Talent Market Competition and Firm Growth

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DUKE FUQUA CFO The tight labor market was reflected in the survey results as 53% of CFOs identified hiring and retaining qualified employees as a top-four concern — a two-decade high and up sharply from 41% in the last quarter.

Deloitte.

CFO Signals™

Internal risk concerns
As the Great Resignation continues, talent and retention dominated CFOs' long list of internal worries this quarter.

Wage inflation
Cybersecurity
Work culture   Transformation
Research & development
CEO succession   Operational challenges
Return-to-work

Retention
Inflation

Raising capital   Technology
Customer demand
ESG   Increased costs

Talent   Supply chain
Financial performance

Strategy execution   Employee morale

pwc

Family Business Survey 2016

Fig 3: Key challenges over the next five years

| 64%	58%	56%	54%
Need to continually innovate to keep ahead	Ability to attract and retain the right talent	Competition in your sector	General economic situation

Duke CFO Survey (2008-present)

4. What are the top three <u>internal</u>, company-specific concerns for your corporation? (rank #1, #2, #3)

Ability to forecast results	Maintaining morale/productivity
Ability to maintain margins	Managing IT systems
Attracting and retaining qualified employees	Pension obligations
Balance sheet weakness	Protection of intellectual property
Cost of health care	Supply chain risk
Counterparty risk	Working capital management
Data security	Other:

Recent trend: Massive rise in CFO's talent retention concerns

Duke CFO Survey:

Q: "What are the top three **internal, company-specific** concerns for your corporation?"
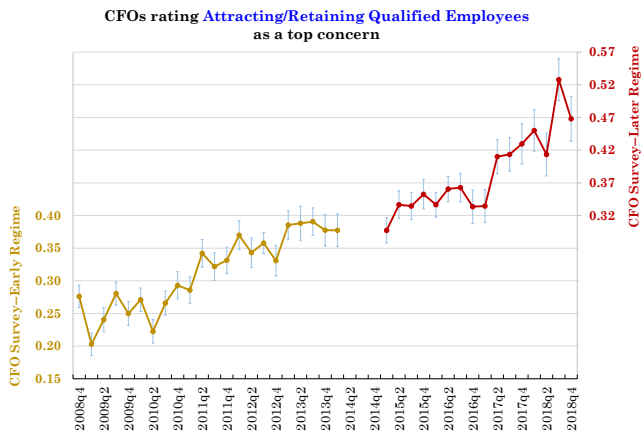
CFOs rating Attracting/Retaining Qualified Employees as a top concern

Talent is central for firm growth in the 21st century

Talent constraints is more pervasive than financial constraints for modern firms

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Talent constraints is more pervasive than financial constraints for modern firms

- **Kellogg CFO Survey**: Jagannathan et al. (2016)

    "We cannot take all (otherwise) profitable projects due to limited resources in the form of limited qualified management and manpower."

    - 55% of CFOs choose talent constraints above (39% choose financial constraints)

- **Duke CFO Survey**: Graham and Harvey (2011)

    "[firms] occasionally bypass (otherwise) value-creating projects. The chief reasons are shortage of management time/expertise..."

    - 58% of CFOs choose talent constraints above (43% choose financial constraints)

Research question and challenges

Q: How does talent market competition contribute to the lackluster U.S. firms investment in the 21st century (Gutiérrez and Philippon (2017))?

Many unknowns:

- How to quantify the *intensity* of talent market competition that firms face?

- How do firms address talent market competition?

- To what extent does talent market competition affect firm growth and aggregate growth?

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Challenges:

- Measuring talent market competition is challenging
    - talents are barely unemployed, making traditional labor-market tightness (v/u) useless

- Measuring firms' exposure to talent markets is challenging
    - how to define talent?
    - how to measure firms' exposure to each talent market?

This Paper

1. **Develop a novel measure of firms' talent retention pressure (TRP)**
   - using two comprehensive microdata sets: BLS OEWS + Lightcast
   - guided by on-the-job search models and captures talent's outside options

2. **Main finding: talent retention pressure significantly dampens firm investment**
   - no results for non-talent retention pressure; identified using shift-share instrument

3. **Underlying mechanism**
   - employee voluntary turnover is costly to pre-empt $\longrightarrow$ more severe when TRP is high
   - Mechanism: inelastic retention responses to TRP results in greater talent turnover and reduced talent productivity $\longrightarrow$ reduced capital investment

4. **Implication for aggregate economy:**
   - superstar firms are not affected by talent retention pressure; only laggard firms suffer
   - TRP has limited impact on aggregate investment but boosts industry concentration

Contribution to Literature

- Lackluster US firm investment in the 21st century
  - Gutierrez and Philippon (2017): US firm investment is lackluster to what Q predicts
  - Prior work explored the measurement issue of intangible (Gutierrez and Philippon (2017), Crouzet and Eberly (2023))
  - Our work highlights the key feature of intangible assets that they are partially controlled by talent who can leave (Eisfeldt and Papanikolaou (2013, 2014))

