

Talent Market Competition and Firm Growth

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Motivation & Research Questions

Motivation

- ▶ Competition for talent is central for firms in the 21st century.
- ▶ “Attracting and retaining talent” is firms’ most pressing internal concern.

Research Question: How does talent market competition affect the firms’ growth (firms’ investment)?

- ▶ How to characterize the *intensity* of talent market competition?
- ▶ How do firms address talent market competition?
- ▶ To what extent does talent market competition shape firm growth?

Empirical Challenges

1. Difficult to measure firms' exposure to talent markets
 - ▶ Talent concerns a small group of highly skilled labor in the firms
 - ▶ How to empirically define *talent*? How to measure the exposure to the talent market.
2. Difficult to measure talent market competition
 - ▶ Talent is less likely to be unemployed.
 - ▶ Traditional labor market tightness measure, i.e., the vacancy-to-unemployment ratio, is inappropriate to capture talent market competition.

Overview

- ▶ A measure of talent market competition and talent retention pressure
- ▶ Talent retention pressure significantly dampens firms' investment
- ▶ Employee voluntary turnover is severe when TRP is high.
 - ▶ Inelastic talent retention responses to TRP → Talent turnover when TRP is high → Reduced talent productivity → Reduced capital investment
- ▶ Superstar firms are not affected by TRP but laggard firms suffer, in terms of investment and talent flows.
- ▶ Rising TRP leads to limited impact on aggregate U.S. investment but increased industry concentration.

Data

- ▶ Lightcast (Burning Glass): firms' job posting data
- ▶ OEWS microdata: establishments' occupational employment
- ▶ O*NET: occupation task data
- ▶ Duke CFO survey microdata: CFO's subjective concerns
- ▶ Revelio microdata: individual online resumes and profiles
- ▶ Glassdoor microdata: job satisfaction

Talent

1. Skill scores following (Acemoglu and Autor 2011, Baghai et al., 2021)
 - ▶ Skill score = analytical skills + interpersonal skills
2. Industry aggregation following (Baghai et al., 2021)
 - ▶ Aggregate the above skill scores to industry level (4-digit NAICS code)
 - ▶ Sort within each industry by the skill measure in each year

An occupation o is considered a talent for industry i in the year if the occupation ranks within the **top 10th percentile** by employment shares.

Talent Composition

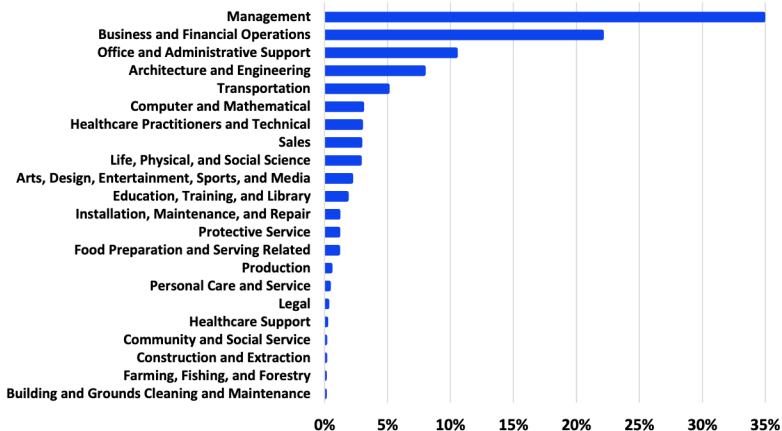


Figure: Composition of Talent

Talent Market Competition

Characteristics of talent market competition:

- ▶ The traditional labor market competes for unemployed individuals
- ▶ The talent market cares about attraction and **retention**.

Following the OJS model (on-the-job search model. Pissarides, 1994), the firm's competition in the local talent market is¹

$$\text{Talent Market Competition}_{m,o,t} = \frac{\text{Vacancy}_{m,o,t}}{\text{Employment}_{m,o,t}}$$

¹ m : MSA; o : occupation; t : year

TRP

Define TRP as talent's outside options in local talent markets. 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.

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

- ▶ $\text{Share}_{f,m,o,t}$: 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

Validation: TRP and CFO Concerns

$$\text{TalentConcern}_{i,t}^{CFO} = \beta \cdot \text{TRP}_{i,t} + X_{i,t} + \text{Firm-Regime FE} + \text{Year FE} + \epsilon_{i,t}$$

	(1)	(2)	(3)	(4)	(5)
TRP	0.602*** (0.126)	1.629** (0.608)	1.780** (0.564)	1.588** (0.544)	3.236*** (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

Figure: Validation: TRP and CFO Concerns

- Subjective retention concern dummy equals 1 if "difficulty attracting and retaining qualified employees" was elected in the top three concerns.

