.02	1,045
Anhui	365.87	28.45	2,600
Liaoning	333.48	43.06	2,070
Shanxi	290.8	15.84	1,309
Jiangxi	277.3	29.8	2,157
Guangxi	274.58	22.93	1,076
Inner Mongolia	271.74	4.4	734
Tianjin	268.1	44.28	1,349
Chongqing	265.93	40.65	1,489
Heilongjiang	230.64	5.04	739
Yunnan	221.68	11.49	905
Jilin	221.5	4.2	1,259
Shanxi	195.63	9.93	945
Guizhou	176.53	4.74	573
Xinjiang	144.65	15.58	669
Gansu	107.93	4.06	477
Hainan	60.76	2.13	134
Ningxia	47.5	2.49	175
Qinghai	38.56	1.37	146
Tibet	17.26	0.47	61
Total	11,693.27	2,097.63	77,085.1

Notes: Data is from China Statistical Yearbook of 2017. Export volume is calculated based on the commodity business unit location. Urban employment includes employment in party and government organizations, state owned enterprises, collective enterprises, public institutions, private firms and individuals in urban areas.

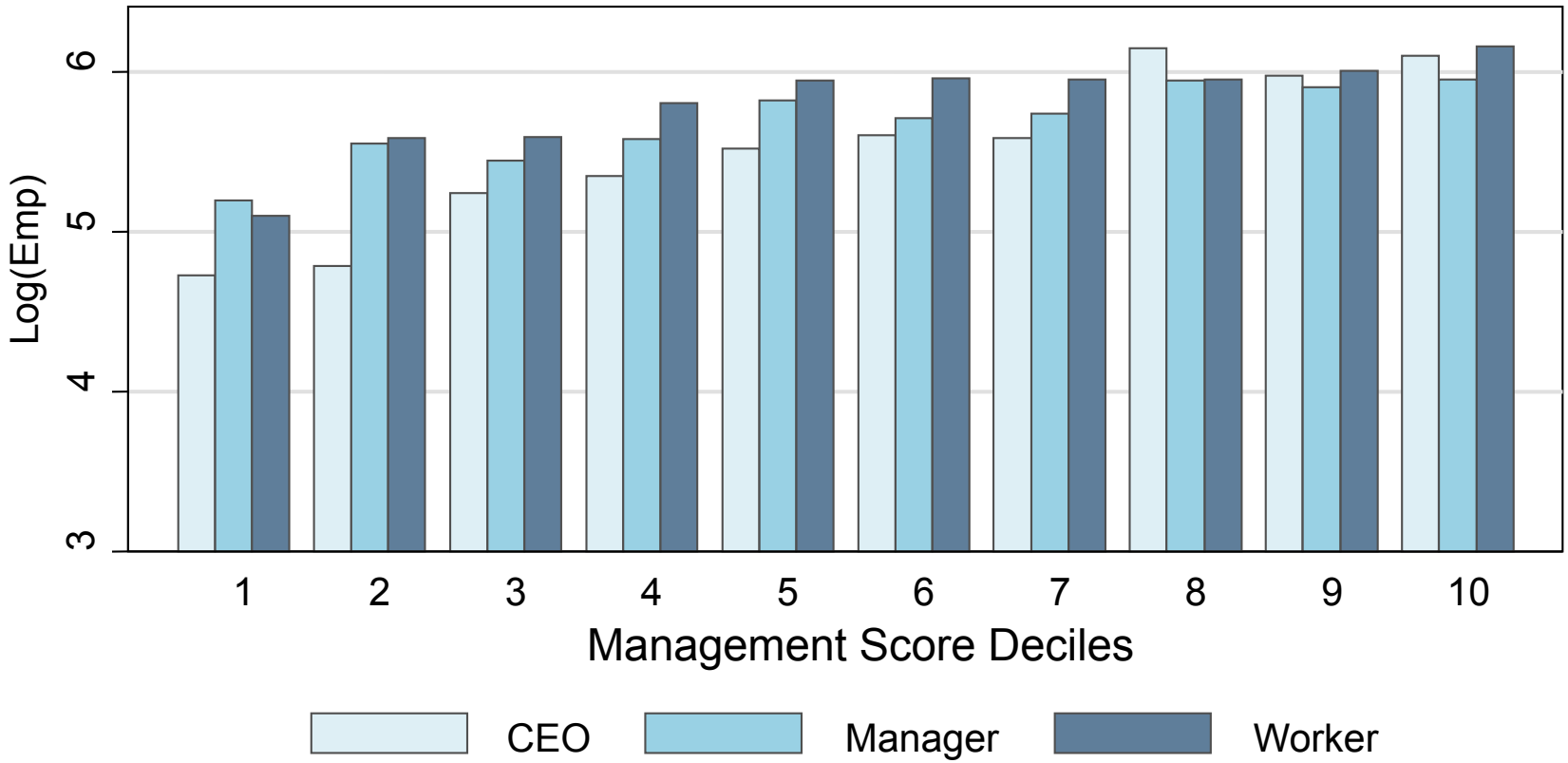
Figure A1: Firm Sales/Employee vs. Management Score in 2016