- Organic talent market competition vs. Non-compete policy
  - State non-compete policy does not explain the rising CFO talent retention concerns
  - Non-compete is a policy "response" to deeper talent competition but not a "cause."
  - Our TRP measure helps examine the dynamics of U.S. firm investment

- The importance of superstar firms in the economy
  - Prior work explored superstar firms in product market competition (Gutierrez and Philippon (2018), Autor et al. (2020)); patent competition (Akcigit and Ates (2020)).
  - We show superstar firms are immune to talent market competition

Data and Measure

Data

Data for measuring firms' TRP:

- **Lightcast (formerly Burning Glass Technologies)** $\longrightarrow$ firms' job posting
  - Near universe of U.S. online job postings from 2010 to 2018
  - 1 billion + job postings including occupation, MSA, industry, firm name ...

- **OEWS Microdata** $\longrightarrow$ establishments' occupational employment
  - Administrative microdata from the BLS
  - 1.2 million establishments' employment at SOC 6-digit occupation level

- **O*NET** $\longrightarrow$ occupation tasks to define talent

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Other proprietary data for our tests:

- **Duke CFO Survey Microdata** $\longrightarrow$ CFOs' subjective talent retention concerns

- **Revelio Workforce Dynamics Microdata** $\longrightarrow$ firms' talent outflow

- **Glassdoor Microdata** $\longrightarrow$ job satisfaction of firms' talent

Define Talents

Two steps:

1. **Ranking occupations by skill scores**

   - Baghai et.al (2021 JF) show that skills scores capture talent better than education
   - Skill score = analytical skills + interpersonal skills (from O*Net data)

2. **Industry-specific talent definition**

   - sort occupations by their skill scores within each NAICS4 industry
   - an occupation is talent if ranked within the top 10th percentile by employment shares

Assessment:

- Accounting for different industries demanding different talent, e.g., healthcare vs. finance
- We validate this definition captures CFOs' talent concerns the best using the Duke CFO survey microdata

Measuring Talent Market Competition

Guided by an OJS model (Pissarides (1994)), we measure firms' competition in the local talent market (MSA-Occupation) as

$$Talent\ Market\ Competition_{m,o,t} = \frac{Vacancy_{m,o,t}}{Employment_{m,o,t}}$$

Feature of talent market competition:

- Different from traditional search market where firms compete for unemployed job seekers

- In OJS, firms compete to attract each other's talent—your gain is my lose

- In this competition, firms worry about not only attraction but also retention!

Measuring Firms' Talent Retention Pressure (TRP)

We measure a firm's TRP as its talent's outside options in local talent markets

$$TRP_{f,t} = \sum_{m,o} Share_{f,m,o,t} \frac{V_{-f,m,o,t}}{E_{m,o,t}}$$

- $Share_{f,m,o,t}$: the focal firm's employment share in each talent market
- $V_{-f,m,o,t}$: job posts from **other** firms
- $TRP_{f,t}$: Weighted average abundance of its talent's outside options
- Intuition: Increases in job postings by other firms in a local talent market can expand the outside options of a focal firm's talent and raise the firm's talent retention pressure.4

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Intuition of our measure in an example:

- Seattle Bank has 20 financial managers in Seattle
- Amazon posts 20 vacancies for financial managers in Seattle
- Seattle Bank's financial managers are more likely to switch their jobs
- Seattle Bank's TRP increases

Validation

Validation 1: Does TRP capture CFO's talent retention concerns?

- We merge our TRP measure to the Duke CFO Survey firm-level microdata
- Subjective Retention concern is a dummy variable equals 1 if the CFO chooses "Difficulty attracting/retaining qualified employees" as a top 3 most pressing concerns

TRP and CFO's subjective talent retention concerns

	(1)	(2)	(3)	(4)	(5)
TRP	0.602***	1.629**	1.780**	1.588**	3.236***
	(0.126)	(0.608)	(0.564)	(0.544)	(0.469)
NonTRP				-1.582*	
				(0.790)	
THP					0.012
					(0.013)
Firm Control	N	N	Y	Y	Y
Firm-Regime FE	N	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Observations	275	146	144	144	108
Adjusted R^2	0.026	0.184	0.198	0.199	0.299

Validation 2: Does TRP predict talent outflows?

