Why is it so hard to find a job now? Enter Ghost Jobs

Svenja Dube
Zicklin School of Business
Baruch College, CUNY

Hye Seung Lee
Gabelli School of Business
Fordham University

Hunter Ng
Zicklin School of Business
Baruch College, CUNY

Yen H. Tong
Nanyang Business School
Nanyang Technological University

Loujaina Abdelwahed

First draft - June 2024

What is a ghost job?



18th Nov Baruch

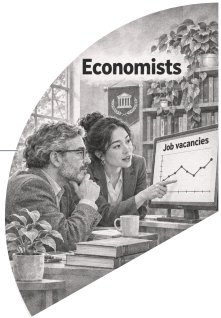
What is a ghost job?



18th Nov Baruch

Importance of Jobs data

Read BLS data to track macro trends.



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Use job postings to gauge firm growth.

Importance of Jobs data

Read BLS data to track macro trends.



Use job postings to gauge firm growth.

Track which roles employers are trying to fill.

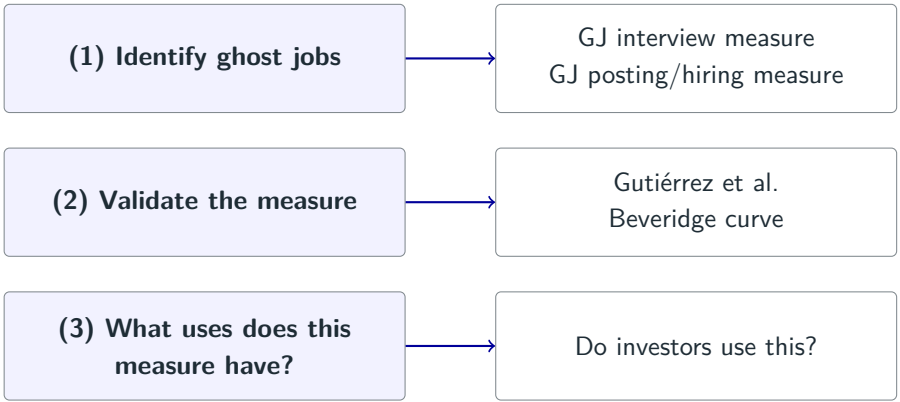
Research Design

(1) Identify ghost jobs

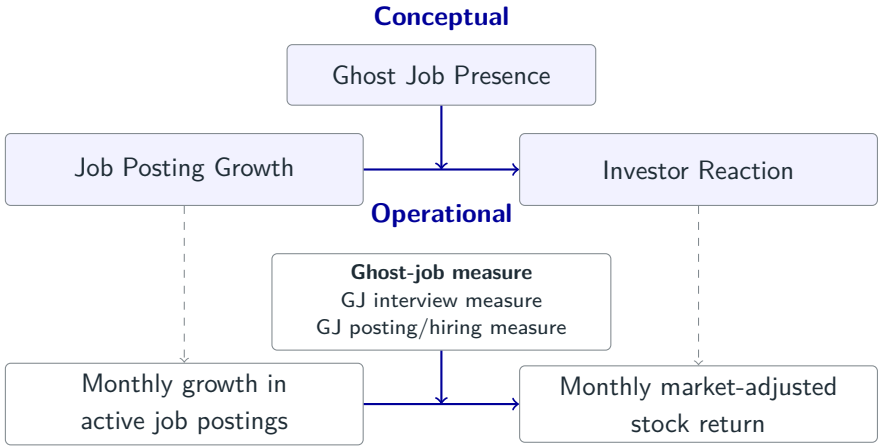
(2) Validate the measure

(3) What uses does this measure have?

Research Design



Libby Box in RQ



Adapted from Libby, Bloomfield, and Nelson (2002).

Motivation (I) - Background



Planet Money NPR - June 2024

Motivation (I) - Background



HR expert estimates 50% of jobs end up without a hire.

Find scarce workers

Motivation (II) - Difficulty in Measuring GJ



Motivation (II) - Difficulty in Measuring GJ

Reliability of the estimates

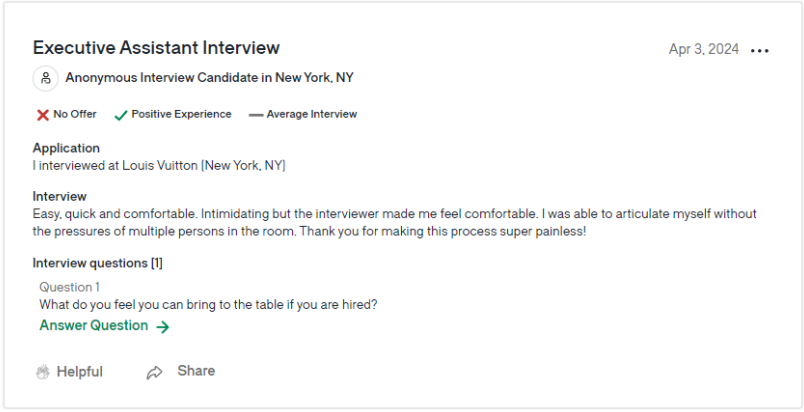
JOLTS estimates are subject to two types of error: sampling error and nonsampling error.