CEO: Corr = 0.181, P-value = 0.000, Obs = 885
Manager: Corr = 0.131, P-value = 0.000, Obs = 2001
Worker: Corr = 0.104, P-value = 0.000, Obs = 4539
Avg (Equal wgt each survey response): Corr= 0.216, P-value= 0.000, Obs= 7425
Avg (Equal wgt each group): Corr= 0.179, P-value= 0.000, Obs= 885

***Notes*:** The management score is unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0-1 scale. The sample is all 2016 CEES surveyors with at least 11 non-missing responses to management questions and from firms with positive value added, at least 20 employees, and positive capital. The management deciles are calculated using the scores for CEOs, managers and workers separately. We report the correlation between firms' sales per employee and above and individual management scores of CEO, manager and worker respectively, as well as the average management scores at firm level, where we either weigh the employees within a firm equally or weigh the average management scores from CEO, managers and workers within a firm equally.

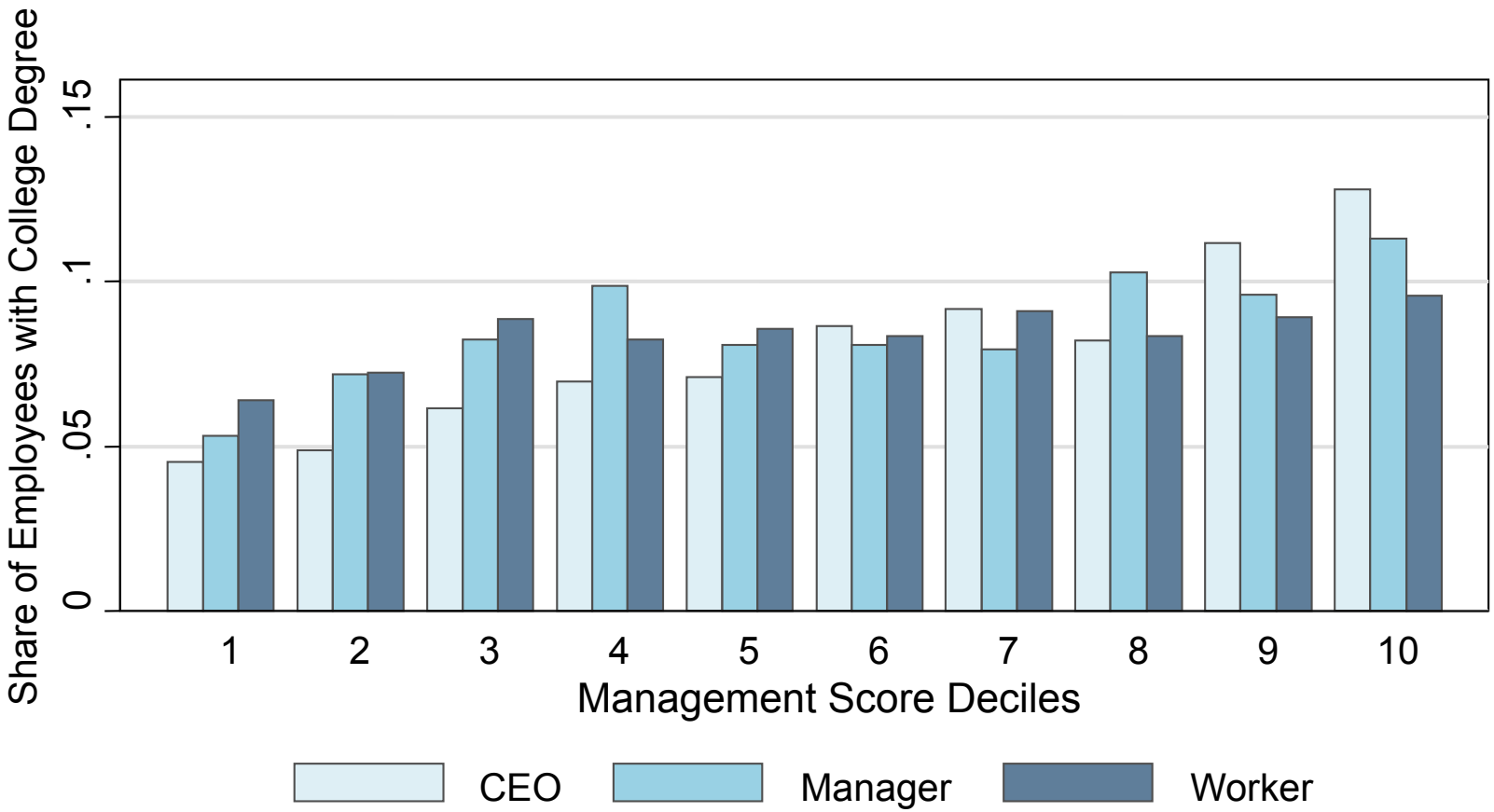
Figure A2: Firm Size vs. Management Score in 2016



