



Contents lists available at ScienceDirect

Journal of Financial Economics

journal homepage: www.elsevier.com/locate/jfecCrowdsourced employer reviews and stock returns[☆]T. Clifton Green^{a,*}, Ruoyan Huang^b, Quan Wen^c, Dexin Zhou^d^a Goizueta Business School, Emory University, 1300 Clifton Rd, Atlanta, GA 30322, United States^b Moody's Analytics, 405 Howard St, San Francisco, CA 94105, United States^c McDonough School of Business, Georgetown University, 3700 O St., Washington DC 20057, United States^d Zicklin School of Business, Baruch College, 55 Lexington Ave, New York, NY 10010, United States

ARTICLE INFO

Article history:

Received 26 April 2018

Revised 27 June 2018

Accepted 19 July 2018

Available online xxx

JEL classification:

G14

Keywords:

Glassdoor

Employee satisfaction

Market efficiency

ABSTRACT

We find that firms experiencing improvements in crowdsourced employer ratings significantly outperform firms with declines. The return effect is concentrated among reviews from current employees, stronger among early firm reviews, and also stronger when the employee works in the headquarters state. Decomposing employer ratings, we find the return effect is related to changing employee assessments of *Career Opportunities* and views of senior management. It is unrelated to work-life balance. Employer rating changes are associated with growth in sales and profitability and help forecast one-quarter-ahead earnings announcement surprises. The evidence is consistent with employee reviews revealing fundamental information about the firm.

© 2019 Published by Elsevier B.V.

[☆] We are grateful to the editor, Bill Schwert, and an anonymous referee for their extremely helpful comments and suggestions. We thank Turan Bali, Zhi Da, Kent Daniel (discussant), Alex Edmans, Jillian Grennan (discussant), David Hirshleifer, Byoung-Hyoun Hwang, Russell Jame, Narasimhan Jegadeesh, Lin Peng (discussant), Mitchell Petersen, Michael Schill (discussant), Baolian Wang, Steven Xiao, Harold Zhang, Xiaofei Zhao, and seminar participants at the China International Conference in Finance (2018), SFS Cavalcade (2018), the University of Miami Behavioral Finance Conference (2017), the Cubist Systematic Strategies Quant Conference (2017), the NFA Conference (2018), Baruch College, Georgetown University, Peking University, Renmin University, Rensselaer Polytechnic Institute, University of International Business and Economics, University of Texas at Dallas, USI-Lugano, University of Zurich, and Stockholm Business School for comments and suggestions. We thank Glassdoor for providing the data and Andrew Chamberlain (Chief Economist) at Glassdoor for the details of the data. Huang worked as a visiting scholar at Glassdoor in the Summer of 2016. The analyses and conclusions of this paper are unaffected by Huang's current and prior employment relationships. The main analyses of this paper were conducted when Huang was on faculty at the School of Economics and Finance of the University of Hong Kong from August 2016 to May 2017 and she acknowledges the financial support from HKU. Zhou acknowledges the financial support from Bert W. Wasserman Department of Economics and Finance. Earlier versions of this paper were

1. Introduction

Firm economic conditions naturally influence employee satisfaction, as changes in firm performance influence compensation, employee benefits, and company morale. Employees also routinely observe nonpublic value-relevant information that may color their assessments of their employers. While trades by top executives have long been known to be informative (e.g., Seyhun, 1986; Cohen et al., 2012; Alldredge and Cicero, 2015), the extent to which rank and file employees possess valuable information is less clear. In this article, we consider employee crowds as sources of fundamental information about their employers, and we explore the relation between crowdsourced employer reviews and stock returns.

circulated under the title "Wisdom of the Employee Crowd: Employer Reviews and Stock Returns."

* Corresponding author.

E-mail addresses: clifton.green@emory.edu (T.C. Green), ruoyan.huang@moodys.com (R. Huang), quan.wen@georgetown.edu (Q. Wen), dexin.zhou@baruch.cuny.edu (D. Zhou).

<https://doi.org/10.1016/j.jfineco.2019.03.012>

0304-405X/© 2019 Published by Elsevier B.V.

Please cite this article as: T.C. Green, R. Huang and Q. Wen et al., Crowdsourced employer reviews and stock returns, Journal of Financial Economics, <https://doi.org/10.1016/j.jfineco.2019.03.012>

A growing literature highlights the value of harnessing the wisdom of crowds to reveal fundamental firm information.¹ Focusing on investor opinions, Chen et al. (2014) find evidence that investors' social media posts help predict stock returns, Jame et al. (2016) uncover incremental earnings information in crowdsourced earnings forecasts, and Kelley and Tetlock (2013) find that aggregating retail investor trades can predict returns and firm news. Other work exploits consumer opinions. Research in marketing and decision sciences documents that online reviews help forecast revenues (e.g., Duan et al., 2008; Zhu and Zhang, 2010), and recent work by Huang (2018) finds evidence that consumer product reviews on Amazon predict firm stock returns.

Employee-authored company reviews offer a potentially fertile setting for uncovering firm information. Employees have unique information about their employers, and employees are generally incentivized to provide honest evaluations due to the benefits associated with contributing to the public good (Lerner and Tirole, 2002). The employer rating setting is not a typical wisdom of the crowd environment since employees primarily evaluate their own satisfaction rather than attempt to predict stock returns. Our underlying premise is that employer ratings may be influenced by the current economic environment of the firm, and averaging across many employees can help mitigate the effects of idiosyncratic views.

In a highly efficient market, we would expect any information contained in employer reviews to be quickly incorporated into prices. On the other hand, attention is a scarce cognitive resource, and it is possible that limited attention and information processing costs may delay the process by which the information in employee reviews is incorporated into prices (e.g., Hong and Stein, 1999; Hou and Moskowitz, 2005; Peng and Xiong, 2006).

Anecdotal evidence suggests that changes in employee morale may signal value-relevant information to financial markets. As an example, consider employer ratings for AutoZone, a large retailer of automotive parts and accessories. AutoZone's overall employer rating rose by 0.8 stars (out of five) in the third quarter of 2013, with employees listing among the pros: "The Company has strong Sr. Management leadership. The board of directors and CEO and the CEO team know how to run the company to make money," and "There are numerous opportunities for employees to move up within the company." The increase in employer rating coincided with a 12% increase in quarterly sales growth and preceded a positive earnings surprise and 12.6% returns over the following quarter. We conjecture that employees' assessments may have been influenced by AutoZone's not-yet-public performance increase, which was later incorporated into the stock price after a delay.²

¹ The "wisdom of the crowd" refers to the notion that the collective opinion of a group of non-experts can be more accurate than a single expert. Surowiecki (2005) cites many examples and highlights the importance of opinion diversity and independence. We describe employer reviews as "crowdsourced" to convey the idea that reviews are voluntarily submitted online by a large number of employees.

² Yahoo! provides another example. Yahoo's overall employer rating fell by 0.8 stars in the last quarter of 2013, with employees listing among

We investigate whether the anecdotal evidence holds more systematically across firms by analyzing over one million employee-level company reviews for more than 1200 firms obtained from the employer review website Glassdoor. Reviews contain one-to-five star ratings for overall employer quality as well as ratings for several dimensions of employee satisfaction: *Career Opportunities*, *Compensation & Benefits*, *Work/Life Balance*, *Senior Management*, and *Culture & Values*. Employees are also able to enter free text responses in *Pros and Cons* sections of the review. For each review, we also obtain information on the reviewers' geographic location and job status (current or former employee).

Our analysis uncovers a statistically and economically significant relation between changes in employee satisfaction and stock returns. For example, value-weighted portfolios consisting of firms with the greatest quarterly improvements in employer ratings (top quintile) outperform firms with declines in employer ratings (bottom quintile) by 0.74% per month over the following quarter. Importantly, the relation between employer rating changes and firm performance is robust after controlling for the level of rating and *Fortune* magazine's 100 Best Companies to Work For, which suggests the information revealed by changing employee reviews is distinct from the intangible value inherent in satisfied employees (Edmans, 2011).

We conjecture that shifting firm fundamentals may influence certain aspects of employee satisfaction more than others. In particular, we hypothesize that changing economic conditions within the firm may affect employees' assessments of their career trajectory and the effectiveness of the management team more so than opinions about work-life balance or firm culture. Consistent with this view, the return differential associated with changes in employee satisfaction is most closely related to the ratings regarding *Career Opportunities* and *Senior Management*, modestly related to changes in *Compensation & Benefits* and *Culture & Values* ratings, and unrelated to employee judgments of their firms' *Work/Life Balance*.

We expand the analysis by exploring whether the information value of employer reviews varies with employee, review, and firm characteristics. Consistent with an information channel, we find that the return differential associated with changes in employer ratings is concentrated among the reviews of current rather than former employees. Employees' geographic location also plays a role. In particular, we find that the return predictability associated with changes in employer ratings is more pronounced when focusing on reviews conducted by employees in the headquarters state, consistent with geographically close employees having more timely access to value-relevant information (Coval and Moskowitz, 2001; Malloy, 2005).

Lengthier reviews require more cognitive effort on the part of employees, and we conjecture that longer reviews may be more revealing than shorter reviews. We partition

the cons: "Cumbersome, ineffective quarterly performance reviews," and "Bad management from the top managers and few good tools to work with." The decline in employer rating coincided with a 6% drop in quarterly sales growth and preceded a negative earnings surprise and -10.7% returns over the following quarter.

the review sample by review length and find that changes in the ratings of lengthier reviews are more predictive of returns than shorter reviews. We also examine the effects of review timeliness on its information value. In product market settings, early reviews tend to be rated as more helpful (e.g., Liu et al., 2008). Early reviewers may also be less influenced by the prevailing consensus, which could lead them to be more informative through less herding (Da and Huang, 2018). We find evidence that the relation between ratings changes and future returns is stronger in the first three years of a firm being added to Glassdoor, consistent with early reviews being more informative. Ratings changes also better predict returns among firms with high idiosyncratic volatility and low institutional ownership, consistent with employee reviews being more informative for firms with low informational efficiency and higher limits to arbitrage.

If fundamental information is embedded in employee reviews, then employer ratings should also predict operating performance and earnings surprises. We find supporting evidence in the data. Quarterly changes in employer ratings are significantly related to contemporaneous (but not yet public) changes in profitability growth as measured by seasonal changes in return on assets. Moreover, employer rating changes also predict subsequent earnings surprises when profits are announced in the following quarter, using proxies for surprise based on analyst consensus forecast errors and three-day abnormal announcement returns. The operating performance evidence provides confirmation to the interpretation that changes in employee satisfaction are influenced by fundamental changes at the firm, with markets being slow to incorporate this information.