- We merge TRP to the Reveilio Workforce Dynamic Microdata
- Our TRP measure captures a credible threat of **losing** talent

	Talent Outflow Rate			Talent Inflow Rate		
	t	$t+1$	$t+2$	t	$t+1$	$t+2$
	(1)	(2)	(3)	(4)	(5)	(6)
TRP	0.403	5.843***	3.902	-0.327	4.116	-1.001
	(1.607)	(1.852)	(2.378)	(2.857)	(3.222)	(3.461)
Firm Controls	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	6,878	6,637	5,638	6,878	6,637	5,638
Adjusted R^2	0.441	0.437	0.436	0.425	0.412	0.391

Main Finding: TRP and Investment

Main Finding: TRP and physical investment

Regression Specification:

$$CAPX_{i,t+1}/AT_{i,t} = \beta \cdot TRP_{i,t} + X_{i,t} + \text{Firm FE} + \text{Year FE} + \epsilon_{i,t}$$

	(1)	(2)	(3)
TRP	-1.472***	-1.717***	-1.605***
	(0.486)	(0.502)	(0.495)
NonTRP		1.609**	
		(0.654)	
THP			0.002
			(0.004)
Job Posting			0.125**
			(0.06)
Q	0.643***	0.636***	0.637***
	(0.056)	(0.056)	(0.056)
Cashflow	1.917***	1.912***	1.917***
	(0.401)	(0.401)	(0.401)
Size	-0.895***	-0.913***	-0.949***
	(0.183)	(0.183)	(0.182)
Age	-2.449**	-2.456**	-2.566**
	(1.116)	(1.119)	(1.116)
Firm FE	Y	Y	Y
Year FE	Y	Y	Y
Observations	11,985	11,985	11,985
Adjusted R^2	0.719	0.720	0.720

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Robustness: TRP and total investment

Total investment and total Q following Peters and Taylor (2017)

- tangible capital + intangible capital

	(1)	(2)	(3)
TRP	-2.044**	-2.358***	-2.203***
	(0.841)	(0.855)	(0.842)
NonTRP		1.976	
		(1.389)	
THP			0.003
			(0.007)
Job Posting			0.142
			(0.111)
Total Q	2.221***	2.213***	2.220***
	(0.133)	(0.132)	(0.133)
Cashflow	3.132***	3.131***	3.122***
	(0.889)	(0.888)	(0.888)
Size	-1.961***	-1.979***	-2.022***
	(0.431)	(0.431)	(0.429)
Age	-18.796***	-18.792***	-18.917***
	(2.327)	(2.323)	(2.332)
Firm FE	Y	Y	Y
Year FE	Y	Y	Y
Observations	10,581	10,581	10,581
Adjusted R^2	0.807	0.806	0.807

Endogeneity concerns and instrument

- Endogeneity concerns:
    - Concern 1: unobserved local drivers
        - shift-share idea: replace local V/E growth with national occupation growth
    - Concern 2: firms endogenous relocate across talent markets
        - fix firms' exposure to talent market as of the initial period
    - Concern 3: isolate labor market from product market
        - using only vacancies posted by non-peer firms

- Shift-share IV for TRP:

$$IV_{i,t} = \sum_{m,o} s_{i,m,o,2010} \times \frac{V_{-i,m,o,2010}}{E_{m,o,2010}} \times G_{o,t}$$

$$= \sum_{o} \underbrace{\left[\sum_{m} s_{i,m,o,2010} \times \frac{V_{-i,m,o,2010}}{E_{m,o,2010}} \right]}_{\text{share}} \times \underbrace{G_{o,t}}_{\text{shift}}, \tag{1}$$

- Cross-sectional variation of IV: firms' initial exposure to talent markets in 2010
- Time-series variation of IV: National growth rate of V/E for each occupation

Shift-share instrument for talent retention pressure

	Physical Investment		Total Investment	
2SLS IV Type:	IV	NonPeer IV	IV	NonPeer IV
	(1)	(2)	(3)	(4)
2SLS(TRP)	-5.352**	-5.639***	-11.277***	-11.128***
	(2.091)	(2.180)	(3.567)	(3.661)
Q	0.654***	0.652***		
	(0.063)	(0.063)		
Total Q			2.159***	2.158***
			(0.144)	(0.144)
Cashflow	2.002***	2.012***	2.976***	3.006***
	(0.442)	(0.441)	(0.973)	(0.972)
Size	-0.878***	-0.879***	-2.044***	-2.051***
	(0.193)	(0.193)	(0.458)	(0.457)
Age	-2.656**	-2.637**	-18.106***	-18.125***
	(1.253)	(1.254)	(2.508)	(2.508)
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Observations	11,110	11,110	9,863	9,863
Adjusted R^2	0.040	0.040	0.206	0.208

Underlying Mechanism

- Motivated by literature on employee voluntary turnover, we show:

- firms exhibit inelastic retention responses to TRP

- hence, TRP leads to more talent turnover and reduced talent productivity

$\longrightarrow$ low capital investment

Ineffective talent retention responses to TRP—compensation

We compute the average wage rate for talent based on BLS establishment-occupation-level wage (including bonuses); We compute wage premium $= \text{wage}_{i,t} - \overline{\text{wage}}_{m,o,t}$

	Talent Wage			Talent Wage Premium		
	t (1)	$t+1$ (2)	$t+2$ (3)	t (4)	$t+1$ (5)	$t+2$ (6)
TRP	0.088** (0.036)	0.052 (0.036)	0.010 (0.035)	0.003 (0.026)	0.023 (0.027)	0.002 (0.027)
Firm Control	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	12,354	9,544	7,458	12,288	9,492	7,417
Adjusted R^2	0.796	0.812	0.813	0.556	0.578	0.580

Like a price war, if all firms increase the price, then increasing prices does not gain you a competitive advantage ex post.