CEO: Corr = 0.290, P-value = 0.000, Obs = 900
Manager: Corr = 0.152, P-value = 0.000, Obs = 2029
Worker: Corr = 0.186, P-value = 0.000, Obs = 4621
Avg (Equal wgt each surveyor): Corr= 0.333, P-value= 0.000, Obs= 7550
Avg (Equal wgt each group): Corr= 0.349, P-value= 0.000, Obs= 900

***Notes*:** The management score is unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0-1 scale. The sample is all 2016 CEES surveyors with at least 11 non-missing responses to management questions and from firms with positive value added, at least 20 employees, and positive capital. The management deciles are calculated using the scores for CEOs, managers and workers separately. We report the correlation between firms' log of employment and individual management scores of CEO, manager and worker respectively, as well as the average management scores at firm level, where we either weigh the employees within a firm equally or weigh the average management scores from CEO, managers and workers within a firm equally.

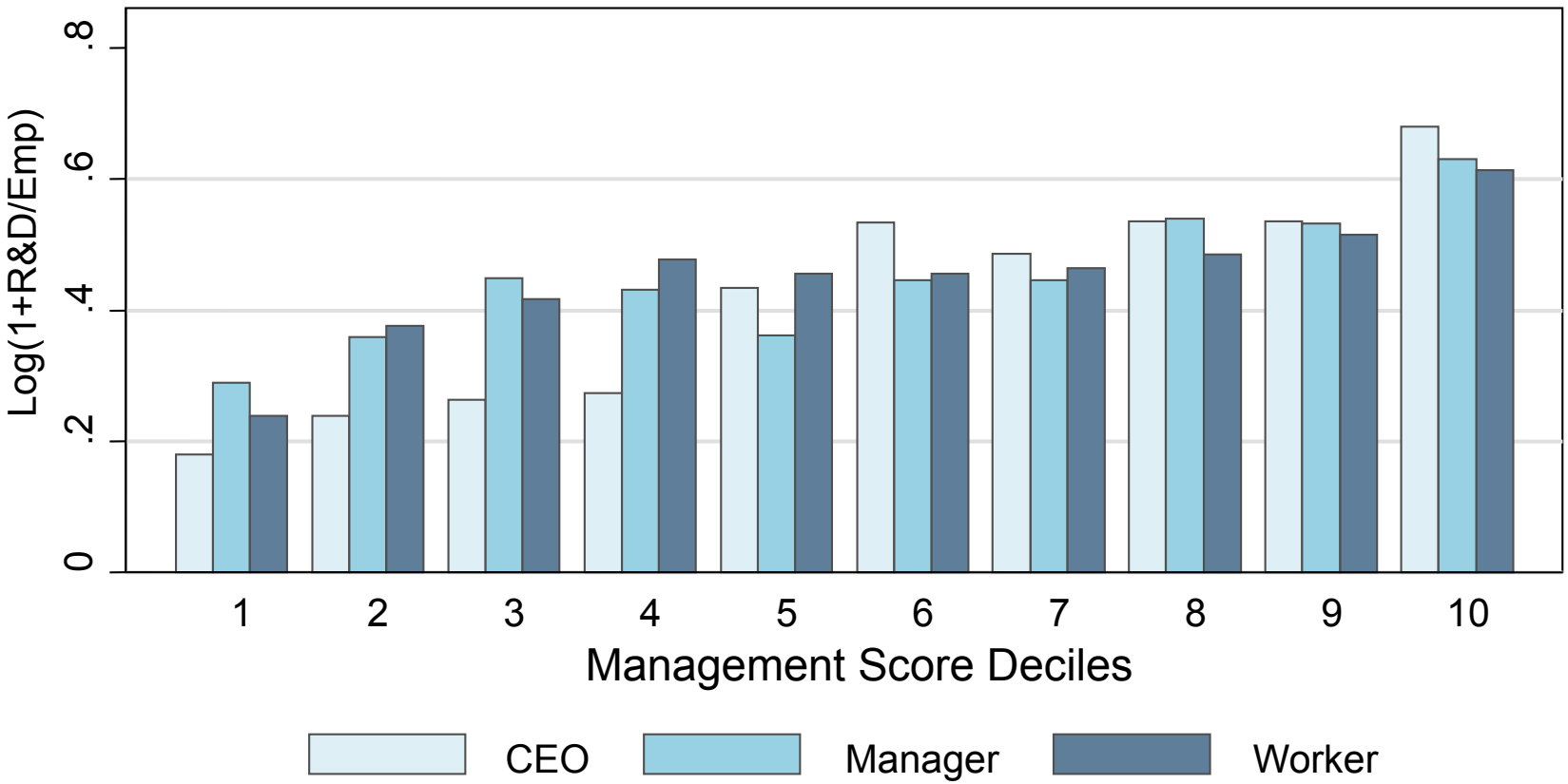
Figure A3: Share College vs. Management Score in 2016



CEO: Corr = 0.206, P-value = 0.000, Obs = 832
Manager: Corr = 0.120, P-value = 0.000, Obs = 1884
Worker: Corr = 0.067, P-value = 0.000, Obs = 4271
Avg (Equal wgt each surveyor): Corr= 0.182, P-value= 0.000, Obs= 6987
Avg (Equal wgt each group): Corr= 0.190, P-value= 0.000, Obs= 832

***Notes*:** The management score is unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0-1 scale. The sample is all 2016 CEES surveyors with at least 11 non-missing responses to management questions and from firms with positive value added, at least 20 employees, and positive capital. The management deciles are calculated using the scores for CEOs, managers and workers separately. We report the correlation between firms' share of employees with college degree and above and individual management scores of CEO, manager and worker respectively, as well as the average management scores at firm level, where we either weigh the employees within a firm equally or weigh the average management scores from CEO, managers and workers within a firm equally.

