

# Crowd-Sourced Data: *Dealing with Selection Bias in Online Reviews*



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Chief Economist



# What is **crowd-sourced** data?

- Traditional surveys are **slow** and **expensive**.
- “Crowd-sourced” data comes from **online users**, often in very high volume (“**big data**”).

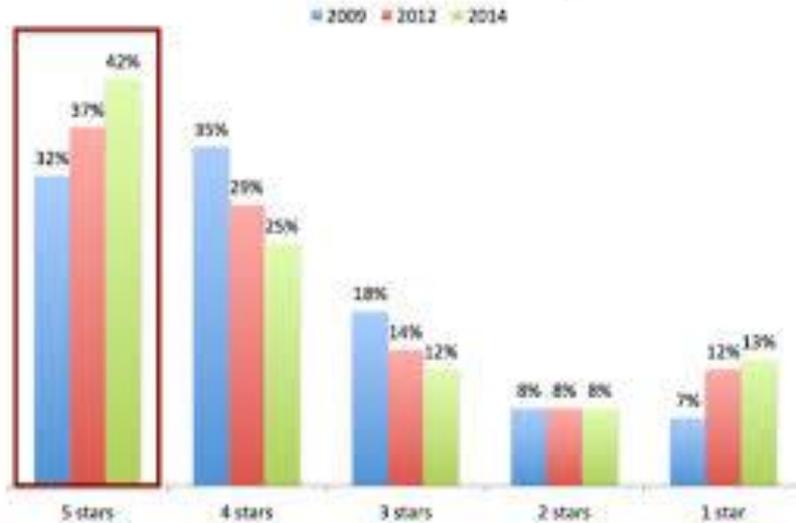


# Problems with online ratings

- Often suffer from “**polarization bias.**”
- “Too many” **very low** and **very high** reviews.
- Causes **bimodal** or “**J-shaped**” distribution in online ratings data.

# Examples of polarization bias

## Review distribution on Yelp



Source: <http://screenwerk.com/2014/11/19/reviewers-mostly-positive-67-on-yelp-either-4-or-5-stars/>

## Distribution of review star ratings on Amazon.com



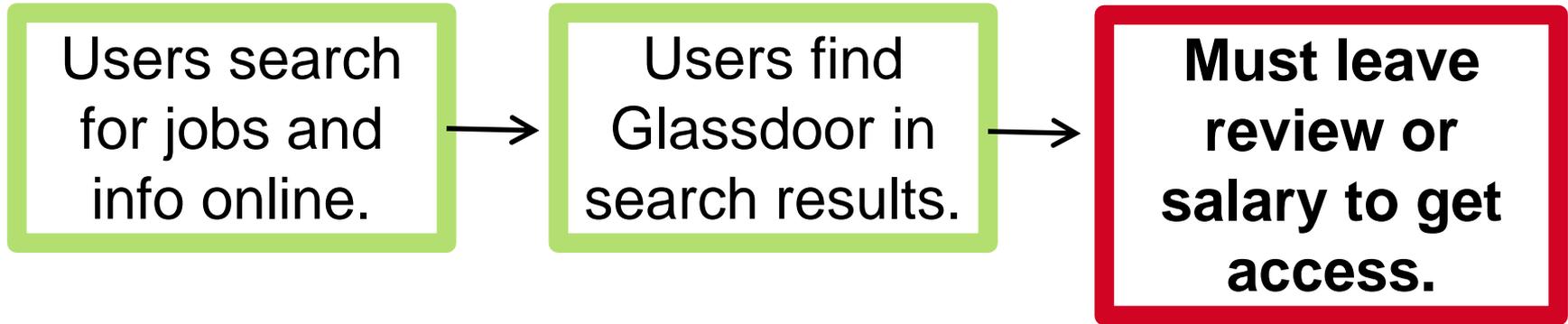
Data: 2011 to July 2014. Amazon.com Home & Kitchen section

Source: <http://www.which.co.uk/news/2015/10/the-truth-about-amazon-reviews-416606/>

# Dealing with bias in online data

- Many methods exist for fixing bias **after the fact**.
  - Cohen's weighted kappa (Verra et al. 2005)
  - Latent class agreement models (Uebersax 1992)
- But can we fix polarization bias **before it happens?**

# The **give to get** mechanism



**Goal:** Provide an **economic incentive** for to leave reviews even when users have **no strategic incentive** to do so.