We reconstruct talent satisfaction based on Glassdoor employee reviews

	Satisfaction of All Employees			Satisfaction of Talent		
	t	$t+1$	$t+2$	t	$t+1$	$t+2$
	(1)	(2)	(3)	(4)	(5)	(6)
TRP	-0.093	-0.234**	0.128	0.016	-0.285	0.062
	(0.098)	(0.109)	(0.133)	(0.203)	(0.260)	(0.272)
Firm Control	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	6,403	5,739	5,307	3,821	3,474	3,250
Adjusted R^2	0.401	0.398	0.396	0.266	0.258	0.257

Talent Retention Pressure and Job Posting for Talent

Job posting $= \log(1 + \#job\ postings)$

	Job Posting		
	t	$t+1$	$t+2$
	(1)	(2)	(3)
TRP	0.445***	0.228	-0.019
	(0.123)	(0.158)	(0.160)
Firm Control	Y	Y	Y
Firm FE	Y	Y	Y
Year FE	Y	Y	Y
Observations	12,799	9,864	7,668
Adjusted R^2	0.857	0.857	0.862

Talent productivity $=$ sales/#talent

	Talent Productivity		
	t	$t+1$	$t+2$
	(1)	(2)	(3)
TRP	-0.800	-3.192**	-2.083
	(1.919)	(1.386)	(1.421)
Firm Control	Y	Y	Y
Firm FE	Y	Y	Y
Year FE	Y	Y	Y
Observations	12,643	9,751	7,601
Adjusted R^2	0.674	0.678	0.676

Implications for Aggregate Economy

Superstar vs. Laggard Firms: Heterogeneous Investment

Suerstar firms: Top 4 firms by sales within NAICS4 industry (Gutierrez and Philippon (2018))

	Physical Investment (1)	Total Investment (2)
TRP × Superstar	3.319***	5.614***
	(0.818)	(1.542)
TRP	-1.821***	-2.684***
	(0.518)	(0.893)
Superstar	-0.811*	-0.714
	(0.426)	(0.610)
Firm Control	Y	Y
Firm FE	Y	Y
Year FE	Y	Y
Observations	11,985	10,581
Adjusted R^2	0.720	0.807

Superstar vs. Laggard Firms: Talent Flows

Two camps of explanations for investment results:

- **Institutional resilience:** Superstar firms' growth is resilient to talent outflows
- **Talent resilience:** Superstar firms' talent are less likely to leave when TRP rises

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	Talent Outflow Rate			Talent Inflow Rate		
	t (1)	$t+1$ (2)	$t+2$ (3)	t (4)	$t+1$ (5)	$t+2$ (6)
TRP $\times$ Superstar	-0.111 (2.927)	-8.711*** (2.838)	-7.643** (3.703)	8.223* (4.319)	-6.045 (4.187)	-5.483 (5.661)
TRP	0.189 (1.680)	6.585*** (1.982)	4.337* (2.522)	-1.384 (2.965)	4.474 (3.334)	-0.405 (3.656)
Superstar	-0.283 (0.897)	2.130** (0.830)	2.014* (1.110)	-2.898** (1.379)	3.025*** (1.167)	3.137** (1.495)
Firm Control	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	6,877	6,637	5,638	6,877	6,637	5,638
Adjusted R^2	0.441	0.441	0.440	0.434	0.423	0.402

Support talent resilience: talent are less likely to leave superstar firms when TRP is high

Superstar vs. Laggard Firms: Retention vs. Job Ladder

Two camps of explanations for outflow results:

- **Elastic retention:** Superstar firms increase retention efforts when TRP is higher

- **Status in job ladder:** Talents are more satisfied in superstar firms even if the firms do not respond to TRP

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	Talent Wage Premium			Satisfaction of Talent		
	t (1)	$t+1$ (2)	$t+2$ (3)	t (4)	$t+1$ (5)	$t+2$ (6)
TRP × Superstar	0.110***	0.099**	0.062	0.061	1.484***	-0.162
	(0.041)	(0.042)	(0.043)	(0.404)	(0.508)	(0.533)
TRP	-0.009	0.013	-0.005	0.178	-0.258	-0.061
	(0.027)	(0.029)	(0.027)	(0.217)	(0.274)	(0.305)
Superstar	-0.029**	-0.023**	-0.018	-0.010	-0.418***	0.199
	(0.014)	(0.012)	(0.012)	(0.157)	(0.160)	(0.182)
Firm Control	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	12,354	9,544	7,458	3,714	3,379	3,157
Adjusted R^2	0.558	0.580	0.582	0.264	0.257	0.254

Cannot reject the elastic retention channel.