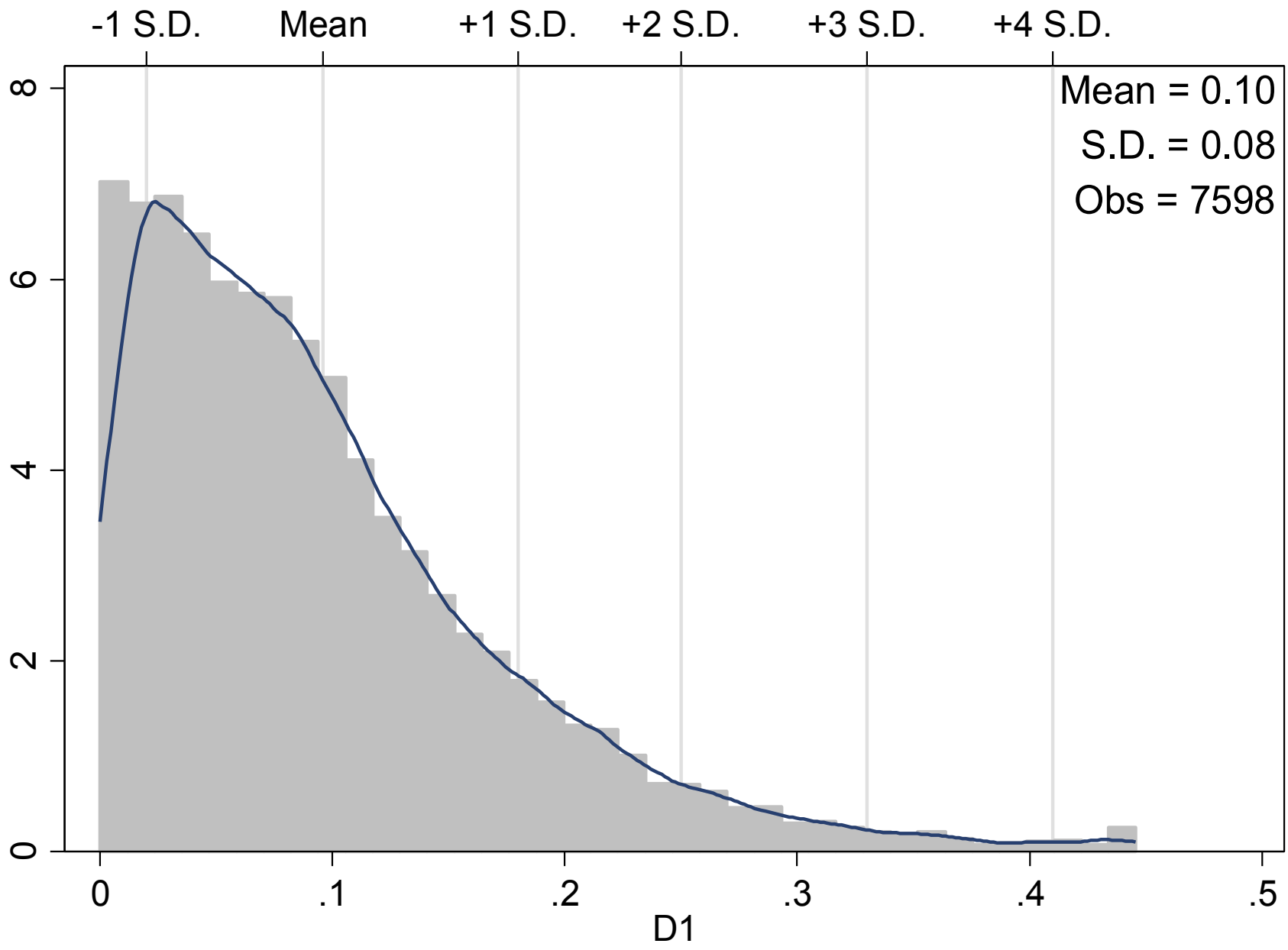
Figure A4: R&D per Employee vs. Management Score in 2016



CEO: Corr = 0.234, P-value = 0.000, Obs = 830
Manager: Corr = 0.133, P-value = 0.000, Obs = 1877
Worker: Corr = 0.133, P-value = 0.000, Obs = 4232
Avg (Equal wgt each surveyor): Corr= 0.258, P-value= 0.000, Obs= 6939
Avg (Equal wgt each group): Corr= 0.257, P-value= 0.000, Obs= 830