# A simple model: Why polarization happens

- **We observe:** 
$$\underbrace{R}_{\text{Online rating}} = \underbrace{Q}_{\text{True quality}} + \underbrace{b}_{\text{User bias}} + \epsilon$$
- **Only observe ratings when:** 
$$\underbrace{U(|b|)}_{\text{Utility of bias}} \geq \underbrace{C}_{\text{Cost of review}}$$
- **Result:** Only observe **polarized** reviews where  $|b| > 0$ .

# A simple model: How “give to get” reduces bias

- **Policy:** Users must contribute to get value of website  $V$ .

- **Now observe ratings if:**  $U(|b| + \underbrace{V}_{\text{Value}}) \geq \underbrace{C}_{\text{Review cost}}$

- **Result:** Now possible to observe **unbiased** reviews from users with with  $|b| = 0$ , who just want access to  $V$  (**no strategic reason to have polarized views**).



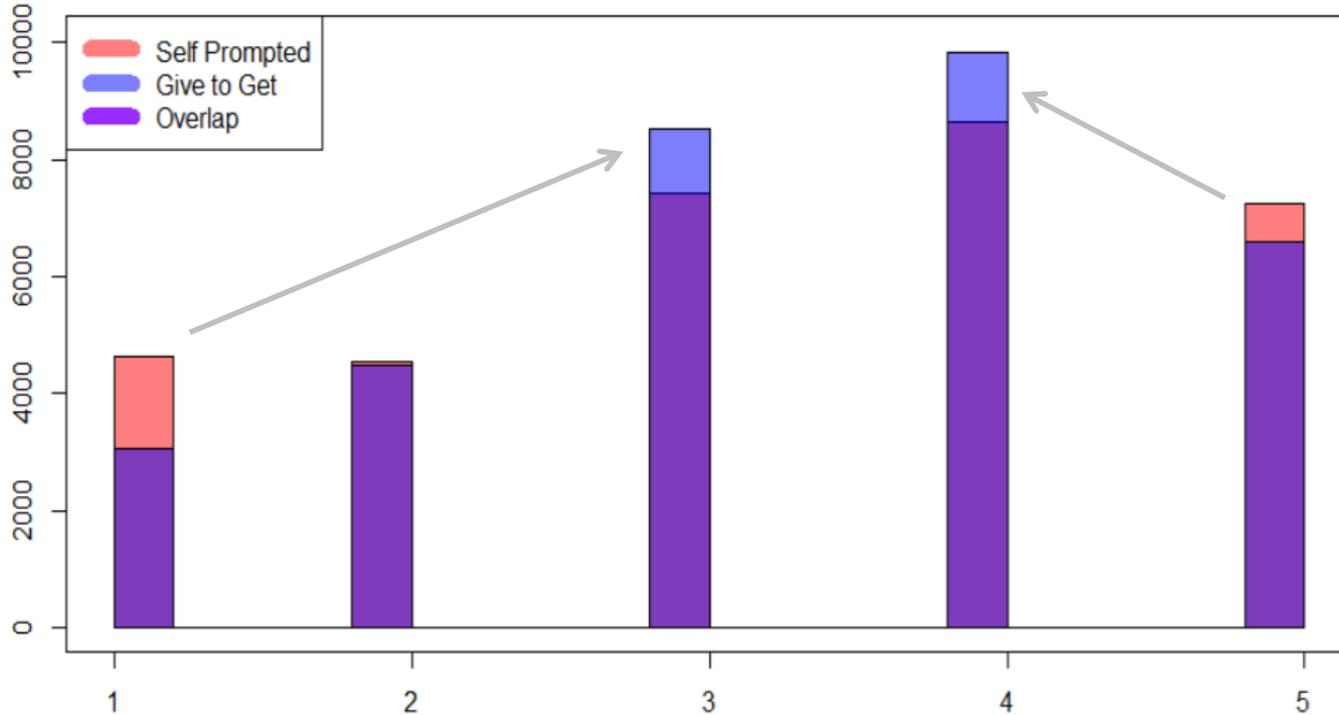
Does it actually **work**?

# Let's look at the data

- We compared reviews from users facing “give to get” vs. those who left unsolicited reviews.
- Sample = **207,000** Glassdoor reviews from 2013-2016.
- To ensure “similar” users in treated vs. control groups we **propensity score matched** users on observables.