Recap on Superstar firm results

Substantial heterogeneity between superstar and laggard firms

- Superstar firms' growth appears immune to talent market competition

- Superstar firms' talent appears resilient to outside options stemming from talent market competition

- Some evidence that superstar firms more elastically retain talent in response to talent market competition, departing from the conventional wisdom that smaller firms are more nimble.

We next explore the aggregate implications of this heterogeneity!

Widening Investment-Q Gap in 21st Century

- Gutiérrez and Philippon (2017): Investment increasingly falls below the level predicted by Q
  - $CAPX_{i,t+1}/AT_{i,t} = \sum_t \gamma_t YearDummy_t + \alpha Q_{i,t} + \text{Firm FE} + \epsilon_{i,t}$

Investment-Q Gap

Basic Q Model
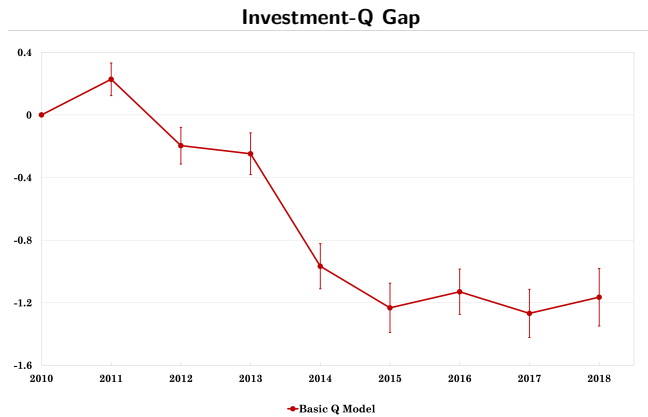
Rising Talent Retention Pressure and Widening Investment-Q Gap

Q: How much does rising TRP contribute to the widening investment-Q gap in 2010s?

- Q Model:
  - $CAPX_{i,t+1}/AT_{i,t} = \sum_t \gamma_t YearDummy_t + \alpha Q_{i,t} + \text{Firm FE} + \epsilon_{i,t}$
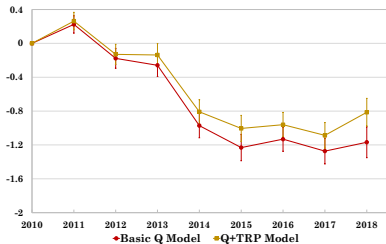
- Q + TRP Model:
  - $CAPX_{i,t+1}/AT_{i,t} = \sum_t \eta_t YearDummy_t + \psi TRP_{i,t} + \alpha Q_{i,t} + \text{Firm FE} + \epsilon_{i,t}$
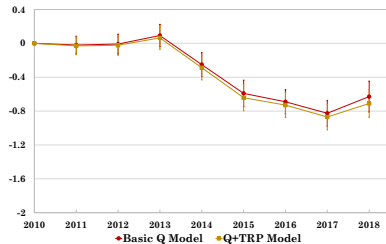
- Comparing γ_t and η_t tells how much rising TRP can explain the widening investment-Q gap in the 2010s
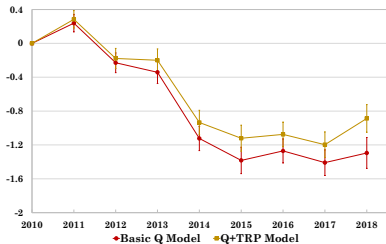
Talent Retention Pressure and Investment-Q Gap
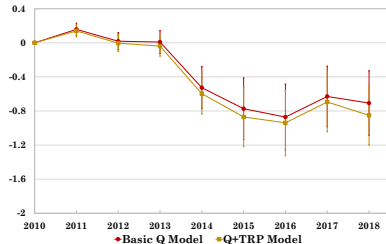

Panel A: Average Firms' Investment-Q Gap

Panel B: Superstar Firms' Investment-Q Gap

Panel C: Laggard Firms' Investment-Q Gap

Panel D: Aggregate Investment-Q Gap

Talent Retention Pressure and Industry Concentration

	CR4 of Industry$_{t+1}$	
	(1)	(2)
TRP	1.169**	0.962**
	(0.521)	(0.480)
Q		-0.120
		(0.088)
Cashflow		-0.424
		(0.601)
Size		0.169
		(0.234)
Age		-0.579***
		(0.205)
Industry FE	Y	Y
Year FE	Y	Y
Observations	1,773	1,751
Adjusted R^2	0.917	0.921

How does firms' competition for talent affect their growth?

- **We construct a new measure to systematically answer this question**

Key takeaway

- Talent retention pressure significantly dampens firm investment

- Firms' inability to retain their talent appears to be the core issue

- Talent market competition substantially shapes the race of firm growth

Many Unanswered Questions about Talent Retention

1. How to design an effective talent retention strategy for firms?

2. How does firms' ESG practice affect their "retention" of talent?

3. Do large firms "overstock" talent and drain small firms' talent access?

4. Are workers "excessively" exploiting outside options, causing welfare losses?

5. How does business cycle affect retention-driven investment cuts?

Thank You!