Sampling error can result when a sample, rather than an entire population, is surveyed. There is a chance that the sample estimates may differ from the true population values they represent. The exact difference, or sampling error, varies with the sample selected, and this variability is measured by the standard error of the estimate. BLS analysis is generally conducted at the 90-percent level of confidence. This means that there is a 90-percent chance that the true population mean will fall into the interval created by the sample mean plus or minus 1.65 standard errors. Estimates of the median standard errors are released monthly as part of the significant change tables on the JOLTS webpage and are available upon request. Standard errors are updated annually with the most recent 5 years of data.

The JOLTS estimates are also affected by nonsampling error. Nonsampling error can occur for many reasons including the failure to include a segment of the population, the inability to obtain data from all units in the sample, the inability or unwillingness of respondents to provide data on a timely basis, mistakes made by respondents, errors made in the collection or processing of the data, and errors from the employment benchmark data used in estimation.

The JOLTS program uses quality control procedures to reduce nonsampling error in the survey's design. See the data sources section.

Motivation (II) - Difficulty in Measuring GJ



Executive Assistant Interview Apr 3, 2024 ...

Anonymous Interview Candidate in New York, NY

✗ No Offer ✓ Positive Experience — Average Interview

Application
I interviewed at Louis Vuitton (New York, NY)

Interview
Easy, quick and comfortable. Intimidating but the interviewer made me feel comfortable. I was able to articulate myself without the pressures of multiple persons in the room. Thank you for making this process super painless!

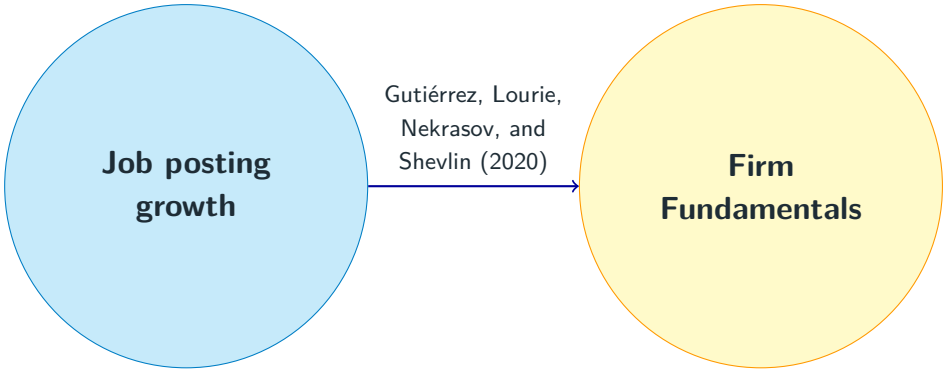
Interview questions [1]

Question 1
What do you feel you can bring to the table if you are hired?
Answer Question →

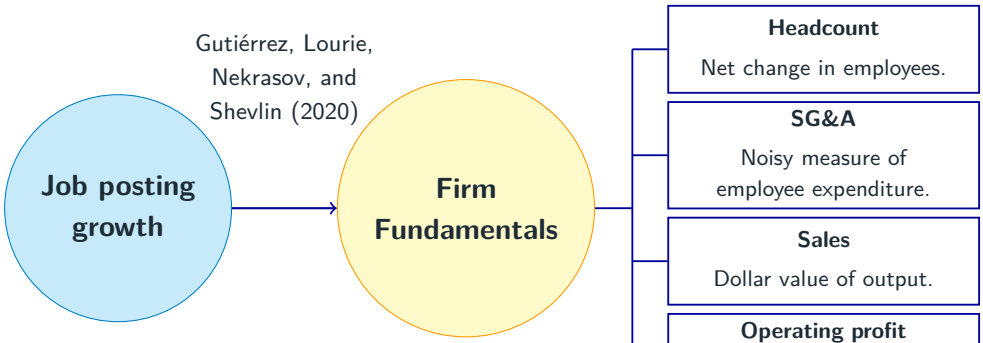
Helpful Share

Example of Glassdoor interview review

Motivation (III) - Postings Data Relationship



Motivation (III) - Postings Data Relationship



Example - GJ Interview Measure

2U, Product Designer

12 April 2023

"She was not prepared and had almost no info on the role."

[. . .]

"I completed the final round and met with the team. I waited a couple days and then reached out to the recruiter to check for updates, and surprise she ghosted me."

ADM, Change Management Support

10 June 2019

"The interview process was pretty quick because at the time I was actively interviewing with another company and was pretty far into interviews."

[. . .]

"In the end, I was a bit ghosted and they didn't even update me on having cancelled their position until I reached out to them."

Excerpts from the interview reviews reproduced in the earlier paper, Figures A3 and A4.