Our analysis contributes to several streams of research. First, our findings contribute to the literature on the productive role of labor in explaining firm performance. Edmans (2011) interprets measures of employee satisfaction as reflecting firms' intangible assets, and the focus is on uncovering the causal effects of employee satisfaction on performance. Other work on the causal effects of company culture include Grennan (2014), Huang et al. (2015), Ji et al. (2017) and Edmans et al. (2017). In contrast, our study emphasizes the effects of firm performance on employee satisfaction through improved morale, and we focus on short horizons during which employees observe performance information that is not yet public. We argue that changes in employer ratings reflect underlying shifts in tangible firm fundamentals, and our findings are robust after including controls for the level of employee satisfaction and *Fortune* magazine's 100 Best Companies to Work For. Subsequent to our study, Sheng (2018) confirms that Glassdoor employer reviews are associated with stock returns over a shorter sample period from 2012 to 2016 and finds evidence consistent with hedge funds trading on employer reviews.

Our work also adds to a growing literature that studies information aggregation and the wisdom of the crowd. Existing research indicates that aggregating views of the online investor community yields useful investment recommendations (Chen et al., 2014) and incremental improvements in earnings forecasts (Jame et al., 2016). In other work, Huang (2018) finds that customer prod-

uct reviews help predict firm returns. We find that the opinions of other important stakeholders in corporations, firm employees, also carry value-relevant information. While their experiences may be noisy individually, aggregating changes in satisfaction across employees reveals information about firm fundamentals.

Existing research on insider information generally focuses on trades executed by top firm executives, board members, or large blockholders (e.g., Seyhun, 1986; Ravina and Sapienza, 2009; Cohen et al., 2012; Alldredge and Cicero, 2015). Our understanding of the extent to which rank and file employees possess valuable information is less well developed. Huddart and Lang (2003) examine option exercises by non-executive employees at seven firms, and Babenko and Sen (2016) study employee purchases reported in annual 10Ks for firms with stock purchase plans. Our setting is novel in that we explore the information contained in employee reviews, and we find evidence that informativeness varies with job status, employee location, and characteristics of the review.

The evidence of return predictability is consistent with markets incorporating the information contained in employer ratings after a delay. Our findings therefore contribute to a growing literature that studies investors' limited attention and resulting market inefficiencies in a variety of contexts, including delayed response to information releases (Huberman and Regev, 2001; DellaVigna and Pollet, 2009; Hirshleifer et al., 2009) and firm characteristics and performance (e.g., Hong et al., 2000; Hirshleifer et al., 2004; Hou, 2007; Edmans, 2011; Hirshleifer et al., 2013).

The remainder of the paper is organized as follows. Section 2 describes the employer review sample, presents descriptive statistics, and characterizes determinants of employer ratings and changes in ratings. Section 3 explores the relation between changes in employer ratings and stock returns. Section 4 presents subsample evidence by partitioning the sample along employee, firm, and review characteristics. Section 5 explores the relation between changes in employer ratings and operating performance and earnings surprises, and Section 6 concludes.

2. Employer review sample

2.1. Glassdoor employer review data

Glassdoor is an employer review and recruiting website that launched in 2008. It hosts a database in which current and former employees voluntarily and anonymously review their companies, salaries, interview experience, senior management, and corporate benefits. Contributors may derive utility from sharing information, as they do when posting reviews to Amazon, contributing entries to Wikipedia, etc. Glassdoor also encourages new users to submit an employer review before accessing parts of the website. To help prevent company self-promotion, Glassdoor requires email verification from an active email address or a valid social networking account. The site administrator also moderates content through a two-step process, using an algorithm to detect fraud and following up with a human team to eliminate invalid reviews.

Glassdoor employer reviews contain employees' one-to-five star overall rating of the firm (*Rating*), as well as optional star ratings for *Career Opportunities*, *Compensation & Benefits*, *Work/Life Balance*, *Senior Management*, and *Culture & Values*. In addition to the star ratings, employees are also able to enter separate textual responses for *Pros* ("Share some of the best reasons to work at ...") and *Cons* ("Share some of the downsides of working at ...").³ Glassdoor's guidelines stipulate that reviews should be about the company and cannot target any identified individuals. Beginning in September of 2012, Glassdoor added a voluntary *Business Outlook* question ("Do you believe your company's business outlook will get better, stay the same or get worse in the next six months?"). We create a *Business Outlook* score that is equal to 5 for "better," 3 for "the same," and 1 for "worse." For each employee review, we are able to discern employee status (current or previous employee) and employee work location using data obtained from Glassdoor.

2.2. Employer reviews summary statistics

We merge Glassdoor ratings and reviews with the Center for Research in Securities Prices (CRSP) and Compustat databases to obtain stock return and accounting information. In particular, we retrieve Glassdoor identifiers together with company names to hand-match to PERMNO identifiers in CRSP. We also use information on company headquarters location and Chief Executive Officer (CEO) name to validate the match. Panel A of Table 1 reports review-level summary statistics for the June 2008 through June 2016 sample period. The Glassdoor sample is comprised of over one million reviews for 3906 firms, which accounts for 65% of firms in the CRSP-Compustat database and covers 81% of the total market capitalization of the CRSP-Compustat universe. There are slightly less than a million observations for the employer rating subcategories since these reviews are not mandatory.⁴

The mean overall *Rating* is 3.20 stars, and the subcategory means vary from 3.21 for *Compensation & Benefits* to 2.79 for *Senior Management*. The mode for each rating category is 3.0, with the exception of 1.0 for *Senior Management* (consistent with its lower mean), which generally helps mitigate concerns that only highly satisfied and unsatisfied employees feel compelled to write employer reviews. Panel B of Table 1 reports correlations across rating categories. We observe that the overall employer *Rating* is most correlated with *Culture & Values* (0.77) and least correlated with *Compensation & Benefits* (0.59). Perhaps unsurprisingly, *Work/Life Balance* and *Compensation & Benefits* show the lowest correlation with each other at 0.42. *Business Outlook* has a mean of 3.35 and correlates

³ We measure text-based employer ratings as the difference between the number of words in the *Pros* and *Cons* sections of employee reviews, scaled by the total number of words in both sections. More details are provided in Section IA.1 in the Internet Appendix.

⁴ Roughly 90% of respondents submit star ratings for the subcategories. The *Culture & Values* subcategory began in May of 2012 and has a similar response rate afterwards.

most highly with the overall *Rating* (0.62) and *Senior Management* (0.59).

In Table IA.1 in the Internet Appendix, we tabulate the industry distribution of sample firms using the Fama-French 30-industry classification. At the firm level, the top three most heavily represented industries are Personal and Business Services (15.1% of sample firms), Business Equipment (14.8%), and Healthcare, Medical Equipment, and Pharmaceutical Products (10.8%). At the opposite end of the spectrum, the three industries with the fewest represented firms are Coal (two firms), Tobacco Products (three firms), and Precious Metals and Non-Metallic and Industrial Metal Mining (seven firms). Firms in the Retail industry account for the largest fraction of reviews (36.2% of all reviews) and 6.5% of sample firms.

Our primary measure of employee satisfaction is the average employer rating obtained from reviews in a given calendar quarter. Consistent with the "wisdom of the crowds" idea (Surowiecki, 2005), we require a minimum of 15 reviews in each quarter to help average out idiosyncratic views.⁵ Our main variable of interest, $\Delta Rating$, is constructed as the quarterly change in overall employer star rating, and we construct similar rating change measures for each of the five individual employer rating subcategories described above.

Panel C of Table 1 reports firm-level summary statistics. The mean change in employee rating ($\Delta Rating$) is approximately 0.01 with a standard deviation of 0.45. The first quartile of $\Delta Rating$ is -0.22 , implying declines in employee satisfaction, whereas the third quartile of 0.24 denotes improvements in satisfaction. To construct the other firm-level variables, we merge CRSP and Compustat to construct a panel of firm-quarter observations of stock returns and accounting information. We further obtain information on analyst coverage and earnings forecasts from the Institutional Broker's Estimate System (IBES) data set, and we extract institutional holdings from the 13-F filings recorded in Thomson Reuters institutional holding database. The average reviewed employer has a market capitalization of \$23.8 billion, indicating that the sample is tilted towards larger firms. Reviewed firms have an average book-to-market ratio of 0.56 and a return-on-assets equal to 5%. They are covered by 18.5 analysts on average and have 75% institutional ownership. Lastly, their average 12-month return momentum is equal to 11%. Detailed definitions for firm-level characteristics are reported in Appendix Table A.1.

2.3. Determinants of employer ratings

Table 2 explores determinants of employee ratings by regressing *Rating* and $\Delta Rating$ on firm characteristics such as market capitalization, book-to-market ratio, return-on-assets, analyst forecast dispersion, turnover ratio, Amihud illiquidity, idiosyncratic volatility, institutional ownership, past stock returns, analyst recommendation changes, and insider trading. We control for time fixed effects in the

⁵ We later vary the review threshold in Internet Appendix Table IA.3 and our results remain robust.

Table 1

Employer reviews summary statistics.

This table reports summary statistics for the sample of employer reviews from Glassdoor. Panel A reports the distribution and number of observations in each review category, on a scale of one to five with five being the top rating. Panel B reports the correlations among the ratings. The top half of Panel B presents Pearson correlation coefficients, and the bottom half of the panel reports Spearman correlation coefficients. All correlation coefficients are significantly different from zero at the 1% level. In Panel C, the review sample is merged with stock information from CRSP, financial statement information from Compustat, and analyst forecast data from IBES. The review sample covers June 2008 to 2016 and the merged sample contains 16,602 firm-quarter level observations for 1238 unique firms. Panel C reports the mean, median, standard deviation, and the 1st and 3rd quartiles for each of the firm characteristics. $\Delta Rating$ is defined as the average employer rating in quarter t minus the average employer rating in quarter $t - 1$, with a minimum of 15 ratings required in each quarter. Firm characteristics are defined in the Appendix.