Appendix

CFO Perception and TRP using Other Definitions of Talent

Dependent Variable:
CFOs rank "Difficulty in Hiring and Retaining Qualified Employees" as a top concern

	Within-Industry Ranking by			National Ranking by
	Wage (1)	College Degree (2)	Work Experience (3)	Skill (4)
TRP	0.364 (0.504)	-0.789 (0.867)	1.034* (0.548)	0.745 (0.414)
Q	0.0672 (0.111)	0.111 (0.129)	0.067 (0.113)	0.077 (0.110)
Cashflow	1.184* (0.538)	1.250** (0.526)	1.174* (0.583)	1.151* (0.561)
Size	0.320 (0.257)	0.106 (0.196)	0.336 (0.258)	0.351 (0.237)
Age	-2.509 (2.171)	-2.001 (1.898)	-2.921 (2.284)	-3.010 (2.213)
Firm-Regime FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Observations	147	142	147	147
Adjusted R^2	0.135	0.187	0.160	0.166

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Robustness Checks Using Alternative Cutoffs in Talent Definition

	Top 7.5%	Top 10% (Baseline)	Top 20%
	(1)	(2)	(3)
TRP	-1.056**	-1.472***	-1.091**
	(0.425)	(0.486)	(0.547)
Q	0.649***	0.643***	0.643***
	(0.057)	(0.056)	(0.059)
Cashflow	2.044***	1.917***	1.640***
	(0.426)	(0.401)	(0.425)
Size	-0.882***	-0.895***	-0.891***
	(0.185)	(0.183)	(0.187)
Age	-2.300**	-2.449**	-2.333**
	(1.163)	(1.116)	(1.118)
Firm FE	Y	Y	Y
Year FE	Y	Y	Y
Observations	11,908	11,985	12,156
Adjusted R^2	0.718	0.719	0.719

Talent Retention Pressure and Long-Term Investment

Panel A: Physical Investment

	$t+1$	$t+2$		$t+3$	
	(1)	(2)	(3)	(4)	(5)
TRP_t	-1.472***	-1.245**	-1.092*	-0.278	0.103
	(0.486)	(0.488)	(0.615)	(0.517)	(0.621)
TRP_{t+1}			-0.867**		-1.348**
			(0.442)		(0.526)
TRP_{t+2}					-0.304
					(0.484)
Firm Control	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Observations	11,985	11,288	9,748	10,634	7,702
Adjusted R^2	0.719	0.695	0.723	0.679	0.736

Panel B: Total Investment

	$t+1$	$t+2$		$t+3$	
	(1)	(2)	(3)	(4)	(5)
TRP_t	-2.042**	-1.423*	0.370	-0.449	1.481
	(0.901)	(0.849)	(1.102)	(1.014)	(1.039)
TRP_{t+1}			-2.277***		-1.448
			(0.824)		(0.997)
TRP_{t+2}					-0.651
					(0.887)
Firm Control	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Observations	10,508	9,869	8,549	8,429	6,769
Adjusted R^2	0.789	0.772	0.786	0.765	0.785

Instrument for Talent Retention Pressure: First Stage

	TRP	
	First Stage (1)	Diagnose (2)
TRP IV	0.424*** (0.036))	0.560*** (0.032)
Q	0.001 (0.001)	0.001 (0.002)
Cashflow	-0.012 (0.011)	-0.006 (0.010)
Size	0.007* (0.004)	0.007* (0.004)
Age	0.026 (0.033)	0.043*** (0.030)
Firm FE	Y	Y
Year FE	Y	Y
Observations	11,853	11,853
Adjusted R^2	0.639	0.674

Diagnosing IV: Pre-sample Investment and In-sample IV

	Physical Investment$_t$		Total Investment$_t$	
	(1)	(2)	(3)	(4)
TRP IV$_{t+9}$	0.001	0.018	0.018	0.032
	(0.012)	(0.012)	(0.032)	(0.028)
Q$_{t-1}$		0.007***		
		(0.001)		
Total Q$_{t-1}$				0.001*
				(0.000)
Cashflow$_{t-1}$		0.024***		0.108***
		(0.005)		(0.015)
Size$_{t-1}$		-0.015***		-0.017***
		(0.002)		(0.006)
Age$_{t-1}$		-0.017		-0.183***
		(0.015)		(0.035)
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Observations	9801	8098	8405	7082
Adjusted R^2	0.647	0.707	0.609	0.669

Diagnosing IV: Controlling Firms' Initial Characteristics

Firm 2010 Char		Q	Cashflow	Size	Age	All
	(1)	(2)	(3)	(4)	(5)	(6)
2SLS(TRP)	-5.352**	-6.857***	-7.077***	-6.669***	-7.011***	-6.703***
	(2.091)	(2.383)	(2.378)	(2.354)	(2.379)	(2.476)
Firm 2010 Char×Year Dummies	N	Y	Y	Y	Y	Y
Firm Control	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	11110	8998	9184	9329	9329	8980
Adjusted R^2	0.040	0.034	0.033	0.036	0.032	0.037