# Results: Reduced Polarization

Overall Job Satisfaction Rating (Matched Data)



Mass of PDF  
is pushed  
**inward**  
under “give  
to get”

# Results: Reduced Polarization

Logit Regression Results (Matched Data)			
Overall Job Satisfaction	isGiveToGet Estimate	Std. Error	z value
1	-4.53E-01	2.46E-02	-114.53
2	-3.61E-02	2.24E-02	-1.613
3	1.98E-01	1.81E-02	10.95
4	1.42E-01	1.72E-02	8.289
5	-8.95E-02	1.90E-02	-4.701

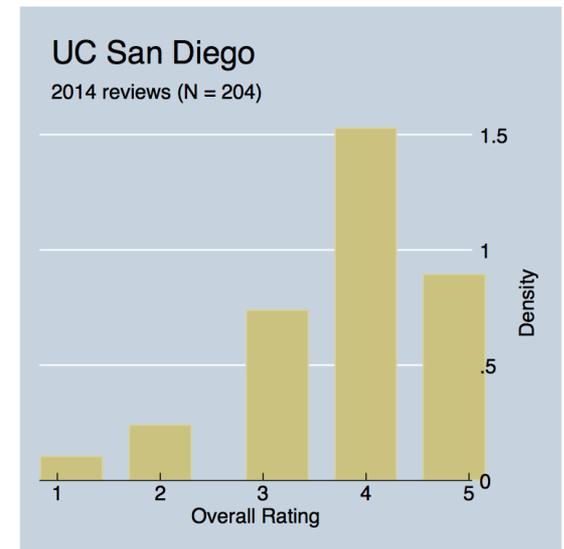
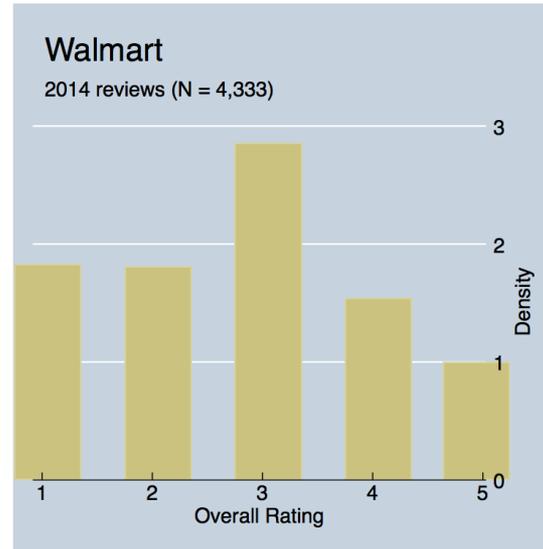
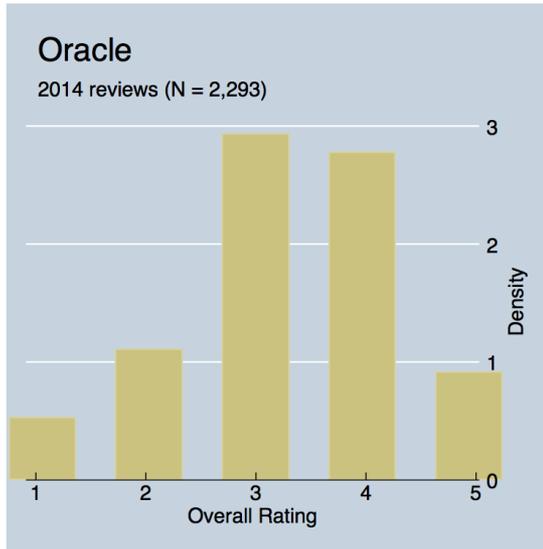
Fewer extreme reviews

# Results: Reduced Polarization

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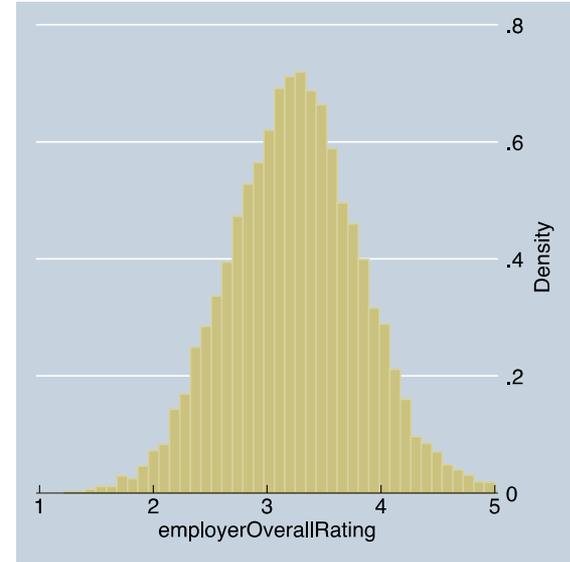
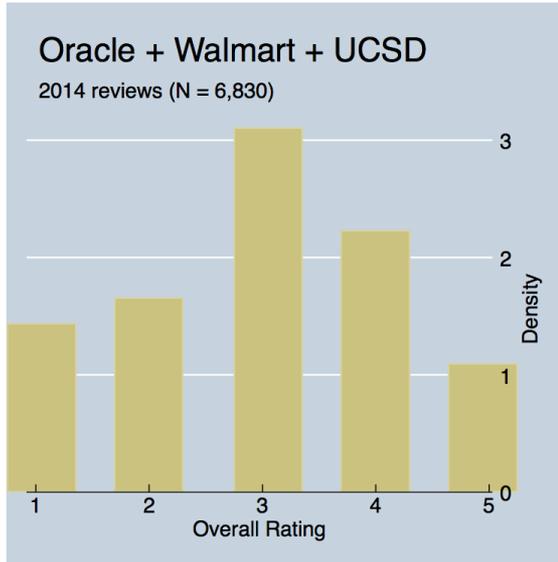
More moderate reviews