Panel A: Employee reviews							
	# of Reviews	Mean	Std. dev.	Q1	Median	Q3	
Employer Rating	1023,217	3.20	1.24	2.00	3.00	4.00	
Career Opportunities	927,140	3.02	1.28	2.00	3.00	4.00	
Compensation & Benefits	927,067	3.21	1.21	2.00	3.00	4.00	
Senior Management	916,898	2.79	1.35	2.00	3.00	4.00	
Work/Life Balance	927,411	3.18	1.31	2.00	3.00	4.00	
Culture & Values	799,834	3.18	1.40	2.00	3.00	4.00	
Business Outlook	725,335	3.35	1.60	3.00	3.00	5.00	
Panel B: Correlation among component ratings							
	Emp. Rating	Career Opp.	Comp. & Benefits	Senior Mgmt.	Work/Life Balance	Cult. & Values	Bus. Outlook
Employer Rating		0.73	0.59	0.76	0.61	0.77	0.62
Career Opportunities	0.72		0.56	0.65	0.47	0.64	0.55
Comp. & Benefits	0.58	0.55		0.49	0.43	0.50	0.41
Senior Management	0.76	0.65	0.49		0.57	0.74	0.58
Work/Life Balance	0.60	0.46	0.42	0.57		0.58	0.40
Culture & Values	0.76	0.64	0.50	0.74	0.58		0.56
Business Outlook	0.62	0.55	0.41	0.59	0.40	0.56	
Panel C: Firm summary statistics							
	Mean	Std. dev.	Q1	Median	Q3		
$\Delta Rating$	0.01	0.45	-0.22	0.01	0.24		
Book-to-market	0.56	1.07	0.22	0.37	0.62		
Size	23,794.80	49,460.02	1945.32	6791.78	21,052.38		
Return on assets	0.05	0.06	0.09	0.02	0.09		
Forecast dispersion	0.03	0.65	0.00	0.00	0.01		
Number of estimates	18.52	9.19	12.00	19.00	25.00		
Turnover	2.30	2.00	1.18	1.77	2.81		
Illiquidity	0.62	14.93	0.00	0.00	0.00		
Idiosyncratic volatility	1.45	1.36	0.79	1.11	1.67		
Institutional ownership	0.75	0.22	0.65	0.77	0.87		
$Return_{t-12:t-2}$	0.11	0.37	-0.06	0.13	0.30		

first specification and include time and firm fixed effects in the second specification.

In the cross-section of firms, employer rating is significantly positively related to size, turnover, and returns over the previous six months, and negatively related to book-to-market, institutional ownership, and insider trading. Including firm fixed effects raises the adjusted R^2 to 65% and a smaller subset of the characteristics remain statistically significant. On the other hand, changes in employer ratings are more difficult to explain with lagged firm characteristics. None of the stock/firm characteristics are able to reliably predict changes in ratings in both specifications, and rating changes are also not significantly explained by analyst recommendation changes or insider trading. The evidence suggests that changes in employer ratings are largely independent of stock and firm characteristics. The information captured by employer rating changes also appears distinct from the information

provided by financial professionals or other firm insiders such as senior management, directors, or blockholders. Lastly, including firm fixed effects produces an adjusted R^2 of only 7.4%, consistent with ratings changes being much less persistent than rating levels.

As a validity check, in Table IA.2 in the Internet Appendix we compare Glassdoor Employer Ratings with two existing measures of employer satisfaction: KLD's (now MSCI ESG KLD) Employee Relations Score, and whether the firm is designated by *Fortune* magazine as one of the 100 Best Companies to Work For. In particular, for the subset of Glassdoor firms that are rated by KLD (during the 2008–2013 sample period), we regress *Rating* on the contemporaneous KLD Employee Relation score (number of Employee Relations Strengths – number of Employee Relations Concerns). We find a significant coefficient on *KLD Score* (at the 1% level), indicating that higher crowdsourced employer ratings are associated with better employee

Table 2

Determinants of employer ratings and changes in ratings.

The table reports the coefficients from panel regressions with employer *Rating* and $\Delta Rating$ as the dependent variable and firm characteristics as the independent variables. $\Delta Rating$ is defined as the average employer rating in quarter t minus the average employer rating in quarter $t-1$, with a minimum of 15 ratings required in each quarter. Firm characteristics are defined in the Appendix. The sample covers the period from June 2008 to June 2016 and consists of 16,273 firm-quarter level observations for 1238 unique firms. The t -statistics given in parentheses are calculated using robust standard errors clustered by quarter. One, two, and three stars indicate significance at the 10%, 5%, and 1% levels, respectively.

	Rating		$\Delta Rating$	
	(1)	(2)	(3)	(4)
Book-to-market	-0.108** (-2.26)	0.002 (0.03)	-0.050 (-0.51)	-0.030 (-0.13)
Size	0.144*** (18.90)	0.040*** (3.23)	-0.016 (-1.28)	-0.008 (-0.46)
Return on assets	0.006 (0.98)	0.014** (2.23)	0.006 (0.34)	0.017 (0.98)
Forecast dispersion	-0.001 (-0.54)	-0.002** (-2.71)	0.010** (2.20)	0.001 (0.16)
Turnover	0.018*** (3.43)	-0.014* (-2.01)	-0.013 (-1.63)	-0.003 (-0.20)
Illiquidity	-0.012*** (-4.75)	-0.011*** (-3.51)	-0.005 (-1.30)	-0.023 (-1.50)
Idiosyncratic volatility	-0.003 (-0.30)	-0.002 (-0.44)	0.002 (0.14)	0.010 (0.47)
Institutional ownership	-0.027*** (-2.87)	-0.000 (-0.04)	-0.009 (-1.05)	-0.008 (-0.84)
Return _{t-1:t-3}	0.002 (0.44)	0.001 (0.43)	0.012 (1.20)	0.014 (1.39)
Return _{t-4:t-6}	0.014** (2.54)	0.009** (2.57)	0.009 (0.94)	0.010 (0.95)
$\Delta Recommendation$	0.004 (0.93)	-0.000 (-0.19)	-0.009 (-0.99)	-0.010 (-1.34)
Insider trading	-0.017*** (-3.65)	-0.000 (-0.04)	0.010 (0.71)	0.012 (1.07)
Fixed effects	Time	Time,Firm	Time	Time,Firm
Observations	16,273	16,073	16,273	16,073
R-squared	0.096	0.649	0.009	0.074

relations. We next examine whether the top 100 employer status is positively associated with the contemporaneous Glassdoor employer rating. We find that 100 Best Companies to Work For status is significantly related to *Rating*, and the coefficient remains significant after including firm fixed effects, consistent with variation in *Ratings* capturing some of the variation over time in employer status.

3. Employer reviews and firm stock returns

In this section, we investigate whether changes in employee satisfaction signal fundamental information about the firm. In particular, we conjecture that the information in ratings changes is incorporated into stock prices with a lag, which leads to stock return predictability. We examine changes in overall employer ratings as well as rating sub-categories, and we also consider a text-based satisfaction measure.

3.1. Portfolios sorted on changes in employer ratings

We first use portfolio sorts to examine the return performance of firms experiencing changes in their employer ratings. Specifically, at the end of each calendar quarter from September 2008 through June 2016, we sort sample stocks into three portfolios based on the quarterly change in ratings ($\Delta Rating$), measured as the average rating in

quarter t minus the average rating in quarter $t-1$. To reduce noise in the data, we require that a firm-quarter have at least 15 reviews to be included in the sample.⁶ We then track the performance of the three portfolios over the following quarter. Each stock remains in the portfolio for three months and then the portfolios are rebalanced.

We partition the groups based on the bottom quintile, the middle three quintiles, and the top quintile changes in ratings. Portfolio 1 is comprised of firms experiencing reductions in employee satisfaction with an average $\Delta Rating$ equal to -0.50 , which is more than one-standard-deviation below the mean change of ratings (see Table 2). The average $\Delta Rating$ for Portfolio 2 is zero, whereas Portfolio 3 consisting of firms experiencing improvements in employee satisfaction has an average $\Delta Rating$ equal to 0.53 . We report performance results for equal- and value-weighted portfolios, including raw portfolio returns as well as alphas from the Fama-French-Carhart (FFC) four-factor model.

Table 3 presents the results. Average portfolio returns increase monotonically from 0.83% to 1.66% from Low to High $\Delta Rating$ for the equal-weighted portfolios, indicating a monthly average return difference of 0.84% between high

⁶ In Table IA.3 in the Internet Appendix, we replicate Table 3 using 10- and 20-review thresholds and find similar evidence.

Table 3

Returns for stock portfolios sorted on changes in employer rating.

We form three portfolios at the end of each quarter from September 2008 to June 2016 by sorting stocks based on quarterly changes in employer ratings ($\Delta Rating$), defined as the average employee rating in quarter t minus the average rating in quarter $t - 1$. The breakpoints for partitioning the groups are based on the bottom 20%, the middle 60%, and the top 20% change in ratings. Low $\Delta Rating$ denotes the portfolio experiencing the lowest change in rating (reductions in employee satisfaction) and High $\Delta Rating$ denotes the highest (improvements in satisfaction). Each stock remains in the portfolio for three months. Portfolio results are reported using equal- and value-weighted portfolio weights. Panel A reports the average monthly raw return and the Fama–French–Carhart (FFC) four-factor alpha. Average returns and alphas are presented in monthly percentage terms. The last row reports the differences in monthly average returns and alphas. Panel B reports the average portfolio characteristics which are defined in the Appendix. Newey–West adjusted t -statistics are given in parentheses. *, **, and ***, indicate significance of the difference in returns and alphas at the 10%, 5%, and 1% levels, respectively.

Panel A: Future portfolio returns sorted by $\Delta Rating$

	Equal-weighted portfolios		Value-weighted portfolios	
	Average return	4-Factor alpha	Average return	4-Factor alpha
Low $\Delta Rating$	0.83 (1.28)	-0.24 (-1.15)	0.59 (1.03)	-0.38** (-2.02)
Middle group	1.06* (1.77)	0.01 (0.07)	0.89* (1.83)	0.02 (0.21)
High $\Delta Rating$	1.66** (2.50)	0.65*** (2.62)	1.33*** (2.62)	0.40* (1.81)
High - Low	0.84*** (2.67)	0.88*** (2.70)	0.74*** (3.03)	0.77*** (3.26)

Panel B: Average portfolio characteristics

	$\Delta Rating$	β^{MKT}	Size (log)	BM	MOM
Low $\Delta Rating$	-0.50	1.24	22.91	0.63	7.63
Middle group	0.00	1.21	23.52	0.66	11.08
High $\Delta Rating$	0.53	1.25	22.98	0.62	10.28

and low $\Delta Rating$ groups with a Newey–West t -statistic of 2.67.⁷ Controlling for the Fama–French–Carhart return factors produces negative point estimates of alpha for firms experiencing declines in their employer rating and positive and significant alpha estimates for firms with improving employer ratings. The alpha estimate for a long-short portfolio is 0.88% per month with a t -statistic of 2.70. Value-weighted portfolios yield similarly yet slightly smaller performance differences, with a 0.74% difference in returns and 0.77% long-short alpha, both of which are statistically different from zero at the 1% level. Moreover, the annualized Sharpe ratio of the long-short portfolio is 0.98, which is large relative to the Sharpe ratios for the Fama–French factors during the same period.⁸

As an initial robustness check, in Table IA.4 in the Internet Appendix we report the long-short portfolio alphas using both the Fama and French (1992) three-factor model and the Carhart (1997) and Pastor and Stambaugh (2003) five-factor model (Carhart four-factor plus the liquidity risk factor). We also consider the Fama and French (2015) five-factor model, which adds factors related to operating profitability and investments. This helps mitigate concerns that the results are driven by high $\Delta Rating$ firms being more profitable or having a less aggressive investment policy.