Panel A: Top 5 Occupations with High Rotemberg Weights		
Occupation	SOC-5	Rotemberg Weight
Marketing and Sales Managers	11-202	0.603
Miscellaneous Managers	11-919	0.147
First-Line Supervisors of Sales Workers	41-101	0.144
Market Research Analysts and Marketing Specialists	13-116	0.070
Management Analysts	13-111	0.068

Diagnosing IV: Occupation Shares and Firm Characteristics

	Panel B: Relation between Occupation Shares and Firm Characteristics				
SOC-5	11-202	11-919	41-101	13-116	13-111
	(1)	(2)	(3)	(4)	(5)
Q	0.715***	-0.086	0.101**	0.182***	0.013
	(0.154)	(0.065)	(0.049)	(0.059)	(0.089)
Cashflow	0.209	0.100	0.025	-0.287	-0.007
	(0.991)	(0.454)	(0.289)	(0.374)	(0.535)
Size	-0.262***	0.154***	0.126***	-0.062**	-0.116**
	(0.078)	(0.052)	(0.032)	(0.030)	(0.050)
Age	-0.854	-0.521	-0.588	-0.013	2.146
	(1.775)	(0.788)	(0.533)	(0.616)	(1.433)
Observations	1377	1377	1377	1377	1377
Adjusted R^2	0.033	0.006	0.014	0.014	0.005

Diagnosing IV: Instrument without Selected Occupations

Excluded Occupations	None	Top 1	Top 2	Top 3	Top 4	Top 5
	(1)	(2)	(3)	(4)	(5)	(6)
2SLS(TRP)	-5.639***	-9.063***	-6.477**	-7.581**	-6.194*	-4.653
	(2.180)	(2.649)	(2.558)	(3.143)	(3.255)	(3.131)
Q	0.652***	0.658***	0.655***	0.656***	0.655***	0.653***
	(0.063)	(0.064)	(0.063)	(0.064)	(0.063)	(0.063)
Cashflow	2.012***	1.924***	1.978***	1.955***	1.984***	2.017***
	(0.441)	(0.444)	(0.444)	(0.446)	(0.447)	(0.445)
Size	-0.879***	-0.850***	-0.869***	-0.861***	-0.872***	-0.883***
	(0.193)	(0.196)	(0.194)	(0.193)	(0.191)	(0.191)
Age	-2.637**	-2.504**	-2.610**	-2.565**	-2.622**	-2.685**
	(1.254)	(1.276)	(1.255)	(1.262)	(1.248)	(1.241)
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	11110	11110	11110	11110	11110	11110
Adjusted R^2	0.719	0.726	0.726	0.726	0.725	0.725

Robustness Check: Talent Retention Pressure from NonPeers

	Physical Investment	Total Investment
	(1)	(2)
TRP NonPeer	-1.540***	-2.081**
	(0.498)	(0.841)
Q	0.642***	
	(0.056)	
Total Q		2.220***
		(0.133))
Cashflow	1.919***	3.135***
	(0.401)	(0.889)
Size	-0.896***	-1.962***
	(0.183)	(0.431)
Age	-2.444**	-18.796***
	(1.117)	(2.327)
Firm FE	Y	Y
Year FE	Y	Y
Observations	11,985	10,581
Adjusted R^2	0.719	0.807

How likely will a firm lose its talent to other employers?

$$\underbrace{\text{Risk from Labor Market Competition}}_{\text{Our Paper}} \quad \times \quad \underbrace{\text{Job Switch Regulations}}_{\text{Previous Literature}}$$

- Job Switch Regulations
  - Non-compete agreements, immigration policies, and etc.
  - Garmaise (2011), Shen (2021), Jeffers (2023), Bai et al. (2023), Chen at el (2023), among others

- Our Paper
  - a TRP measure based on the fundamental risk from local talent market competition
  - proxied by talent outside options

TRP and Firms' Labor Market Response

- Wage: increase but not beyond the market price
- Job post: increase but not covert into more talent inflows

	Wage of Talent (1)	Wage Premium of Talent (2)	Job Posting for Talent (3)
TRP	0.013**	-0.018	34.839**
	(0.036)	(1.653)	(16.949)
Q	-0.001	-0.103	3.216**
	(0.003)	(0.126)	(1.587)
Cashflow	0.021	-0.029	0.699
	(0.020)	(0.096)	(16.158)
Size	-0.035**	-0.445	21.044***
	(0.008)	(0.373)	(6.885)
Age	-0.040	0.819	48.172
	(0.061)	(2.667)	(39.287)
Firm FE	Y	Y	Y
Year FE	Y	Y	Y
Observations	12,350	12,284	6,332
Adjusted R^2	0.796	0.561	0.696

Many Reasons to Believe Managers Are Special

A large literature shows that managers are pivotal for firms

- Hoffman and Tadelis (2020): Managers' exodus affects subordinates' attrition
- Caliendo and Rossi-Hansberg (2012): Managers provide knowledge while other employees provide labor

We divide skilled labor in **Management** and **Non-Management**

Managers in our TRP measure

Manager Title	Emp. Share
General and Operations Managers	17%
Computer and Information Systems Managers	14%
Architectural and Engineering Managers	10%
Financial Managers	9%
Sales Managers	9%
Marketing Managers	8%
Industrial Production Managers	6%
Administrative Services Managers	3%
Transportation, Storage, and Distribution Managers	3%
Human Resources Managers	3%
Purchasing Managers	3%
Chief Executives	2%
Natural Sciences Managers	1%
...	...