# What this looks like in practice



We observe **fewer** j-shaped distributions.

# Things look even better as $N \rightarrow \infty$

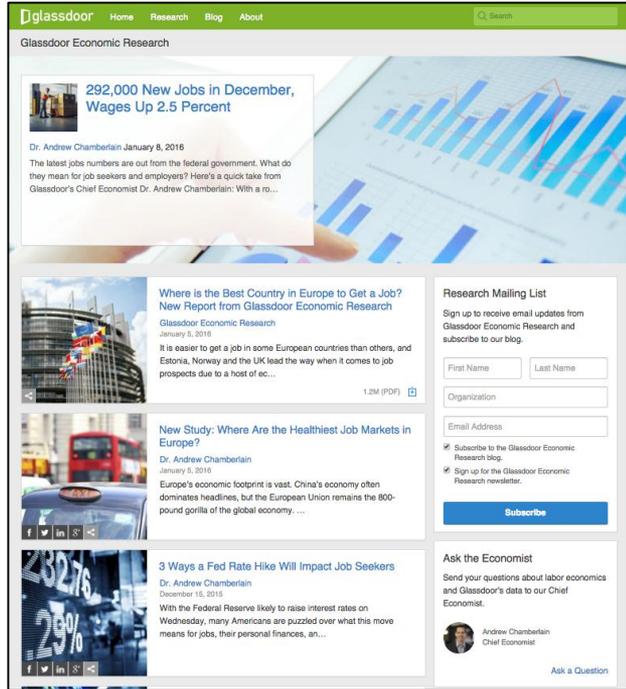


All Glassdoor employers



Can we do **research** with  
these data?

# Glassdoor Economic Research



The screenshot shows the Glassdoor Economic Research website. The top navigation bar includes 'Home', 'Research', 'Blog', and 'About'. A search bar is located in the top right corner. The main content area features several articles:

- 292,000 New Jobs in December, Wages Up 2.5 Percent**  
By Dr. Andrew Chamberlain, January 8, 2016  
The latest jobs numbers are out from the federal government. What do they mean for job seekers and employers? Here's a quick take from Glassdoor's Chief Economist Dr. Andrew Chamberlain. With a ro...
- Where is the Best Country in Europe to Get a Job? New Report from Glassdoor Economic Research**  
By Glassdoor Economic Research, January 5, 2016  
It is easier to get a job in some European countries than others, and Estonia, Norway and the UK lead the way when it comes to job prospects due to a host of ec...
- New Study: Where Are the Healthiest Job Markets in Europe?**  
By Dr. Andrew Chamberlain, January 5, 2016  
Europe's economic footprint is vast. China's economy often dominates headlines, but the European Union remains the 800-pound gorilla of the global economy. ...
- 3 Ways a Fed Rate Hike Will Impact Job Seekers**  
By Dr. Andrew Chamberlain, December 15, 2015  
With the Federal Reserve likely to raise interest rates on Wednesday, many Americans are puzzled over what this move means for jobs, their personal finances, an...

On the right side of the page, there is a 'Research Mailing List' sign-up form with fields for 'First Name', 'Last Name', and 'Organization', and an 'Email Address' field. Below these fields are two checked checkboxes: 'Subscribe to the Glassdoor Economic Research blog.' and 'Sign up for the Glassdoor Economic Research newsletter.' A blue 'Subscribe' button is located below the checkboxes. At the bottom of the page, there is an 'Ask the Economist' section with a profile picture of Dr. Andrew Chamberlain and a link to 'Ask a Question'.