Moreover, in Panel C of Table IA.4, we use characteristic-based benchmarks as in Daniel et al.

⁷ Newey and West (1987) adjusted standard errors are computed using six lags.

⁸ The Sharpe ratios for the Fama–French factors during the same period are as follows: market factor (MKTRF: 0.70), size factor (SMB: 0.23), book-to-market factor (HML: -0.30), momentum factor (UMD: -0.19), investment factor (RMW: 0.30), and profitability factor (CMA: 0.31).

(1997) instead of factor models, and we also measure abnormal performance using industry-adjusted returns following Moskowitz and Grinblatt (1999) to address concerns that the results could be driven by industry effects. Monthly return spreads across all benchmarks range from 0.55% to 0.78%, and all estimates are statistically different from zero at the 5% level.

Panel B of Table 3 reports the average portfolio characteristics for the stocks in each rating change portfolio. Specifically, the table shows the cross-sectional averages of various characteristics of portfolios of stocks in the month prior to entering portfolio formation. We report values for the change in ratings ($\Delta Rating$), market beta (β^{MKT}), market capitalization (log size), book-to-market ratio, and the return over the 11 months prior to portfolio formation (MOM). The evidence in Panel B of Table 3 indicates that stocks in the extreme employer rating change portfolios do not differ significantly in market beta, size, or book-to-market. Stocks in the high $\Delta Rating$ portfolio in general have higher return momentum, but the abnormal return performance in Panel A is robust to controls for momentum.

The significant outperformance of firms experiencing improvements in employee satisfaction along with the underperformance of firms with reductions in satisfaction is consistent with changes in firm fundamentals being revealed through employer ratings. Edmans (2011) finds evidence of persistent long-term outperformance among *Fortune* magazine's "100 Best Companies to Work For," consistent with the market underestimating the intangible value associated with satisfied employees. Although our emphasis is on near-term fundamental information being revealed by changes in employee satisfaction, we investigate the relation between the level of Glassdoor's

crowdsourced employer ratings and stock returns as a point of comparison. Specifically, we replicate Table 3 using the ratings level rather than changes in the ratings, and we tabulate the results in Table IA.5 in the Internet Appendix. The return evidence is considerably weaker when sorting on the level of rating instead of changes in rating, with only the average return spread for the equal-weighted portfolios being marginally significant from zero (0.31%).

We also consider an alternative text-based measure of employee satisfaction. We conjecture that if employees have strong positive opinions of their employer, they are likely to submit lengthy discussions in the pros section and relatively few words in the cons section. On the other hand, if employees are more negatively inclined toward their employer, the cons discussion will likely be lengthier than the pros section. We therefore define the text-based employer rating ($Rating^{text}$) as the difference between the number of words in the *Pros* and *Cons* sections of employee reviews, scaled by the total number of words in both sections. We find that forming portfolios based on sorts of $\Delta Rating^{text}$ produce return differences that are similar but somewhat weaker than the evidence in Table 3. The findings are tabulated in Table IA.6 in the Internet Appendix and more details are provided in Section IA.1.

3.2. Employer ratings and stock returns: Fama–MacBeth approach

The portfolio sorting approach has the benefit of not specifying a functional form for the relation between employer rating changes and returns, yet it does not allow for firm-specific controls. As a robustness check, we also estimate a Fama and MacBeth (1973) regression which assumes a linear relation between ratings changes and returns but permits multiple firm controls and also allows us to control for the rating level. Specifically, each month we estimate cross-sectional regressions of monthly stock returns on lagged quarterly changes in employer ratings as follows:

$$R_{i,t+1} = \lambda_{0,t} + \lambda_{1,t} \Delta Rating_{i,t} + \lambda_{i,t} \mathbf{X}_{i,t} + \varepsilon_{i,t}, \quad (1)$$

where $R_{i,t+1}$ is the excess return on stock i in month $t+1$; $\Delta Rating_{i,t}$ is the most recent quarter-by-quarter change in ratings, and $\mathbf{X}_{i,t}$ is a vector of firm-level characteristics for firm i in month t . We include as controls Size, Book-to-market, $Return_{t-12,t-2}$, Illiquidity, $Return_{t-1}$, Idiosyncratic volatility, Forecast dispersion, $\Delta Recommendation$, and Insider trading.

The time-series averages for the slope coefficients ($\lambda_{i,t}$) and Newey–West adjusted t -statistics are presented in Table 4. To interpret the economic significance of the return effects, $\Delta Rating$ is z-scored (demeaned and divided by their standard deviation) within each month. When $\Delta Rating$ is included alone as a regressor, the time-series average of the cross-sectional coefficients on $\Delta Rating$ is 0.273% (with a Newey–West adjusted t -statistic of 2.52), which indicates that a one-standard-deviation increase in $\Delta Rating$ increases returns by 0.27%. Adding size, book-to-market, and momentum as controls results in an average $\Delta Rating$ coefficient of 0.236% (t -statistic 2.48), and including the full list of controls results in an average

$\Delta Rating$ coefficient of 0.254% (t -statistic 2.50). It is worth noting that the results remain robust after controlling for $\Delta Recommendation$ and *Insider trading*, indicating that rating changes capture information beyond the changing view of the analyst community or the information reflected in the trades of firm executives or blockholders.⁹

We also note that the time-series average of the coefficients on *Top 100* (an indicator variable for *Fortune's* 100 Best Companies to Work For) is statistically insignificant, indicating little evidence of outperformance among firms with high levels of employee satisfaction. Our 2008–2016 sample period is largely non-overlapping with the 1984–2009 period in Edmans (2011), and the weaker evidence of outperformance among firms with high levels of employee satisfaction is consistent with the post-publication reduction in anomaly returns documented by McLean and Pontiff (2016). For robustness, we also consider *Rating* as an alternative measure of the level of employee satisfaction and the coefficients on $\Delta Rating$ remain similar. For example, replacing *Top 100* with *Rating* in Specification 3 results in an average coefficient on $\Delta Rating$ of 0.269 (t -statistic = 2.46).¹⁰ The robust evidence of a relation between $\Delta Rating$ and returns is consistent with near-term fundamental information being revealed by changes in employee satisfaction.

If changes in employer ratings reflect shifts in firm fundamentals, we also may expect the relation with returns to be relatively short-term as markets learn the information known initially only inside the firm. We explore this conjecture and examine returns over longer horizons by repeating the Fama–MacBeth analysis using returns 4–6, 7–9, and 10–12 months after the ratings change. The coefficients vary from 0.029 to 0.099 and none of the estimates are statistically significant, which suggests that the performance differential is concentrated in the calendar quarter following the change in employer ratings.

The Fama–MacBeth findings confirm the strong relation between employer rating changes and future stock returns. One potential concern is that $\Delta Rating$ is partially predictable using firm characteristics (as weakly evidenced in Table 2), which may lead to concerns regarding what unique information is conveyed by $\Delta Rating$. In Table IA.7 in the Internet Appendix, we construct orthogonalized $\Delta Rating$ by running contemporaneous cross-sectional regressions of $\Delta Rating$ on the firm characteristics defined in Table 2, and we then repeat the analysis in Table 4 using the orthogonalized $\Delta Rating$ as the main independent

⁹ Previous month stock return and forecast dispersion are the only control variables with average coefficients that are significantly different than zero, which may be an artifact of our recent and relatively short sample period (2008–2016). The insignificant size effect is consistent with Gompers and Metrick (2001) and Schwert (2003), and the insignificant coefficient on momentum may reflect the momentum crash of 2009 (Daniel and Moskowitz, 2016).

¹⁰ We also examine the economic significance without standardizing the key variables. Untabulated results show that an increase in rating change by 1.0 (similar to the difference in $\Delta Rating$ between the bottom and top quintile portfolios analyzed above) increases returns by 0.67%. In contrast, variation in the level of ratings by 1.0 is associated with returns that are 0.108% higher in a univariate setting and the estimate is insignificant. In a univariate setting, regressing excess returns on Top 100 produces an average coefficient of 0.129 (t -stat = 1.10).

Table 4

Changes in employer ratings and stock returns: Fama–MacBeth regressions.

This table reports the average intercept and slope coefficients from the Fama and MacBeth (1973) cross-sectional regressions of monthly excess stock returns on lagged changes in employer ratings ($\Delta Rating$), defined as the average employer ratings in quarter t minus the average ratings in quarter $t-1$. Specifications 1–3 regress monthly excess returns on ratings changes from the most recent quarter end, whereas Specifications 4–6 consider ratings changes from the previous three quarters. The independent variables are defined in the Appendix and include Top 100, size, book-to-market, stock returns, the Amihud illiquidity measure, ROA, asset growth, idiosyncratic volatility, analyst forecast dispersion, analyst recommendation change, and insider trading. $\Delta Rating$ is z-scored (demeaned and divided by its standard deviation) within each month. Newey–West adjusted t -statistics are given in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The sample covers June 2008–June 2016.