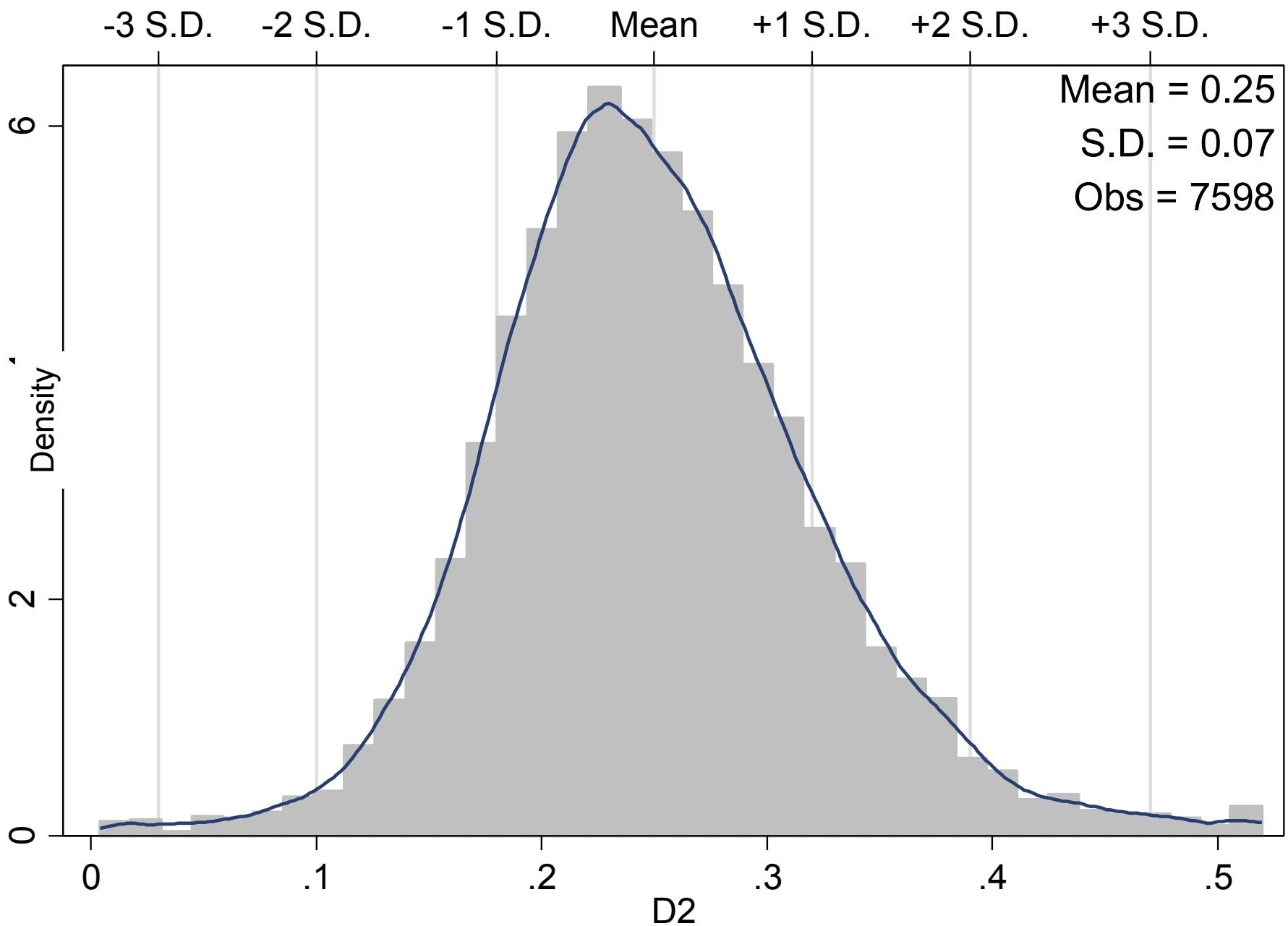
***Notes*:** The management score is unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0-1 scale. The sample is all 2016 CEES surveyors with at least 11 non-missing responses to management questions and from firms with positive value added, at least 20 employees, and positive capital. The management deciles are calculated using the scores for CEOs, managers and workers separately. We report the correlation between firms' log of 1+R&D expenditure per employee and above and individual management scores of CEO, manager and worker respectively, as well as the average management scores at firm level, where we either weigh the employees within a firm equally or weigh the average management scores from CEO, managers and workers within a firm equally.

Figure A5: Distribution of Dispersion Measure 1



***Notes*:** D1 is the dispersion measure that measures the average absolute deviation of each employees overall management score from the firm mean. The sample is all 2016 CEES surveyors with at least 11 non-missing responses to management questions and from firms with positive value added, at least 20 employees, and positive capital.