GJ Interview Measure - 14-Feature Scoring List

	Feature	Points
1	Inside knowledge	3
2	Future-only hiring	3
3	Employer not hiring	3
4	Nonexistent or unavailable role	3
5	Internal hire	3
6	Explicit mention of ghosting	3

	Feature	Points
7	Communication delay	1
8	Generic questions	1
9	Scheduling delay	1
10	Uninformed interviewer	1
11	No follow-up after the interview	1
12	Posting persistence	—
13	Recruiter mention	—
14	Interview rounds	—

A review is flagged if the score reaches three points and the applicant received no offer.

GJ Interview Measure - 14-Feature Scoring List

	Feature	Points
	Strong GJ	
1	Inside knowledge	3
2	Future-only hiring	3
3	Employer not hiring	3
4	Nonexistent or unavailable role	3
5	Internal hire	3
6	Explicit mention of ghosting	3
	Weak GJ	
7	Communication delay	1
8	Generic questions	1
9	Scheduling delay	1
10	Uninformed interviewer	1
11	No follow-up after the interview	1
12	Posting persistence	—
13	Recruiter mention	—
14	Interview rounds	—

A review is flagged if the score reaches three points and the applicant received no offer.

Example - GJ Hiring/posting Measure

Job postings

Eligible ads in the firm's first fiscal quarter, identified by employer, state, job type, and seniority.

→

Observed hires

Look for a compatible worker start in the hiring histories within six months of each ad.

$$\text{GJ posting/hiring measure} = \frac{\text{Ads without a matched start within six months}}{\text{All eligible ads}}$$

Example. 100 eligible ads, of which 40 have a matched start, give a 60% unmatched share.

My Dataset

- **6,289,805 interview reviews** from **Glassdoor**, February 2009 through March 2026.
- U.S. job postings from **Indeed**, January 2016 through August 2025 in our tests.
- U.S. hiring data from **Revelio Labs** to identify hires.
- Company financials from **Compustat**, including headcount, SG&A, sales, operating profit, and assets.
- Stock and market returns from **CRSP**.
- Vacancies, quits, and unemployment from **BLS** for the Beveridge curve comparison, 2018–2024.

Sample Selection - Interview Reviews

Number of interview reviews	N
All Glassdoor interview reviews (2009–2026)	6,289,805
Remove reviews outside linked financial firm-years (FY 2016–2024)	(−5, 559, 650)
Remove reviews with unresolved scored features (FY 2016–2024)	(−22)
Remove reviews in incompletely classified firm-years (FY 2016–2024)	(−8, 832)
Final coded interview-review sample (FY 2016–2024)	**721,301**

Sample Selection - Posting/Hiring Data

Number of postings	**N**
Raw posting records in the Indeed archive (2005–2026)	496,085,748
Remove records outside the unique U.S. matching archive (2016–2025)	(−441, 667, 377)
Remove ads missing matching information (2016–2025)	(−524, 799)
Final eligible posting sample (2016–2025)	**53,893,572**

(0)
Construction of the GJ Measure

Constructing the Measures

Measure	Construction
(1) GJ Interview Measure	Empirical Bayes smoothed (Rozema and Schanzenbach, 2019). $$G_{it}^{I} = \frac{F_{it} + \kappa \widehat{p}_{it}}{n_{it} + \kappa}$$ F is flagged reviews, n is all reviews, $\widehat{p}$ is the fitted peer rate, and κ is the smoothing strength.
(2) GJ Posting/Hiring Measure	Share of eligible ads without a matched start within six months. $$G_{it}^{PH} = \frac{\text{Ads without a matched start within six months}}{\text{All eligible ads}}$$

(1) GJ Interview Measure captures actual applicants' experiences.

(2) GJ Posting/Hiring Measure captures statistically reported numbers.

GJ measures

GJ Interview Measure

$$I_{it} = 100\frac{F_{it} + \kappa\widehat{p}_{it}}{n_{it} + \kappa}.$$

F: no offer and score ≥ 3; n: coded reviews. Empirical Bayes uses the peer rate $\widehat{p}$ and smoothing strength κ.

GJ Posting/Hiring Measure

$$U_{it} = 100\frac{A_{it} - H_{it}^{(6)}}{A_{it}}.$$

A: eligible ads; $H^{(6)}$: ads with a compatible worker start within six months.

Annual firm averages

Year	Interview (%)	Posting/hiring (%)
2017	1.40	70.47
2018	1.57	75.22
2019	1.93	76.33
2020	2.24	77.11
2021	2.71	76.27
2022	3.38	80.92
2023	3.47	82.57
2024	3.90	83.77

Same firm-years for both measures each year: at least 10 coded reviews, 20 eligible ads, and 10 prior-year observed starts.

(I)

Do the two measures agree?