	Returns _{t+1}			Returns _{t+2}	Returns _{t+3}	Returns _{t+4}
	(1)	(2)	(3)			
$\Delta Rating$	0.273*** (2.52)	0.236** (2.48)	0.254** (2.50)	0.099 (1.29)	0.096 (0.28)	0.029 (0.09)
Top 100		0.125 (1.07)	0.118 (0.39)	0.104 (0.56)	0.084 (0.40)	0.035 (0.16)
Size		−0.099 (−1.01)	−0.267 (−1.43)	−0.073 (−0.74)	0.169 (0.44)	−0.105 (−0.85)
Book-to-market		−0.206 (−0.94)	0.213 (0.33)	−0.218 (−1.13)	0.697 (0.57)	0.338 (0.62)
Return _{t−12:t−2}		−0.007 (−0.57)	0.004 (0.46)	−0.010 (−0.77)	0.010 (0.39)	−0.004 (−0.71)
Illiquidity			0.071 (1.30)	0.791 (1.01)	0.555* (2.04)	0.465 (1.10)
Return _{t−1}			−0.057 (−1.29)	−0.040** (−2.23)	−0.048** (−2.24)	−0.080* (−1.94)
ROA			0.634 (0.53)	0.470 (0.45)	0.220 (0.02)	0.688 (0.70)
Asset growth			−0.589 (−1.02)	−0.343 (−1.34)	−0.226 (−0.73)	−0.675 (−1.04)
Idiosyncratic volatility			−0.009 (−0.03)	−0.250 (−0.56)	0.170 (0.77)	−0.212 (−0.62)
Forecast dispersion			−0.466* (−1.91)	−1.003 (−1.27)	−0.030 (−0.13)	−0.042 (−0.12)
$\Delta Recommendation$			0.653 (0.46)	0.397 (0.91)	0.229 (1.36)	0.029 (0.33)
Insider trading			0.493 (0.78)	0.423 (0.35)	0.326 (0.10)	0.447 (0.56)
# of Time periods	93	93	93	93	93	93
Obs. per period	244	244	244	244	244	244
Adj. R-squared	0.01	0.03	0.07	0.07	0.06	0.06

variable. The coefficients on orthogonalized $\Delta Rating$ remain positive and significant in predicting future stock returns, with coefficients similar to those in Table 4 (e.g., the smallest coefficient is 0.209%).

3.3. Employer rating subcategories and stock returns

In addition to the overall one-to-five star employer rating, Glassdoor also encourages employees to rate individual aspects of the company: *Career Opportunities*, *Compensation & Benefits*, *Work/Life Balance*, *Senior Management*, and *Culture & Values*. As shown in Table 1, all of the rating subcomponents are positively correlated in the range of 0.61–0.77, indicating that they capture common information regarding employees' views of their firms. However, it is possible that shifts in firm fundamentals may affect employees' views along certain firm dimensions more than others. For example, we may expect changes in firm performance to color employees' perception of senior management and their own career prospects more so than their views regarding the firm's culture or work-life balance. In this section, we explore whether certain employer rating dimensions are more informative for future firm performance.

We sort stocks into portfolios each quarter by the amount of change they experience in the five employer rating dimensions. We use the top and bottom quintile breakpoints to form portfolios and rebalance quarterly as in Table 3. Table 5 presents the subcategory return evidence. To conserve space, we report the returns and four-factor alphas only for long-short portfolios that are long firms with high $\Delta Rating$ and short firms with low $\Delta Rating$, where rating in this case refers to the employer rating subcategories.

Among the five rating categories, changes in *Senior Management* ratings produce the strongest return differentials, with a long-short portfolio yielding 0.71% abnormal monthly returns when equal-weighted and 0.56% when value-weighted (although the latter is only statistically significant at the 10% level). Changes in *Career Opportunities* also significantly predict abnormal returns for both equal- and value-weighted portfolios, with alphas of 0.65% and 0.49%, respectively. The evidence that changes in *Compensation & Benefits* ratings and *Culture & Values* ratings predict abnormal performance is more modest and only statistically significant when the long-short portfolios are value-weighted. We find no evidence that changes in *Work/Life Balance* ratings predict stock returns, which suggests that changing firm conditions do not

Table 5

Portfolio returns and changes in employer ratings: rating subcategories.

This table reports returns for portfolios of stocks sorted by the changes in employer ratings associated with *Career Opportunities*, *Compensation & Benefits*, *Work/Life Balance*, *Culture & Values*, *Senior Management*, and *Business Outlook* (from the Glassdoor database). All measures are based on quarterly changes in employee ratings, defined as the average employer rating in quarter t minus the average ratings in quarter $t - 1$. Each stock remains in the portfolio for three months, and portfolios are either equal- or value-weighted. The breakpoints for partitioning the rating change groups are based on the top and bottom 20% ratings, with High (Low) denoting improvements (reductions) in employee satisfaction. The various panels report differences in performance between the high and low change portfolios, using returns and alphas with respect to the Fama–French–Carhart (FFC) model. Newey–West adjusted t -statistics are given in parentheses, with *, **, *** indicating significance at the 10%, 5%, and 1% levels, respectively.

	Equal-weighted portfolios		Value-weighted portfolios	
	Average return	4-Factor alpha	Average return	4-Factor alpha
<i>Panel A: Changes in Career Opportunities</i>				
High – Low Δ Rating	0.56** (2.10)	0.65** (2.18)	0.45** (2.09)	0.49** (2.62)
<i>Panel B: Changes in Compensation & Benefits</i>				
High – Low Δ Rating	0.22 (0.82)	0.20 (0.71)	0.44* (1.92)	0.46** (1.99)
<i>Panel C: Changes in Work/Life Balance</i>				
High – Low Δ Rating	0.11 (0.35)	0.09 (0.32)	0.12 (0.32)	0.05 (0.17)
<i>Panel D: Changes in Culture & Values</i>				
High – Low Δ Rating	0.08 (0.45)	0.09 (0.39)	0.56** (2.05)	0.64** (2.12)
<i>Panel E: Changes in Senior Management</i>				
High – Low Δ Rating	0.71*** (2.86)	0.71*** (2.95)	0.56* (1.82)	0.57** (2.02)
<i>Panel F: Changes in Business Outlook</i>				
High – Low Δ Rating	0.27* (1.99)	0.29** (2.44)	0.34** (2.14)	0.33** (2.08)

influence employees' assessments of their firm's treatment of career-lifestyle prioritization. On the other hand, the ability of changes in reviews of *Career Opportunities* and senior management to predict returns is consistent with these assessments being influenced by economic conditions within the firm that are unknown to the market.

In the latter half of the sample (beginning September 2012), employees are able to provide assessments of their firm's *Business Outlook* in the next six months using a three-point scale: better, the same, or worse. As with the employer ratings, we form portfolios based on quarterly changes in *Business Outlook* using the top and bottom quintiles. In Panel F of Table 5, we find that changes in *Business Outlook* are significantly related to abnormal returns for both equal- and value-weighted portfolios, although the economic significance is considerably lower than for the overall change in employer rating. For example, the equal-weighted long-short four-factor alpha is 0.65% for portfolios sorted on Δ Rating compared to 0.29% for Δ Outlook.

We explore whether employees' business outlook assessments hold information not contained in their overall employer ratings by regressing Δ Outlook on Δ Rating and vice versa. We then regress returns on Δ Outlook^{Orthogonal} and Δ Rating^{Orthogonal} using the Fama–MacBeth approach as in Table 4. The results are tabulated in Table IA.8 in the Internet Appendix. While returns are positively and marginally significantly related to Δ Outlook at the 10% level, there is no relation between returns and Δ Outlook^{Orthogonal}. In contrast, the coefficients are very similar in magnitude when regressing returns on Δ Rating or Δ Rating^{Orthogonal} and both estimates are statistically significant at the 5% level. The weaker relation between *Business Outlook* and returns is consistent with employees

forming business outlook assessments by combining inside information embedded in their employer ratings with other relevant information that is already reflected in stock prices.¹¹ Alternatively, it is possible employee satisfaction affects future performance in a causal way that is not incorporated into their outlook assessments (we consider the potential causal effect of employee satisfaction on returns in Section 4.4).

4. Employer review characteristics and stock returns

To help better understand the nature of the relation between employer ratings and stock returns, in this section we conduct various subsample analyses related to employee, firm, and review characteristics.

4.1. Employment status and location

Our overarching premise is that changes in firm fundamentals influence employees' perceptions of their firm, and therefore we can uncover relevant firm information by measuring changes in employer ratings. We expect that reviews submitted by current employees should be more informative than former employees since current employees are more likely to observe timely value-relevant information.

¹¹ Supporting this view, in Table IA.9 in the Internet Appendix we find evidence that next-quarter sales growth is better explained by the current level of *Business Outlook* than employer *Rating*, which is consistent with *Business Outlook* being better at predicting the level of growth than surprises in growth. Consistent with the return results described above, we find that future earnings surprises are better explained by Δ Rating than Δ Outlook (Panel B of Table IA.9).

Table 6

Employer ratings and returns: employee, review, and firm characteristics.

The table reports the return performance of portfolios sorted by changes in employer rating ($\Delta Rating$), conditioning on employee, review, and firm characteristics. $\Delta Rating$ is defined as the average employer rating in quarter t minus the average ratings in quarter $t-1$. Each stock remains in the portfolio for three months, and portfolios are either equal- or value-weighted. The breakpoints for partitioning the rating change groups are based on the top and bottom 20% ratings, with High (Low) denoting improvements (reductions) in employee satisfaction. The panels report differences in performance between the high and low change portfolios, using returns and alphas with respect to the Fama–French–Carhart (FFC) model. Newey–West adjusted t -statistics are given in parentheses, with *, **, *** indicating significance at the 10%, 5%, and 1% levels, respectively. Employee, review, and firm characteristics are described in the text in Section 4.

	Equal-weighted portfolios High – Low $\Delta Rating$		Value-weighted portfolios High – Low $\Delta Rating$	
	Avg. return	4-Factor alpha	Avg. return	4-Factor alpha
<i>Panel A: Employee characteristics</i>				
Employment status: Current	0.81*** (2.86)	0.88*** (2.91)	0.64*** (2.75)	0.52** (2.13)
Employment status: Former	0.13 (0.38)	0.28 (0.62)	–0.08 (–0.20)	–0.24 (–0.62)
Location: Headquarters state	0.96*** (2.90)	0.92*** (2.75)	0.75** (2.24)	0.56** (2.20)
Location: Not HQ state	0.75* (1.79)	0.85* (1.82)	–0.18 (–0.76)	–0.22 (–0.70)
<i>Panel B: Review characteristics</i>				
Review length: Short	0.23 (0.67)	0.19 (0.60)	0.14 (0.35)	0.07 (0.15)
Review length: Long	0.81** (2.34)	1.03*** (2.74)	0.41* (1.86)	0.39* (1.82)
Review age: Early	0.95** (2.24)	1.05*** (2.62)	0.88** (2.22)	0.97*** (2.60)
Review age: Late	0.76** (2.50)	0.64* (2.00)	0.55** (2.17)	0.55* (1.81)
<i>Panel C: Firm characteristics</i>				
Firm size: Small	1.27*** (2.62)	1.18** (2.31)	0.89** (2.54)	0.74** (2.29)
Firm size: Large	0.58** (2.29)	0.65*** (2.65)	0.53** (2.46)	0.56** (2.49)
Idiosyncratic volatility: Low	0.32 (1.15)	0.23 (0.88)	0.29 (1.08)	0.22 (0.62)
Idiosyncratic volatility: High	1.06*** (2.76)	1.11*** (2.81)	0.99** (2.50)	0.84*** (2.63)
Institutional ownership: Low	1.19*** (2.63)	1.02** (2.46)	1.12*** (2.81)	1.05*** (2.79)
Institutional ownership: High	0.68 (0.70)	0.51 (0.56)	0.22 (0.36)	0.29 (0.43)
Analyst coverage: Low	0.95** (2.56)	1.02** (2.64)	0.74** (2.28)	0.59* (1.99)
Analyst coverage: High	0.68** (2.07)	0.69* (1.85)	0.34 (0.89)	0.21 (0.60)

We calculate $\Delta Rating$ separately for current and former employees, requiring ten reviews in quarters t and $t-1$.¹² We then repeat the portfolio-level analysis in Table 3 for the two review samples. Panel A of Table 6 reports the abnormal returns for equal- and value-weighted long-short portfolios. The Fama–French–Carhart four-factor alpha for the long-short portfolio consisting of stocks sorted on change in rating among current employees is 0.88% per month and is statistically significant at the 1% level, whereas the analogous long-short alpha when using reviews from former employees is 0.28% per month and insignificant.