Figure A6: Distribution of Dispersion Measure 2



Notes: D2 is the dispersion measure that measures the average deviation of employees individual management question score from the firm mean averaged across all questions. The sample is all 2016 CEES surveyors with at least 11 non-missing responses to management questions and from firms with positive value added, at least 20 employees, and positive capital.

B 2016 CEES Management Questions and Scores

Management Scores: To calculate the management score from each survey respondent, we first normalize the response to each question to be on a 0-1 scale. For each question, 0 is the lowest score representing the least structured management practice, and 1 is the highest score representing the most structured management practice. For example, when asking "...how long would the supervisors be fired if he/she couldn't pass his performance appraisal?", the response "Within six months" is assigned 1 and the response "Rarely dismiss people" is assigned 0. If a question has three categories, the "in between" category is assigned the value 0.5. Similarly, if there are four categories, the "in between" categories are assigned 1/3 and 2/3 and so on. For "Single choice" questions, we assign the corresponding item's score for each question. For "Multiple choice" questions, we assign score of the highest-scoring response selected for each question. The management score from each respondent is then calculated as the unweighted average of the normalized scores from those 16 questions. The management score is missing if there are fewer than 11 non-empty responses out of 16 management items.

There are three common issues with the submitted raw survey responses that require an edit. First, in the case that if a respondent selects more than one response where a question specifies "Single choice", we assign score of the most structured management practice selected by the respondent. Second, in the case that if a respondent answers at least one question that should have been skipped based her response to a prior question, the answers provided to questions that should have been skipped are retained[1]. Third, in the case that if a respondent properly follows skip patterns which means the responses to subsequent questions are empty as prescribed by the skip pattern, we assign scores of the least structured management practice for the subsequent questions skipped[2].

[1] Although responses to these questions may be inconsistent with the response to the trigger question, there is no way to determine which responses match the intentions of the respondent. Hence, we treat inconsistent data as valid and only flag such responses.

[2] Nullifying the subsequent questions instead of editing them would have two effects. First, it reduces the survey response rate as respondents who properly followed the skip patterns may have answered fewer than 11 questions. Second, it upward biases the management score since it is an unweighted average of the completed questions from each respondent.

Management Questions: The management module in the CEES survey contained 16 questions, which are separated into three sections: monitoring, targets and incentives. The monitoring section asked firms about their collection and use of information to monitor and improve the production process. The targets section asked about the design, integration and realism of production targets. Finally, the incentives section asked about non-managerial and managerial bonus, production and reassignment/dismissal practices.

We use the same set of questions for both the firm and worker surveys. Below we list the 16 questions on management which are translated from CEES Chinese version..

(If the enterprise was established after year 2010, please fill in the conditions when it was established in Column 2010)

Monitoring

1. Which description below conforms with the real treatment the enterprise chooses to solve problems generated during production process? (e.g., the product has quality problem or producing machine breakdown)【Single choice】
   1) just repair
   2) repair and assure that the same problem will not occur again
   3) repair and assure that the same problem will not occur again, and take prevention measure for possible problem generated at this producing link
   4) no treatment
   2010：_____ 2015：_____

2. In 2010 and 2015, how many performance indicators did the factory monitored? 【Single choice】
   Performance indicators including capacity, cost, loss, quality, inventory, energy consumption, absenteeism, on-time delivery.

	Year 2010	Year 2015
1 to 2	☐	☐
3 to 9	☐	☐
10 and above	☐	☐
Do not monitor **If select this option in both year，→Go to 6**	☐	☐

3. In 2010 and 2015，how long did the supervisors check on the performance indicators mentioned above?【Multiple choice】
   (Supervisors can be understood as the leadership of the people in charge, such as plant manager, human resources manager, quality manager, etc.)