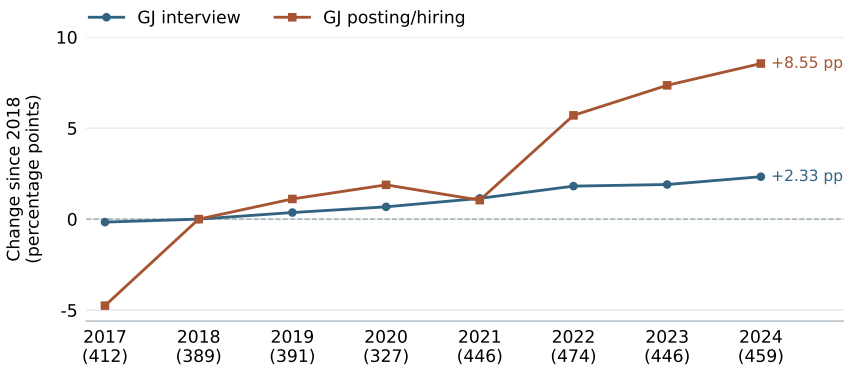
(1) - Comparing the Two Measures

Association with the unmatched share across hiring windows

	3 months	6 months	9 months	12 months
Pooled comparison	1.12***	**1.28***	1.44***	1.58***
Company and year effects	−0.23	−0.19	−0.11	0.01
Firm-years	3,344	3,344	3,344	3,344

Firms with more warning signs tend to have more unmatched ads. The comparison within the same firm over time is imprecise.

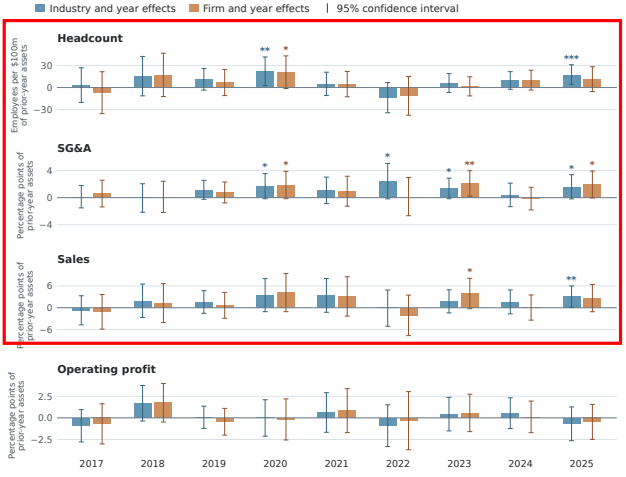
Both Measures Rise After 2018



(II)
Main Test – Validating Our GJ Measure

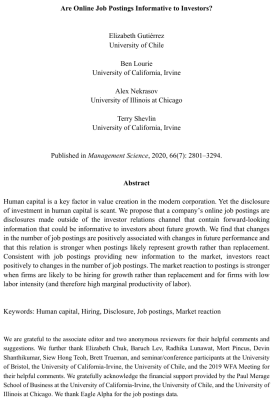


VT1 – Job Postings and Firm Fundamentals



We replicate the patterns for headcount, SG&A, and sales. We are unable to replicate the operating profit estimate in our period.

VT1 – Gutiérrez, Lourie, Nekrasov, and Shevlin (2020)



Are Online Job Postings Informative to Investors?

Elizabeth Gutiérrez
University of Chile

Ben Lourie
University of California, Irvine

Alex Nekrasov
University of Illinois at Chicago

Terry Shevlin
University of California, Irvine

Published in *Management Science*, 2020, 66(7): 2801–3294.

Abstract

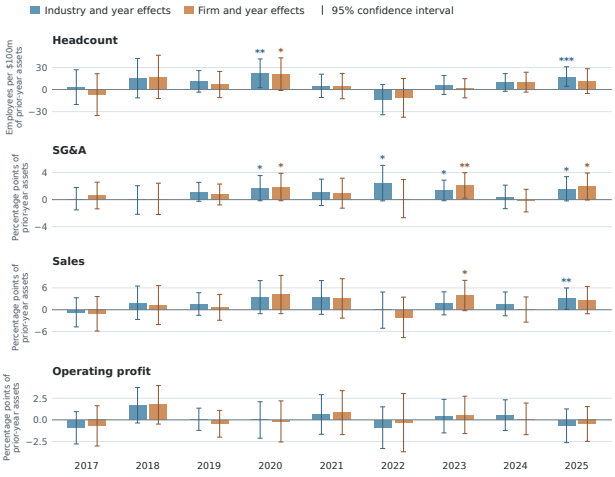
Human capital is a key factor in value creation in the modern corporation. Yet the disclosure of investment in human capital is scant. We propose that a company's online job postings are disclosures made outside of the investor relations channel that contain forward-looking information that could be informative to investors about future growth. We find that changes in the number of job postings are positively associated with changes in future performance and that this relation is stronger when postings likely represent growth rather than replacement. Consistent with job postings providing new information to the market, investors react positively to changes in the number of job postings. The market reaction to postings is stronger when firms are likely to be hiring for growth rather than replacement and for firms with low labor intensity (and therefore high marginal productivity of labor).