Employees' geographic location may also play a role in the informativeness of their reviews. Malloy (2005) finds

that geographically proximate brokerage analysts are more informed, Coval and Moskowitz (2001) find evidence that mutual fund managers outperform in their nearby holdings, and Bernile et al. (2015) find evidence that local investors' informational advantage is stronger when they are located near a firm's headquarters rather than their operating locations. In our setting, employees who work geographically close to the firm's headquarters may have more timely access to value-relevant information.

We use Compustat to identify firm headquarters, and we examine whether the "work location" submitted by employees is in the same state as the firm's headquarters. We then calculate $\Delta Rating$ separately for in-state and out-of-state reviews, requiring ten reviews in quarters t and $t-1$. Panel A of Table 6 reports the abnormal returns of the two long-short portfolios. The four-factor alpha of the equal-weighted long-short portfolio constructed from geographically close reviews is 0.92%, vs. 0.85% for out-of-state

¹² We require ten reviews (instead of 15 as in Table 3) to increase the number of stocks in the portfolios.

reviews. The differences for the value-weighted portfolios are more prominent, 0.56% vs. (a statistically insignificant) -0.22% . The employee status and location findings are consistent with the notion that more timely and central access to information about firms' fundamentals plays a role in the observed return predictability.¹³

4.2. Review informativeness and timeline

We next consider proxies for review informativeness. Lengthier reviews require more cognitive effort and have been shown in product market settings to be rated as more helpful (e.g., Korfiatis et al., 2012). We conjecture that longer reviews will be more indicative of firm conditions, and we partition the sample of ratings each quarter into two groups based on the median length of the *Pros and Cons* sections of the review. We then calculate $\Delta Rating$ separately for short reviews and long reviews, requiring ten reviews in quarters t and $t-1$. The portfolio evidence is reported in Panel B of Table 6 and supports the view that in-depth reviews are more informative. The four-factor alpha for the long-short $\Delta Rating$ portfolio is 1.03% per month when constructed from long reviews (and statistically significant at the 1% level) vs. 0.19% (and insignificant) for short review portfolios. The value-weighted portfolio evidence supports the same conclusions. The four-factor alpha is 0.39% (significant at the 10% level) when constructed from long reviews and an insignificant 0.07% when constructed from short-reviews.

Review informativeness may also vary with the timeliness of the review. Liu et al. (2008) find evidence that earlier product market reviews are rated as more helpful. We conjecture that early Glassdoor reviewers may be more thorough and revealing than later reviewers, akin to community-minded reviews from early adopters of new products, and we predict that changes in ratings constructed from reviews early in an employers' Glassdoor tenure will be more strongly associated with future stock returns. We consider reviews authored within the first three years following a firm's appearance on Glassdoor as early reviews, and we form portfolios separately for employer ratings changes based on early and late reviews (requiring ten reviews in quarters t and $t-1$).

The results are presented in Panel B of Table 6. The portfolio evidence is consistent with early reviews being more informative. The four-factor alpha for the long-short $\Delta Rating$ portfolios is 1.05% per month when constructed from early reviews (and significant at the 1% level) and 0.64% for later reviews (and the latter is only significant at the 10% level). The value-weighted portfolio evidence

¹³ We may expect that experienced or senior employees have better access to information, and one possibility would be to partition the sample of reviews based on job title. Unfortunately, job title is missing in 36% of the employer reviews in our sample, and the remaining reviews list more than 86,000 different job titles. The most common title is "sales associate," which represents 2.3% of the total reviews. Job titles that include the words "President," "Executive," "Chief," or "Director" account for 3.3% of the sample. Although it is difficult to split the sample into different groups based on seniority, the evidence suggests that the vast majority of the reviews come from rank and file employees rather than from senior management.

supports the same conclusions. The four-factor alpha is 0.97% (significant at the 1% level) when constructed from early reviews and 0.55% (significant at the 10% level) when constructed from later reviews. In sum, the evidence that the association between changes in employer ratings and future returns is stronger when constructed from earlier and lengthier reviews is consistent with employer reviews revealing fundamental information that is only gradually incorporated into prices.

4.3. Firm informational efficiency

If employee reviews are influenced by fundamental firm information that is not yet embedded into stock prices, we might expect employer ratings to be more informative among firms that are less informationally efficient. We explore this conjecture by partitioning the sample of reviews by firm characteristics. We use four commonly used proxies for informational efficiency including firm size, idiosyncratic volatility (Ang et al., 2006; Pontiff, 2006), institutional ownership, and analyst coverage (Hou and Moskowitz, 2005; Hirshleifer et al., 2009). We group reviews by each proxy, splitting the sample in two using the median value each quarter. We then calculate $\Delta Rating$ separately for each group, requiring ten reviews in quarters t and $t-1$. We then repeat the portfolio-level analysis in Table 3 for the two subsamples.

Panel C of Table 6 reports the abnormal returns for equal- and value-weighted long-short portfolios. The portfolio evidence is consistent with reviews being more informative among smaller stocks, stocks with high idiosyncratic volatility, low institutional ownership, and low analyst coverage. Overall, the evidence in Panel C suggests that changes in employee reviews are more likely to reveal information unknown to the market among firms that are less informationally efficient.

4.4. Labor intensity and changes to the workforce

The predictive relation between employer rating changes and firm stock returns is consistent with employee reviews revealing nonpublic information about firm performance that is incorporated into prices after a delay. Another possible interpretation, advocated by Edmans (2011) and Edmans et al. (2017), is that employee morale affects firm performance. Our broader, higher frequency sample allows us to study relatively short-horizon effects of changes in employee satisfaction, and the observed relation between rating changes and firm performance is robust after controlling the level of ratings. However, it is possible that the relation between rating changes and stock returns reflects changes in the productivity of employees. We explore the labor productivity channel by examining the employer rating return relation for firms sorted on labor intensity.

If the relation between employer rating changes and stock performance reflects underlying changes in employee productivity, we would expect a stronger relation among firms in which labor plays a particularly important role. For example, employee satisfaction may be more critical for productivity in service-oriented firms like healthcare

or retail companies than in utility or heavily automated manufacturing firms. Thus, a causal labor channel would predict a stronger employer rating return among health-care firms than utility firms.

We measure labor intensity following Agrawal and Matsa (2013) and John et al. (2015), sort firms into two groups based on the median level of labor intensity in the portfolio formation month, and repeat the return analysis as in Table 6. More details are provided in Section IA.2 in the Internet Appendix and the results are tabulated in Table IA.10. We find no evidence that the association between employer ratings changes and stock returns stronger among firms with greater labor intensity. In particular, the equal-weighted and value-weighted portfolio evidence is consistent with reviews being more informative among firms with low labor share. Overall, the labor intensity evidence is inconsistent with the interpretation that the relation between ratings changes and returns is primarily driven by a causal relation between employee satisfaction and firm performance.¹⁴

5. Employer ratings and firm performance

We find compelling evidence that changes in employer ratings predict stock returns. The findings support the view that markets are unaware that employee reviews are influenced by nonpublic information about their firm's performance. If information about firm performance is embedded in employee reviews, then employer ratings should predict operating performance and future earnings surprises, which we explore in this section.

5.1. Changes in employer ratings and operating performance

We conjecture that current firm economic conditions will influence employee satisfaction, and we explore the relation between contemporaneous (yet unobserved outside the firm) operating performance and employer ratings. We consider two measures of operating performance: sales growth and change in profitability. $SalesGrowth_t$ is defined as $\log(Sales_t) - \log(Sales_{t-4})$, and ΔROA_t is measured as net income over total assets in quarter t less the same ratio in quarter $t-4$. We measure differences from the same quarter a year ago to adjust for seasonality in profits. We then estimate a panel regression with $SalesGrowth_t$ or ΔROA_t as the dependent variable and change in employer ratings as the primary independent variable. Specifically, we use the following regression specification for changes in operating performance:

$$\begin{aligned} \Delta OperatingPerformance_{i,t} \\ = \lambda_0 + \lambda_1 \Delta Rating_{i,t} + \lambda_2 \mathbf{X}_{i,t} + \varepsilon_{i,t}, \end{aligned} \quad (2)$$

where the dependent variable is either $SalesGrowth$ or ΔROA and \mathbf{X} is a vector of control variables that includes firm size, book-to-market, past returns, illiquidity, share

turnover, return-on-assets, analyst forecast dispersion, idiosyncratic volatility, and institutional ownership. The operating performance results are presented in Table 7. The first column considers ΔROA as the measure of operating dependent variable. With the full set of control variables and time fixed effects, the coefficient on $\Delta Rating$ is 8.8 basis points (bps) and statistically significant at the 5% level. Adding firm fixed effects drops the coefficient on $\Delta Rating$ slightly to 8.7 bps and (significant at the 10% level).

We next examine whether $\Delta Rating$ captures information related to sales growth. If employer ratings reflect the morale of employees, a quarter with high sales growth may be more likely to coincide with favorable company reviews. Thus, we expect a positive association between $\Delta Rating$ and the sales growth. In the third column of Table 7, with the full set of control variables and time fixed effects, the coefficient on $\Delta Rating$ is 30.1 bps and statistically significant at the 1% level. Results are similar after adding firm fixed effects. Taken together, the evidence in Table 7 helps support the view that changes in employer ratings capture underlying shifts in firm operating performance that are later reflected in prices.

5.2. Changes in employer ratings and earnings surprises

The operating performance evidence presented above supports the interpretation that changes in employee satisfaction are influenced by fundamental changes at the firm. If the market is slow to incorporate this information, we would expect that changes in ratings should predict earnings surprises in the following quarter. We explore this hypothesis using two proxies for earnings surprises: analysts' forecast errors and earnings announcement returns.