	Year 2010	Year 2015
Each year	☐	☐
Each quarter	☐	☐
Each month	☐	☐
Each week	☐	☐
Each day	☐	☐
Each hour or more	☐	☐
Never	☐	☐

4. In 2010 and 2015， how long did the common employees check on the performance indicators mentioned above?【Multiple choice】
(Common employees refer to the employees except the "supervisors" described in the 12)

	Year 2010	Year 2015
Each year	☐	☐
Each quarter	☐	☐
Each month	☐	☐
Each week	☐	☐
Each day	☐	☐
Each hour or more	☐	☐
Never	☐	☐

5. In 2010 and 2015, Where did the enterprise place the dashboards for important performance indicators? 【Single choice】

	Year 2010	Year 2015
All dashboards displayed in the same place (such as: the end of the production line, interface of MIS)	☐	☐
Different dashboards were located in different places (such as: various places along production lines)	☐	☐
No dashboards	☐	☐

Targets

6. In 2010 and 2015, which option can best describe the enterprise' time planning of the production goals？【Single choice】

	Year 2010	Year 2015
Mainly focus on short-term goals (in one year)	☐	☐
Mainly focus on long-term goals（over one year）	☐	☐
Both concerned	☐	☐
Do not focus on anyone **If choose this option on both year，→Go to 13**	☐	☐

7. In 2010 and 2015, which option best describe the degree of difficulty for this enterprise to reach the production goals?【Single choice】

	Year 2010	Year 2015
Very easy to accomplish	☐	☐
With certain effort	☐	☐
Could accomplish under normal condition	☐	☐
Need more effort to accomplish	☐	☐
Need considerable effort to accomplish	☐	☐

8. In 2010 and 2015, who knows the production plan? 【Single choice】

	Year 2010	Year 2015
Only senior management	☐	☐
Most of the management and some workers	☐	☐
Most of the management and majority of the workers	☐	☐
All managers and workers	☐	☐

Incentives

9. In 2010 and 2015, what is the determinant of the non-management level employee's performance bonus? 【Multiple choice】

	Year 2010	Year 2015
Measuring by individual production plan completion status	☐	☐
Measuring by group production plan completion status	☐	☐
Measuring by the entire plant production plan completion status	☐	☐
Measuring by the company's production plan completion status	☐	☐
No performance bonus if choose this option on both year，**→Go to 11**	☐	☐

10. In 2010 and 2015, what was the proportion for common employees to get the performance bonus after the completion of the production plan? 【Single choice】

	Year 2010	Year 2015
0%	☐	☐
1-33%	☐	☐
34-66%	☐	☐
67-99%	☐	☐
100%	☐	☐
The annual production plan was not completed	☐	☐

11. In year 2010 and 2015, what is the determinant of the management level employee's performance reward? 【Multiple choice】

	Year 2010	Year 2015
Measuring by individual production plan completion status	☐	☐
Measuring by group production plan completion status	☐	☐
Measuring by the entire plant production plan completion status	☐	☐
Measuring by the company's production plan completion status	☐	☐
No performance bonus **If choose this option on both year，→Go to 13**	☐	☐

12. In 2010 and 2015, after the completion of production plan, what was the proportion of supervisors that will get performance bonuses? 【Multiple choice】

	Year 2010	Year 2015
0%	☐	☐
1-33%	☐	☐
34-66%	☐	☐
67-99%	☐	☐
100%	☐	☐
The annual production plan was not completed	☐	☐

13. In 2010 and 2015, what accounted for promotion of common employees? 【Single choice】

	Year 2010	Year 2015
Solely by ability and performance	☐	☐
Partially by ability and performance, also reference other factors (such as serving years, relations, etc.)	☐	☐

Mainly determined by factors other than ability and performance (such as serving years, relations, etc.)	☐	☐
Common employees generally have no chance to be promoted	☐	☐

14. In 2010 and 2015, what accounted for promotion of managers? 【Single choice】

	Year 2010	Year 2015
Solely by ability and performance	☐	☐
Partially by ability and performance, also reference other factors (such as serving years, relations, etc.)	☐	☐
Mainly determined by factors other than ability and performance (such as serving years, relations, etc.)	☐	☐
managers generally have no chance to be promoted	☐	☐

15. In 2010 and 2015, how long would the common employees be fired if he/she has not finished the task? 【Single choice】

	Year 2010	Year 2015
Within six months	☐	☐
After six months	☐	☐
Rarely dismiss people	☐	☐

16. In 2010 and 2015, how long would the supervisors be fired if he/she couldn't pass his performance appraisal? 【Single choice】

	Year 2010	Year 2015
Within six months	☐	☐
After six months	☐	☐
Rarely dismiss people	☐	☐