Keywords: Human capital, Hiring, Disclosure, Job postings, Market reaction

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1. Job postings reveal firms' hiring plans before financial reports.
2. Posting growth predicts growth in employees, SG&A, revenue, and earnings.
3. Investors react positively to posting growth, especially when firms hire for growth.

VT1 – Job Postings and Firm Fundamentals



We repeat the Gutiérrez et al. test (August 2007–December 2016) using 2017–2025 operating outcomes.

VT1 – Extending the Gutiérrez et al. Test

$$\frac{Y_{i,t+1} - Y_{it}}{A_{it}} = \alpha + \beta P_{i,t+3m} + \delta G_{it} + \phi U_{it} + \theta(P_{i,t+3m} \times G_{it}) + \psi(P_{i,t+3m} \times U_{it}) + \gamma' X_{it} + \rho D_{it} + \kappa(P_{i,t+3m} \times D_{it}) + \eta_{j(i)} + \lambda_t + \varepsilon_{it}$$

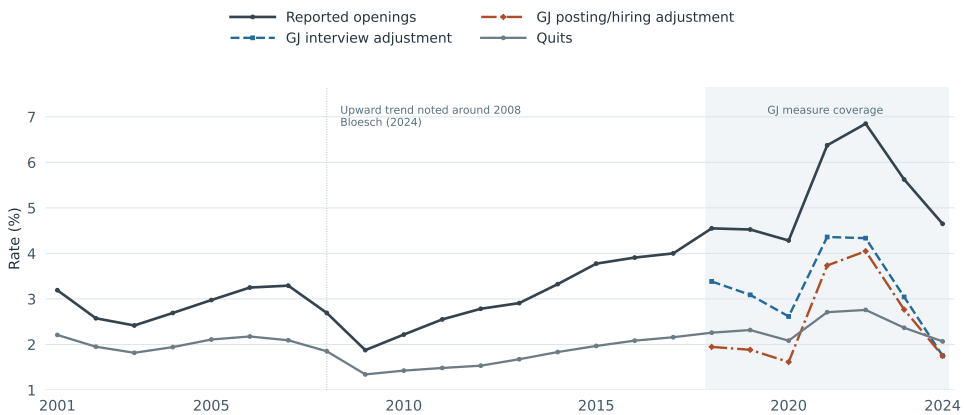
- Y is headcount, SG&A, or sales. P ranks changes in active postings.
- G is the GJ interview measure. U is the GJ posting/hiring measure. D flags firm-years without coded reviews.
- A negative θ or ψ means postings predict less growth where the corresponding GJ measure is higher.

VT1 – Ghost Jobs Weaken the Link to Firm Growth

Posting-rank interaction	Headcount	SG&A	Sales
GJ interview measure	-0.0315^{**}	0.1598	-0.6749^{**}
GJ posting/hiring measure	-0.0036^{**}	-0.0389^{***}	-0.0183
Observations	6,735	6,728	6,739
Adjusted R^2	.0925	.3183	.2030

Both measures weaken the headcount association. The interview measure also weakens the sales association, and the posting/hiring measure weakens the SG&A association.

VT2 – Beveridge Curve: Vacancies and Quits



Adjustment$_t$ = 2.90 pp × GJ$_t$ / max(GJ$_{2018–2024}$); scale = average 2018–2024 openings–quits gap.
Annual averages. Sources: BLS JOLTS via FRED; Bloesch, Brookings presentation, January 18, 2024.

VT3 – Postings With a Matched Hire Are More Informative

Difference in posting coefficients	Headcount	SG&A	Sales
Matched ads minus unmatched ads	2.504***	15.456***	41.125***
Remaining ads minus interview-weighted ads	1.951	21.183*	11.324

Postings followed by an observed hire predict more growth in all three outcomes. The interview-weighted part of postings is less predictive of SG&A growth.

(III)

Main Test – Do investors take into account ghost jobs?



Stock Returns and Job Posting Growth

Full sample. A roughly 10% increase in active postings is associated with a **12.5 bp** higher monthly market-adjusted return ($p < 0.001$).

Ghost-job measure	Top minus bottom quartile	p-value
GJ interview measure	−7.1 bp	.340
GJ posting/hiring measure	+0.8 bp	.890

We find little evidence that investors respond less to posting growth when either ghost-job measure is higher.

(IV)
When are ghost jobs more common?

Determinants of Ghost Jobs

Prior condition	GJ interview	GJ posting/hiring
Competition	−0.022	0.463
Profit decline	−0.004	−0.112
Sales decline	0.060*	0.101
Stock-price pressure	0.075***	0.097
Operating uncertainty	−0.104	−0.191
Stock-return volatility	−0.080	−0.145
Industry sales decline	0.031	0.167

Stock-price pressure is the negative of the prior year's compounded stock return. A one-standard-deviation increase in stock-price pressure is associated with a **0.075 percentage-point increase** in the following year's measure, with $p = 0.0045$.