Analyst forecasts are a common proxy for markets' earnings expectations, and consensus forecast errors have often been used to gauge whether return predictability is related to misreaction to fundamental information rather than risk (e.g., Hirshleifer et al., 2009; Engelberg et al., 2018). In our setting, we examine the relation between employer rating changes and future earnings surprises using a panel regression specification with forecast error (FE) as the dependent variable and change in employer ratings as the primary independent variable. Specifically, we use the following regression specification:

$$FE_{i,t+1} = \lambda_0 + \lambda_1 \Delta Rating_{i,t} + \lambda_2 \mathbf{X}_{i,t} + \varepsilon_{i,t}, \quad (3)$$

where $FE_{i,t+1}$ is the earnings forecast error measured as realized earnings minus the final analyst consensus forecast in IBES, scaled by the realized earnings (e.g., Diether et al., 2002; Da and Warachka, 2009). \mathbf{X} is a vector of control variables that includes firm size, book-to-market, past returns, illiquidity, share turnover, return-on-assets, analyst forecast dispersion, idiosyncratic volatility, and institutional ownership. Additionally, we also consider time fixed effects and firm fixed effects.

The forecast error regression results are reported in Table 7. In the fifth column, we include the full set of controls with time fixed effects, and in Column 6 we also add firm fixed effects. The coefficient of our variable of interest remains positive and significant, and the economic

¹⁴ We also consider whether the relation between employer rating changes and stock returns is sensitive to changes in the firm's workforce in Section IA.2 and Table IA.11 in the Internet Appendix. Our results remain robust.

Table 7

Change in employer ratings and firm operating performance and earnings surprises.

This table reports the results of regressing changes in performance and earnings surprises on employer ratings. Return-on-assets and sales growth are measured from quarter $t - 4$ to t . Analyst forecast errors is defined as the difference between the realized earnings in quarter $t + 1$ and the consensus analyst earnings forecast, scaled by the absolute value of the realized earnings. Announcement return is the three-day cumulative abnormal return surrounding the earnings announcement estimated based on the Fama–French three-factor model. The key independent variable is the change in employer rating ($\Delta Rating$), defined as the average employer rating in quarter t minus the average rating in quarter $t - 1$. Control variables are defined in the Appendix. Time-clustered t -statistics are reported in parentheses, with *, **, and *** indicating significance at the 10%, 5%, and 1% levels, respectively.

	Δ Return-on-assets		Sales growth		Analyst forecast errors		Announcement returns	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta Rating$	0.088** (2.44)	0.087* (2.02)	0.301*** (3.07)	0.308*** (3.29)	0.021** (2.42)	0.017** (2.33)	0.165** (2.11)	0.146* (1.97)
Size	-0.031 (-0.65)	-0.951*** (-3.46)	-0.188 (-0.91)	0.829 (1.43)	0.031** (2.27)	-0.062 (-0.97)	-0.013 (-0.12)	-1.363* (-1.92)
Book-to-Market	-0.062 (-1.61)	-0.345* (-1.85)	-2.156*** (-16.58)	-1.176*** (-5.27)	0.003 (0.11)	0.204** (2.29)	-0.103 (-1.27)	-0.128 (-0.49)
Return _{t-12:t-2}	0.397*** (4.22)	0.282*** (2.84)	2.263*** (7.25)	1.585*** (7.39)	0.039*** (2.95)	0.004 (0.23)	-0.153 (-1.16)	-0.672*** (-3.94)
Illiquidity	0.020* (2.03)	0.009 (0.57)	0.118 (1.70)	0.006 (0.09)	0.031 (0.12)	-1.005* (-1.96)	0.123*** (2.99)	0.008 (0.08)
Turnover	0.003 (0.07)	-0.124 (-1.59)	0.390*** (2.84)	-0.082 (-0.42)	-0.012 (-0.78)	0.043* (2.00)	0.183 (0.97)	0.395 (1.48)
ROA	-0.054* (-1.95)	-0.093** (-2.19)	-0.447*** (-4.07)	-0.088 (-1.29)	-0.011 (-1.37)	-0.070*** (-3.90)	0.007 (0.07)	-0.310 (-1.41)
Forecast disp.	-0.000 (-0.01)	-0.038 (-0.26)	-0.793*** (-3.20)	-0.811 (-0.93)	-0.656*** (-3.40)	-0.598*** (-3.38)	-0.114 (-0.91)	0.170 (0.91)
Idio. volatility	-0.058 (-0.72)	-0.132** (-2.63)	0.276 (1.18)	-0.865*** (-3.84)	-0.077** (-2.53)	-0.018 (-0.50)	-0.331* (-1.92)	0.095 (0.51)
Inst. ownership	0.009 (0.27)	-0.011 (-0.31)	0.295** (2.22)	-0.108 (-1.23)	0.009 (1.32)	-0.022 (-1.51)	0.086 (0.98)	0.012 (0.09)
Fixed effects	Time	Time, Firm	Time	Time, Firm	Time	Time, Firm	Time	Time, Firm
Observations	10,101	9,907	9,698	9,511	8,515	8,356	9,489	9,315
R-Squared	0.028	0.120	0.111	0.502	0.060	0.336	0.008	0.140

magnitude of the $\Delta Rating$ coefficient is 1.7bps.¹⁵ This evidence is consistent with analysts not fully anticipating positive earnings when the company has a recent increase in employee satisfaction.

Our second proxy for earnings surprises relies on cumulative abnormal stock returns (CAR) around the earnings announcement window in the following quarter. A number of prior studies use cumulative abnormal returns around earnings announcements to proxy for the surprise component of earnings news (e.g., Bernard and Thomas, 1990; La Porta, 1996; Cohen et al., 2013). Specifically, our dependent variable is CAR[-1,1], where returns are measured using a three-day window centered on the announcement date and adjusted using the Fama–French three-factor model. We use the same regression as in Eq. (3), replacing forecast error with CAR[-1,1], and we also consider the same set of control variables. The regression results with CAR as the dependent variable are reported in the last two columns of Table 7. The regression specifications are largely analogous to those in the forecast error analysis. We control for the full set of controls in Column 7 and we add firm fixed effects in Column 8. The economic magnitude and the statistical significance of the coefficients remain unchanged.

¹⁵ In untabulated univariate specifications, we find that the coefficient of $\Delta Rating$ is positive and significant at a 1% level. The economic magnitude indicates that a one-standard-deviation change in $\Delta Rating$ leads to a 3.9 basis point change in forecast error in the following quarter, which reflects a 25% increase relative to the mean forecast error.

We next investigate whether the predictability of $\Delta Rating$ for earnings surprises extends beyond one quarter. In Table IA.12 in the Internet Appendix, we use two-, three-, and four-quarter-ahead forecast errors and announcement returns as the dependent variables. The results in Table IA.12 of the Internet Appendix indicate that the coefficients on $\Delta Rating$ are statistically indistinguishable from zero. These results provide evidence that the information embedded in ratings changes is short-term, consistent with the short-term return predictability in our previous tables.

The evidence regarding employer ratings changes and subsequent earnings surprises in Table 7 suggests that market participants underreact to employee reviews when forming earnings expectations. Taken together, the evidence of a contemporaneous relation between rating changes and operating performance, as well as the ability of ratings changes to predict future earnings surprises, is consistent with the interpretation that changes in employee satisfaction are influenced by fundamental changes at the firm that markets are slow to incorporate.

6. Conclusions

In this article, we argue that changes in employee satisfaction signal underlying shifts in the economic fundamentals of their employers. We find strong supporting evidence, with quarterly changes in employer ratings predicting one-quarter-ahead stock returns. The return effect is concentrated among reviews from current employees,

and it is stronger among early firm reviews and when the employee works in the headquarters state.

Decomposing employer ratings, we find that the return effect is related to changing employee assessments of *Career Opportunities* and views of senior management, and it is unrelated to considerations of work-life balance. Changing employer reviews also predict contemporaneous changes in sales growth and profitability and help forecast one-quarter-ahead earnings surprises. The evidence is consistent with employee reviews revealing fundamental information about the firm that is incorporated into stock prices with a delay.

Our findings highlight the wisdom of the employee crowd and extend recent work that uncovers value-relevant information by aggregating the opinions of consumers and investors. The evidence of return predictability associated with employer rating changes is inconsistent with perfect market efficiency and instead points towards limited arbitrage, as well as the roles of costly information processing and investor inattention.

Appendix

Table A1

Table A.1
Variable definitions.

Variable	Description
Rating	The overall one-to-five star employer rating from the Glassdoor database, measured quarterly using the average of the reviews submitted that quarter. Similarly, we construct the following subcategory ratings: Career Opportunities, Compensation & Benefits, Work/Life Balance, Culture & Values, and Senior Management.
Δ Rating	The quarterly change in Rating, defined as the average employer rating in quarter t minus the average ratings in quarter $t-1$.
Top 100	An indicator variable for <i>Fortune</i> magazine's 100 Top Companies to Work For. Top 100 has a value of one if the firm is among the top 100 places to work in year t and zero otherwise.
Rating ^{text}	The difference between the number of words in the <i>Pros and Cons</i> sections of the employer review, scaled by the total number of words in both sections. The measure is constructed quarterly using the average of the reviews submitted that quarter.
β^{MKT}	The market beta estimated by regressing individual excess stock returns on the value-weighted market excess return using a 36-month rolling window.
Size	Market equity (in million USD) measured at the end of the previous fiscal year. We use the natural log of this quantity in our regression analysis.
Book-to-market	The book-to-market ratio measured at the end of the previous fiscal year. We use the natural log of this quantity in regression analyses.
Return _{$t-12:t-2$}	The cumulative returns from month $t-12$ to $t-2$, skipping month $t-1$.
Return _{$t-1:t-3$}	The cumulative returns from month $t-1$ to $t-3$ relative to the month of the dependent variable.
Forecast dispersion	Analyst forecast dispersion scaled by the absolute realized earnings in the month preceding the quarterly earnings date, following Diether et al. (2002).
Number of estimates	Number of analysts with an active earning forecast on a firm. We use the data from IBES summary file.
Turnover	Number of shares traded scaled by the shares outstanding.
Illiquidity	The Amihud (2002) illiquidity measure, calculated as the absolute price change scaled by the volume.
Idiosyncratic volatility	The standard deviation of the residual returns estimated using daily stock returns from the Fama-French three-factor model in the three-month period preceding the dependent variable.
Institutional ownership	The institutional holding numbers are extracted from Thomson Reuter Institutional Holding database. We calculate the institutional holding at the end of the quarter prior to the return month.
Asset growth	The quarterly growth rate of total assets, following Cooper et al. (2008).
Sales growth	The log of sales in quarter t minus the log of sales measured four quarters ago (to adjust for seasonality in profits).
Δ ROA	Return on assets in quarter t minus the return on assets measured four quarters ago (to adjust for seasonality in profits). Return on assets is defined as net income over total assets.
Forecast error	Earnings forecast error, measured as realized earnings minus the final analyst consensus forecast in IBES, scaled by the realized earnings.
Δ Recommendation	Change in the IBES mean analyst recommendation from month $t-1$ to month t . We invert the IBES consensus recommendation so that a numerical score of one represents the lowest rating and five represents the highest rating.
Insider Trading	Insider trading is the net trading by top executives, directors, and blockholders, scaled by total shares outstanding as in Massa et al. (2015). We obtain insider trading data from the Thomson Reuters database.
CAR	Earnings surprise, measured as the cumulative three-day $[-1, 1]$ abnormal return relative to the Fama-French three-factor model. Factor loadings are estimated in the period $[-180, -10]$ relative to the earnings announcement date.