A Glance at Talents
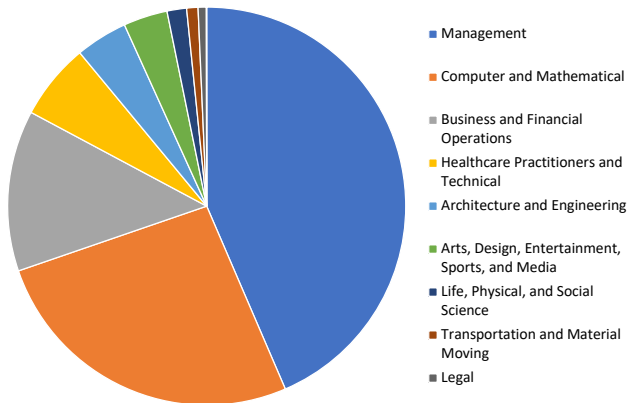
Figure: SOC 2-digits Distribution of Skilled Occupation

Legend:
- Management
- Computer and Mathematical
- Business and Financial Operations
- Healthcare Practitioners and Technical
- Architecture and Engineering
- Arts, Design, Entertainment, Sports, and Media
- Life, Physical, and Social Science
- Transportation and Material Moving
- Legal

Management

Talent Retention and New Investment: Kellogg Survey

The survey was sent out in October 2003 with a cover letter from the Dean Emeritus of the Kellogg School of Management, Donald Jacobs, along with a postage-paid return envelope to a total of 4,600 CFOs of U.S. companies listed in the Compustat name file. 4 We asked the participants to return the questionnaire within ten days. A week after the initial mailing we sent a follow-up mailing. The survey was completed by the CFOs of 127 companies—113 public and 14 private.

There are some good projects we cannot take due to limited access to capital markets.

39% Financial Constraints

We cannot take all profitable projects due to limited resources in the form of limited qualified management and manpower.

55% Operational Constraints

We need a higher hurdle rate to account for optimism in cash flow forecasts.

| 0% | 20% | 40% | 60% | 80% | 100% |

▧ –2 (Strongly disagree)   ▨ –1   ☐ 0   ▦ +1   ■ +2 (Strongly agree)

Back
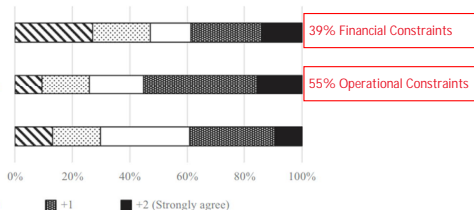
Motivation: Aggregate Firm Discussion of Talent Labor Risks

Firm perspective of skilled labor risks

- Replicated from method in Qiu and Wang (forthcoming) and extended to 2020

Firm Discussions of Skilled Labor Risk

DUKE THE FUQUA SCHOOL OF BUSINESS **CFO**
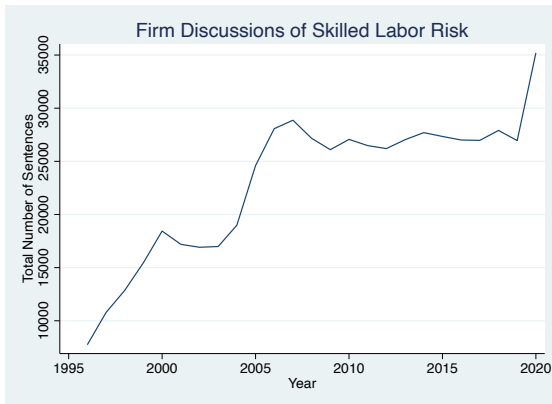
Duke University/CFO
Global Business Outlook Survey

3a. During the past quarter, which items have been the most pressing concerns for your company's top management team? (Choose up to 4)

- [ ] Access to capital
- [ ] Corporate tax code
- [ ] Cost of benefits
- [ ] Cost of borrowing
- [ ] Currency risk
- [ ] Data security
- [ ] Deflation
- [ ] Difficulty attracting / retaining qualified employees
- [ ] Economic uncertainty
- [ ] Employee morale

- [ ] Employee productivity
- [ ] Geopolitical / health crises
- [ ] Government policies
- [ ] Inflation
- [ ] Regulatory requirements
- [ ] Rising input or commodity costs
- [ ] Rising wages and salaries
- [ ] Weak demand for your products/services
- [ ] Other

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