Ghost Jobs by Job Type

Job type	GJ interview	GJ posting/hiring
Management	0.775***	1.889
Professional or technical	0.298***	−3.629***
Sales or customer-facing	0.061	−2.114**

Management stands out in the interview reviews. Professional and sales ads more often have a matched start than operations and service ads.

Conclusion

- **Identify.** Interview reviews and unmatched job ads provide two views of potentially unavailable roles.
- **Validate.** Posting growth predicts headcount, SG&A, and sales. Both ghost-job measures weaken the link to headcount.
- **Interpret.** Stock prices rise with posting growth, with little evidence that the reaction weakens where ghost jobs are more common.

Thank you



Corresponding Author: Hunter hng@gc.cuny.edu

The 14-Feature Interview Scoring Framework

Weight	Interview review features
3 points each	Inside knowledge, future-only hiring, employer not hiring, nonexistent or unavailable role, internal hire, explicitly reported ghosting.
1 point each	Communication delay, generic questions, scheduling delay, uninformed interviewer, no follow-up after the interview.
Recorded separately	Posting persistence, recruiter mention, and number of interview rounds.

A score of at least three points flags a review if the applicant received no offer.

Reading the Two Ghost-Job Measures

- **Interview measure.** The empirical Bayes estimate gives more weight to a peer rate based on industry and prior market value when the firm has fewer reviews. The peer rate uses other firms' data available as of the scoring date.
- **Posting/hiring measure.** An unmatched ad shows that we did not observe a compatible start within six months. Some of these searches may have ended because employers could not find a suitable candidate.
- **Beveridge curve scaling.** We divide each GJ measure by its maximum over 2018–2024, multiply it by the average openings–quits gap (2.90 percentage points), and subtract that adjustment from the reported vacancy rate.

Appendix – Regression Equations

Main slide	Equation and variables
28: Comparing the measures	Pooled and company/year comparisons.
35: VT1	Posting growth interacted with both GJ measures.
37: VT3	Matched/unmatched and interview-weighted posting components.
39: Investors	Monthly returns and the top-minus-bottom posting response.
41: Determinants	Prior company conditions and subsequent GJ measures.
42: Job types	Job-type differences within the same company-year.

i denotes a company, t a fiscal year, m a calendar month, and j an industry.

Appendix – Measure Definitions and Units

$$g_{it}^{I} = \frac{F_{it} + \kappa \widehat{p}_{it}}{n_{it} + \kappa}, \qquad I_{it} = 100 g_{it}^{I}, \qquad U_{it}^{(w)} = 100 \left(1 - \frac{H_{it}^{(w)}}{A_{it}}\right).$$

- F: flagged interview reviews; n: all eligible coded reviews. Reviews reporting an offer receive a zero flag and stay in the denominator.
- A flag requires no offer and at least three points under our 14-feature framework. No follow-up receives one point.
- $\widehat{p}$: fitted peer rate using industry and prior market value; κ: estimated empirical Bayes smoothing strength. Peer fitting uses other companies and information available by the scoring date.
- A: eligible ads; $H^{(w)}$: ads allocated a compatible observed start within w months. A match uses employer, state, job type, and seniority.
- I and U are percentages. g^{I} is a fraction between zero and one. Unless stated otherwise, $U = U^{(6)}$.

Appendix – Slide 28: Comparing the Measures

Pooled comparison

$$U_{it}^{(w)} = a_w + b_w I_{it} + e_{it}^{(w)}.$$

Comparison within companies over time

$$U_{it}^{(w)} = a_i + \lambda_t + b_w I_{it} + e_{it}^{(w)}, \qquad w \in \{3, 6, 9, 12\}.$$

- $U^{(w)}$: percentage of ads without a matched start within the stated window. The posting month is month one. I: empirical Bayes interview percentage.
- b_w: percentage-point difference in unmatched ads for a one-percentage-point increase in the interview measure.
- a_i absorbs persistent company differences; λ_t absorbs common annual changes. The pooled regression includes an intercept and no fixed effects.
- Same 3,344 firm-years and 695 companies in all windows; at least ten fully coded reviews, twenty eligible ads, and ten prior-year starts. Standard errors are clustered by company.

Appendix – Slide 35: VT1 Equation

$$
\begin{aligned}
y^{k}_{i,t+1} = a &+ \beta P_{i,t+3m} + \delta I_{it} + \theta(P_{i,t+3m} I_{it}) \\
&+ \phi U_{it} + \psi(P_{i,t+3m} U_{it}) + \rho D_{it} + \kappa_D(P_{i,t+3m} D_{it}) \\
&+ \gamma' X_{it} + \eta_{j(i)} + \lambda_t + \varepsilon_{it}.
\end{aligned}
$$

- Estimate separately for headcount, SG&A, and sales. y^k is the subsequent annual change scaled by beginning assets.
- P: rank of posting growth. I: interview percentage. U: percentage of earlier first-quarter ads unmatched within six months.
- $D = 1$ when there are no classified reviews; those firm-years use the fitted peer rate for I.
- The posting slope is $\beta + \theta I + \psi U + \kappa_D D$. A negative θ or ψ means the association weakens as that GJ measure rises.
- η_j and λ_t: industry and fiscal-year effects. Standard errors are clustered by company.