References

- Agrawal, A., Matsa, D., 2013. Labor unemployment risk and corporate financing decisions. *J. Financ. Econ.* 108, 449–470.
- Allredge, D., Cicero, D., 2015. Attentive insider trading. *J. Financ. Econ.* 115, 84–101.
- Amihud, Y., 2002. Illiquidity and stock returns: cross-section and time-series effects. *J. Financ. Mark.* 5, 31–56.
- Ang, A., Hodrick, R.J., Xing, Y., Zhang, X., 2006. The cross-section of volatility and expected returns. *J. Financ.* 61, 259–299.
- Babenko, I., Sen, R., 2016. Do nonexecutive employees have valuable information? Evidence from employee stock purchase plans. *Manag. Sci.* 62, 1878–1898.
- Bernard, V., Thomas, J., 1990. Evidence that stock prices do not fully reflect the implications of current earnings for future earnings. *J. Account. Econ.* 13, 305–340.
- Bernile, G., Kumar, A., Sulaeman, J., 2015. Home away from home: geography of information and local investors. *Rev. Financ. Stud.* 28, 2009–2049.
- Carhart, M.M., 1997. On persistence in mutual fund performance. *J. Financ.* 52, 57–82.
- Chen, H., De, P., Hu, Y.J., Hwang, B., 2014. Wisdom of crowds: the value of stock opinions transmitted through social media. *Rev. Financ. Stud.* 27, 1367–1403.
- Cohen, L., Diether, K., Malloy, C., 2013. Misvaluing innovation. *Rev. Financ. Stud.* 26, 635–666.
- Cohen, L., Malloy, C., Pomorski, L., 2012. Decoding inside information. *J. Financ.* 67, 1009–1043.
- Cooper, M.J., Gulen, H., Schill, M., 2008. Asset growth and the cross-section of stock returns. *J. Financ.* 63, 1609–1651.

- Coval, J., Moskowitz, T., 2001. The geography of investment: informed trading and asset prices. *J. Polit. Econ.* 4, 811–841.
- Da, Z., Huang, X., 2018. Harnessing the wisdom of crowds. University of Notre Dame and Washington University at St Louis Unpublished working paper.
- Da, Z., Warachka, M., 2009. Cashflow risk, systematic earnings revisions, and the cross-section of stock returns. *J. Financ. Econ.* 94, 448–468.
- Daniel, K., Moskowitz, T.J., 2016. Momentum crashes. *J. Financ. Econ.* 122, 221–247.
- Daniel, K., Grinblatt, M., Titman, S., Wermers, R., 1997. Measuring mutual fund performance with characteristic-based benchmarks. *J. Financ.* 52, 1035–1058.
- DellaVigna, S., Pollet, J., 2009. Investor inattention and Friday earnings announcements. *J. Financ.* 64, 709–749.
- Diether, K., Malloy, C., Scherbina, A., 2002. Differences of opinion and the cross section of stock returns. *J. Financ.* 57, 2113–2141.
- Duan, W., Gu, B., Whinston, A., 2008. Do online reviews matter? An empirical investigation of panel data. *Dec. Support Syst.* 45, 1007–1016.
- Edmans, A., 2011. Does the stock market fully value intangibles? Employee satisfaction and equity prices. *J. Financ. Econ.* 101, 621–640.
- Edmans, A., Li, L., Zhang, C., 2017. Employee Satisfaction, Labor Market Flexibility, and Stock Returns Around the World. London Business School, London School of Economics, and University of Warwick Unpublished working paper.
- Engelberg, J., McLean, R.D., Pontiff, J., 2018. Anomalies and news. *J. Financ.* 73, 1971–2001.
- Fama, E.F., French, K.R., 1992. Cross-section of expected stock returns. *J. Financ.* 47, 427–465.
- Fama, E.F., French, K.R., 2015. A five-factor asset pricing model. *J. Financ. Econ.* 116, 1–22.
- Fama, E.F., MacBeth, J.D., 1973. Risk, Return, and Equilibrium: empirical Tests. *J. Polit. Econ.* 81, 607–636.
- Gompers, P., Metrick, A., 2001. Institutional investors and equity prices. *Q. J. Econ.* 116, 229–259.
- Grennan, J., 2014. A Corporate Culture Channel: How Increased Shareholder Governance Reduces Firm Value. Duke University Unpublished working paper.
- Hirshleifer, D., Hou, K., Teoh, S.H., Zhang, Y., 2004. Do investors overvalue firms with bloated balance sheets? *J. Account. Econ.* 38, 297–331.
- Hirshleifer, D., Hsu, P.-H., Li, D., 2013. Innovative efficiency and stock returns. *J. Financ. Econ.* 107, 632–654.
- Hirshleifer, D., Lim, S.S., Teoh, S.H., 2009. Driven to distraction: extraneous events and underreaction to earnings news. *J. Financ.* 64, 2289–2325.
- Hong, H., Lim, T., Stein, J., 2000. Bad news travels slowly: size, analyst coverage, and the profitability of momentum strategies. *J. Financ.* 55, 265–295.
- Hong, H., Stein, J., 1999. A unified theory of underreaction, momentum trading, and overreaction in asset markets. *J. Financ.* 54, 2143–2184.
- Hou, K., 2007. Industry information diffusion and the lead-lag effect in stock returns. *Rev. Financ. Stud.* 20, 1113–1138.
- Hou, K., Moskowitz, T., 2005. Market frictions, price delay, and the cross-section of expected returns. *Rev. Financ. Stud.* 18, 981–1020.
- Huang, J., 2018. The customer knows best: the investment value of consumer opinions. *J. Financ. Econ.* 128, 164–182.
- Huang, M., Li, P., Meschke, F., Guthrie, J., 2015. Family firms, employee satisfaction, and corporate performance. *J. Corp. Financ.* 34, 108–127.
- Huberman, G., Regev, T., 2001. Contagious speculation and a cure for cancer: a non-event that made stock prices soar. *J. Financ.* 56, 387–396.
- Huddart, S., Lang, M., 2003. Information distribution within firms: evidence from stock option exercises. *J. Account. Econ.* 34, 3–31.
- Jame, R., Johnston, R., Markov, S., Wolfe, M., 2016. The value of crowdsourced earnings forecasts. *J. Account. Res.* 54, 1077–1110.
- Ji, Y., Rozenbaum, O., Welch, K., 2017. Corporate Culture and Financial Reporting Risk: Looking Through the Glassdoor. Hong Kong Polytechnic University and George Washington University Unpublished working paper.
- John, K., Knyazeva, A., Knyazeva, A., 2015. Employee rights and acquisitions. *J. Financ. Econ.* 118, 49–69.
- Kelley, E., Tetlock, P., 2013. How wise are crowds? Insights from retail orders and stock returns. *J. Financ.* 68, 615–641.
- Korfiatis, N., García-Bariocanal, E., Sánchez-Alonso, S., 2012. Evaluating content quality and helpfulness of online product reviews: the interplay of review helpfulness vs. review content. *Electron. Commer. Res. Appl.* 11, 205–217.
- La Porta, R., 1996. Expectations and the cross-section of stock returns. *J. Financ.* 51, 1715–1742.
- Lerner, J., Tirole, J., 2002. Some simple economics of open source. *J. Ind. Econ.* 50, 197–234.
- Liu, Y., Huang, X., An, A., Yu, X., 2008. Modeling and predicting the helpfulness of online reviews. In: Proceedings of the Eighth IEEE International Conference on Data Mining, pp. 443–452.
- Malloy, C., 2005. The geography of equity analysis. *J. Financ.* 60, 719–755.
- Massa, M., Qian, W., Xu, W., Zhang, H., 2015. Competition of the informed: does the presence of short sellers affect insider selling? *J. Financ. Econ.* 118, 268–288.
- McLean, D., Pontiff, J., 2016. Does academic research destroy stock return predictability? *J. Financ.* 71, 5–32.
- Moskowitz, T.J., Grinblatt, M., 1999. Do industries explain momentum? *J. Financ.* 54, 1249–1290.
- Newey, W.K., West, K.D., 1987. A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica* 55, 703–708.
- Pastor, L., Stambaugh, R.F., 2003. Liquidity risk and expected stock returns. *J. Polit. Econ.* 111, 642–685.
- Peng, L., Xiong, W., 2006. Investor attention, overconfidence and category learning. *J. Financ. Econ.* 80, 563–602.
- Pontiff, J., 2006. Costly arbitrage and the myth of idiosyncratic risk. *J. Account. Econ.* 42, 35–52.
- Schwert, G.W., 2003. Anomalies and market efficiency. In: Constantinides, G., Harris, M., Stulz, R. (Eds.), *Handbook of the Economics of Finance*, 1B. Elsevier, Amsterdam, pp. 939–974.
- Seyhun, N., 1986. Insiders' profits, costs of trading, and market efficiency. *J. Financ. Econ.* 16, 189–212.
- Sheng, J., 2018. Asset Pricing in the Information Age: Employee Expectations and Stock Returns. University of British Columbia Unpublished working paper.
- Surowiecki, J., 2005. *The Wisdom of Crowds*. Anchor, New York Reprint edition.
- Ravina, E., Sapienza, P., 2009. What do independent directors know? Evidence from their trading. *Rev. Financ. Stud.* 23, 962–1003.
- Zhu, F., Zhang, X., 2010. Impact of online consumer reviews on sales: the moderating role of product and consumer characteristics. *J. Market.* 74, 133–148.