- [Glassdoor.com/research](https://www.glassdoor.com/research)
- Team of **economists + data scientists.**
- Published **11 studies** using crowd-sourced data since 2015 launch.

# Academic research: 15+ ongoing projects

**Family Firms, Employee Satisfaction, and Corporate Performance**

[Minjie Huang](#)  
University of Louisville - Department of Finance

[Pingshu Li](#)  
University of Kansas - School of Business

[Felix Meschke](#)  
University of Kansas - Finance Area

[James P. Guthrie](#)  
University of Kansas - School of Business

July 15, 2015

[Journal of Corporate Finance 34 \(2015\) 108-127](#)

**Abstract:**  
Prior research shows that family control affects firm value through capital investment, debt financing, M&A activities, and governance structure. This study investigates the role of corporate culture in family firms and its implications for firm value. We use more than 100,000 surveys collected by Glassdoor between 2008 and 2012 that capture how employees perceive their company's culture. We find that employees who work for firms with active founders rate their companies higher than employees in nonfamily firms, especially if the founder runs the company. In contrast, employee satisfaction in scion firms does not differ from nonfamily firms, and when scions run the company, employees are less satisfied. Scion firms also exhibit significant lower employee satisfaction during the recent financial crisis. Furthermore, employee assessments predict subsequent firm performance measured by Tobin's q and return on assets (ROA). Our findings provide evidence that family firms exhibit a human-capital-enhancing culture that improves firm performance.

**Number of Pages in PDF File:** 52

**Keywords:** Family firms, Corporate culture, Employee satisfaction, Human capital, Firm performance

**JEL Classification:** G3, G32, J28, M14

Source: Huang, Minjie et al. (2015). "Family Firms, Employee Satisfaction, and Corporate Performance," *Journal of Corporate Finance*, Vol. 34, pp. 108-127.

PR  
44,6

**New evidence of the relationship between employee satisfaction and firm economic performance**

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University of Las Palmas de Gran Canaria, Las Palmas, Spain, and*  
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906

Received 23 January 2014  
Revised 25 July 2014  
Accepted 6 October 2014

**Abstract**  
**Purpose** – Employee satisfaction appears in any discussion about how employees can contribute to organizational performance. The purpose of this paper is to test the relationship between employee satisfaction and organizational performance; this latter measured with three firm-level performance outcomes (returns over assets, operating margin, and revenue per employee).  
**Design/methodology/approach** – At different times and from two independent sources the authors obtained firms' data about worker attitudes and financial and productivity performance, respectively. The analyzed sample of 475 firms is the biggest among the studies that analyze performance and employee satisfaction at the firm level. The impact of employee satisfaction over firm performance was assessed.  
**Findings** – Overall satisfaction and satisfaction with senior leadership, compensation, and work-life balance, respectively impact firm performance.  
**Research limitations/implications** – The ratings come from both employees and ex-employees and the individual characteristics were unknown. Additionally as an internet-based sample there has been a lack of control over the individuals' response process.  
**Practical implications** – Managers have evidence about the importance of their employees' satisfaction on firm performance, and on how the facets involved on worker satisfaction impact the performance.  
**Social implications** – Employer review web sites are increasing their popularity. However, unlike the marketing field with consumers HR area has not taken advantage of this trend. The found results may contribute to highlight the importance of this kind of data.  
**Originality/value** – Hitherto there is only one empirical evidence about the positive role of worker satisfaction in objective and financial firm level performance. That was based in best-firms type data. The current study draws in a big sample independent of this kind of rankings. Additionally, the job facet satisfaction conceptualization considered demonstrates the usefulness of this way to understand the employee satisfaction.  
**Keywords** Job satisfaction, Firm performance, Quantitative, Employee attitudes  
**Paper type** Research paper

**1. Introduction**  
Strategic human resource management (SHRM) is currently looking for mediators in the relationship between HR practices and organizational performance (Boxall et al., 2011) in order to understand how HR practices influence firm performance (Guest, 2011). A consensus is emerging on the key role of employees' attitudes in organizational performance (Guest, 2011; Jiang et al., 2012). Employee satisfaction is an employee attitude that has been highlighted in several models that describe the flow from HR practices toward organizational performance.



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Source: Melián-González and Jacques Bulchand-Gidumal (2014). "New Evidence of the Relationship Between Employee Satisfaction and Firm Economic Performance," *Personnel Review*, Vol. 44, No. 6.

Thank you!

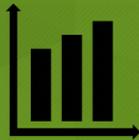
# Questions? Please reach out.



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[glassdoor.com/research](https://glassdoor.com/research)



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