Appendix – VT1 Outcomes, Posting Rank, and Controls

$$y^k_{i,t+1} = s_k \frac{Y^k_{i,t+1} - Y^k_{it}}{AT_{it}}, \qquad P_{i,t+3m} = R_5\left(\frac{\overline{A}^{\text{active}}_{i,Q1(t+1)} - \overline{A}^{\text{active}}_{i,Q1(t)}}{AT_{it}}\right).$$

- AT: total assets in millions of dollars. Headcount is reported as employees per million dollars of assets; SG&A and sales as percentages of assets. With Compustat headcount in thousands, $s_{\text{emp}} = 1{,}000$ and $s_{\text{SG\&A}} = s_{\text{sales}} = 100$.
- $\overline{A}^{\text{active}}$: average active ads in the first fiscal quarter. R_5 assigns $0, .25, .5, .75, 1$: two groups of decreases, zero change, and two groups of increases.
- X: prior annual changes in operating profit after depreciation, sales, SG&A, headcount, and capital expenditures, scaled by starting assets; plus year-end book-to-market.
- The interactions are reported per one-percentage-point increase in I or U. Outcome-specific samples: 6,735, 6,728, and 6,739 firm-years, respectively.
- Coverage requires twenty eligible ads in each first quarter and ten observed starts in the prior year.

Appendix – Slide 37: Matched Versus Unmatched Ads

$$y^{k}_{i,t+1} = a + \beta_M \Delta A^{M}_{i,t+1} + \beta_U \Delta A^{U}_{i,t+1} + \gamma' X_{it} + \eta_{j(i)} + \lambda_t + \varepsilon_{it}.$$

$$\Delta A^{M}_{i,t+1} = \frac{A^{M}_{i,Q1(t+1)} - A^{M}_{i,Q1(t)}}{AT_{it}}, \quad \Delta A^{U}_{i,t+1} = \frac{A^{U}_{i,Q1(t+1)} - A^{U}_{i,Q1(t)}}{AT_{it}}.$$

- A^M: new ads allocated a compatible worker start within six months. A^U: new ads without that match. Each observed start is allocated subject to matching capacity.
- Both changes are ads per million dollars of beginning assets. Their sum is the change in all eligible new ads.
- Outcomes and financial controls X follow VT1. Industry and fiscal-year effects; company-clustered standard errors. Common sample: 6,797 firm-years.
- The first row on slide 37 reports $\beta_M - \beta_U$, with a direct test that this difference equals zero. A positive difference means matched ads predict more subsequent growth.

Appendix – Slide 37: Interview-Weighted Postings

$$y^k_{i,t+1} = a + \beta_R \Delta A^R + \beta_W \Delta A^W + d_0 g^I_{i0} + d_1 g^I_{i1} + \gamma' X_{it} + \eta_{j(i)} + \lambda_t + \varepsilon_{it},$$

$$\Delta A^W = \frac{g^I_{i1}\overline{A}_{i1} - g^I_{i0}\overline{A}_{i0}}{AT_{it}}, \qquad \Delta A^R = \frac{(1-g^I_{i1})\overline{A}_{i1} - (1-g^I_{i0})\overline{A}_{i0}}{AT_{it}}.$$

- $q = 0, 1$ denotes the earlier and later first fiscal quarter. $\overline{A}_{iq}$ is average active ads; g^I_{iq} is the interview fraction available at that quarter's start.
- W is the score-weighted component; R is the remainder. These company-level weights do not classify individual ads.
- Both score levels enter as controls, alongside VT1 financial controls. Industry and fiscal-year effects; company-clustered standard errors; 10,287 firm-years.
- The second row on slide 37 reports $\beta_R - \beta_W$. A positive value means the remaining component predicts more growth than the score-weighted component.

Appendix – Slide 39: Investor Reaction Equation

$$AR_{im} = \eta_{j(i,m)} + \lambda_m + \beta P_{im} + \delta T_{im} + \theta(P_{im} T_{im}) + \gamma' X_{im} + \varepsilon_{im}.$$

$$AR_{im} = 10{,}000\,(R_{im} - R_m^{\text{market}}), \qquad P_{im} = \frac{\log[(1+\overline{A}_{im})/(1+\overline{A}_{i,m-1})]}{\log(1.1)}.$$

- R_{im}: compounded monthly company return; R_m^{market}: compounded CRSP value-weighted market return. AR is expressed in basis points.
- $\overline{A}$: average daily active ads in the month. One unit of P is a ten-percent increase in one plus average active ads.
- $T = 1$ for the top GJ quartile and zero for the bottom quartile. Estimate separately using the interview and posting/hiring measures, dated before the month begins.
- Bottom-quartile posting response: β; top response: $\beta + \theta$. Slide 39 reports θ, the top-minus-bottom difference.

Appendix – Investor Controls, Timing, and Sample

- X: lagged log market equity and book-to-market. Industry effects use lagged two-digit SIC; calendar-month effects absorb common market conditions. No company fixed effects in this specification.
- Standard errors are clustered by company and calendar month. Posting growth, market-adjusted returns, size, and book-to-market are capped at their first and ninety-ninth percentiles.
- Monthly cutoffs use the 36,521 eligible company-months with both prior GJ measures. Each interaction regression retains only that measure's bottom and top quartiles.
- The prior interview measure requires at least five fully coded reviews. The unmatched-ad measure uses a completed six-month matching window; later starts are not carried back into an earlier return month.
- January 2020–August 2025. Full benchmark: 128,362 company-months. Interview split: 18,292; posting/hiring split: 18,297.
- The full-sample benchmark omits T and $P \times T$ and estimates the overall posting response on all eligible observations.

Appendix – Slide 41: Determinants Equation

$$G_{it}^{k} = a_i + \lambda_t + b_s' Z_{i,t-1}^{(s)} + \gamma' X_{i,t-1} + \rho \log(1 + n_{it}) + \varepsilon_{it}, \qquad k \in \{I, PH\}.$$

- $G^I = I$ and $G^{PH} = U$: the interview and six-month unmatched-ad percentages. Estimate each outcome separately.
- $Z^{(s)}$: the prior determinant or pair of determinants for specification s. Each is standardized using the original determinant-panel mean and standard deviation after its existing tail caps.
- Five specifications per outcome: competition; profit and sales declines together; stock-price pressure; operating uncertainty and stock volatility together; industry sales decline.
- X: lagged log assets, debt/assets, operating income/assets, and capital expenditures/assets. n: eligible interview-review count.
- Company and fiscal-year effects; company-clustered standard errors. Same 4,063 firm-years from 1,053 companies, 2017–2024.
- Each coefficient is a percentage-point change in the GJ measure per one-standard-deviation increase in its determinant.

Appendix – Definitions of the Determinants

Variable	What a higher value means
Competition	One minus the industry sales-concentration index: sales are spread across more public firms.
Profit decline	Greater prior deterioration in operating profitability.
Sales decline	A larger prior decline in company sales, divided by starting assets.
Stock-price pressure	Negative of the prior year's compounded stock return: poorer stock performance.
Operating uncertainty	Greater variation in operating profitability over the preceding three years.
Stock-return volatility	Greater volatility of monthly stock returns over the preceding year.
Industry sales decline	A larger prior percentage decline in sales across public firms in the industry.

Appendix – Slide 42: Differences Across Job Types

$$G^k_{itr} = a_{it} + \sum_{h \neq \text{operations/service}} d^k_h \, \mathbf{1}\{r = h\} + u^k_{itr}, \qquad k \in \{I, PH\}.$$

- r: job-type group. Groups include management, professional/technical, sales/customer-facing, operations/service, and other/unclassified.
- G^I_{itr}: the group's empirical Bayes flagged-review percentage, using the common company-year peer rate. Offers remain in the denominator with zero flags.
- G^{PH}_{itr}: percentage of the group's eligible ads without a matched start within six months.
- a_{it}: company-by-year effects. Each coefficient compares a job type with operations/service jobs in the same company and year.
- Weighted least squares: review-count weights for G^I; ad-count weights for G^{PH}. Standard errors are clustered by company. No additional financial controls.
- A negative d^{PH}_h means fewer unmatched ads, hence more ads with observed starts, than in the reference group. Coefficients are percentage-point differences.

Appendix – Sample Filters: Agreement and Validation

Test	Interview-review requirement	Posting/hiring requirement
Measure agreement / annual trends	At least 10 fully coded reviews per year.	At least 20 ads per year; 10 prior-year starts.
VT1: interaction test	No minimum; zero reviews use the peer estimate.	At least 20 ads in each first quarter; 10 prior-year starts.
VT3: matched ads	No review requirement.	Same posting coverage as VT1.
VT3: interview-weighted ads	At least one review at both score dates.	Active ads in at least one quarter; no 20-ad or hire-match filter.

Investor, determinant, and job-type filters: next slide.

Appendix – Sample Filters: Other Tests

Test	Interview-review requirement	Posting/hiring requirement
Investor GJ splits	At least 5 fully coded reviews in the prior year.	Both scores; at least 20 earlier-quarter ads and 10 prior starts; complete six-month follow-up.
Determinants	At least 5 eligible reviews.	At least 20 earlier-quarter ads and 10 prior starts; complete follow-up.
Job-type comparison	All coded reviews; no minimum per job group.	At least 20 ads per year, 10 prior starts, and 12 usable posting months.

The full-sample investor benchmark does not require either GJ score. The quartile comparisons require both scores before the return month starts.