Validation: TRP and Future Talent Outflows

$$\text{Talent Outflow Rate}_{i,t+k} = \beta \cdot \text{TRP}_{i,t} + X_{i,t} + \text{Firm FE} + \text{Year FE} + \epsilon_{i,t}$$

<i>Panel A: Talent Outflow Rate</i>						
	<i>t</i>		<i>t</i> + 1		<i>t</i> + 2	
	(1)	(2)	(3)	(4)	(5)	(6)
TRP	1.097 (1.562)	0.336 (1.574)	6.035*** (1.815)	5.580*** (1.835)	4.896** (2.245)	3.482 (2.353)
Firm Control	N	Y	N	Y	N	Y
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	7,176	6,877	7,113	6,637	6,077	5,638
Adjusted R ²	0.429	0.441	0.426	0.440	0.422	0.439

Figure: Validation: TRP and Future Talent Outflow

- ▶ Job-to-job outflow rate as the number of talent leaving the firm in year t divided by the total number of talent at the beginning of the year

Baseline Regression

$$\text{Inv}_{i,t+1} = \beta \cdot \text{TRP}_{i,t} + X_{i,t} + \text{Firm FE} + \text{Year FE} + \epsilon_{i,t}$$

- ▶ The firm's physical investment is defined as next year's capital expenditure normalized by this year's total assets.
- ▶ The firm's total investment is defined as next year's physical and intangible expenditures divided by this year's total assets.
- ▶ Controls include common investment predictors: Tobin's Q, cash flows, firm size, total assets, and firm age.

Baseline Regression Results

	Physical Investment			Total Investment		
	(1)	(2)	(3)	(4)	(5)	(6)
TRP	-1.472*** (0.486)	-1.717*** (0.502)	-1.605*** (0.495)	-2.044** (0.841)	-2.358*** (0.855)	-2.203*** (0.842)
NonTRP		1.609** (0.654)			1.976 (1.389)	
THP			0.002 (0.004)			0.003 (0.007)
Job Posting			0.125** (0.06)			0.142 (0.111)
Q	0.643*** (0.056)	0.636*** (0.056)	0.637*** (0.056)			
Total Q				2.221*** (0.133)	2.213*** (0.132)	2.220*** (0.133)
Cashflow	1.917*** (0.401)	1.912*** (0.401)	1.917*** (0.401)	3.132*** (0.889)	3.131*** (0.888)	3.122*** (0.888)
Size	-0.895*** (0.183)	-0.913*** (0.183)	-0.949*** (0.182)	-1.961*** (0.431)	-1.979*** (0.431)	-2.022*** (0.429)
Age	-2.449** (1.116)	-2.456** (1.119)	-2.566** (1.116)	-18.796*** (2.327)	-18.792*** (2.323)	-18.917*** (2.332)
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	11,985	11,985	11,985	10,581	10,581	10,581
Adjusted R ²	0.719	0.720	0.720	0.807	0.806	0.807

Endogeneity Concerns

1. Omitted TRP and investment drivers from local talent markets
 - ▶ Replace local v - e ratio with national growth of each occupation's v - e ratio
2. Endogenous labor reallocation across local markets
 - ▶ Fix firms' talent exposure at the levels observed at the beginning of the sample period
3. Firm's product market competitors may post jobs based on their expectations of the focal firm's investment
 - ▶ Use only non-peer's job postings to mitigate the product market competition channel

Shift-share Instrument

$$\begin{aligned}
 IV_{i,t} &= \sum_{m,o} s_{i,m,o,2010} \times \frac{V_{-i,m,o,2010}}{E_{m,o,2010}} \times G_{o,t} \\
 &= \sum_o \underbrace{\left[\sum_m s_{i,m,o,2010} \times \frac{V_{-i,m,o,2010}}{E_{m,o,2010}} \right]}_{\text{share}} \times \underbrace{G_{o,t}}_{\text{shift}}
 \end{aligned}$$

where $G_{o,t}$ is the cumulative growth rate of occupation o 's V/E ratio from 2010 to t

Two sources of variations:

1. Cross-sectional variation: in each occupation's retention pressure on the firm in 2010, i.e., $\sum_m s_{i,m,o,2010} \times \frac{V_{-i,m,o,2010}}{E_{m,o,2010}}$
2. Time-series variation: changes in the competition for the occupation at the national level, i.e., $G_{o,t}$

2SLS Results

<i>2SLS IV Type:</i>	Physical Investment		Total Investment	
	IV (1)	NonPeer IV (2)	IV (3)	NonPeer IV (4)
2SLS(TRP)	-5.352** (2.091)	-5.639*** (2.180)	-11.277*** (3.567)	-11.128*** (3.661)
Q	0.654*** (0.063)	0.652*** (0.063)		
Total Q			2.159*** (0.144)	2.158*** (0.144)
Cashflow	2.002*** (0.442)	2.012*** (0.441)	2.976*** (0.973)	3.006*** (0.972)
Size	-0.878*** (0.193)	-0.879*** (0.193)	-2.044*** (0.458)	-2.051*** (0.457)
Age	-2.656** (1.253)	-2.637** (1.254)	-18.106*** (2.508)	-18.125*** (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
F stat.	131.414	142.313	126.929	136.581

Figure: Instruments for Talent Retention Pressure

Testing Model Mechanism

1. Firms are unable to fully avoid losing talent when talent's outside options become more abundant
2. Firms increase their current job postings when facing higher TRP so as to fill in the slots due to potential talent loss
3. Talent turnover reduces average talent productivity as newly hired talent takes time to be productive

Testing Model: limited retention responses (talent wage and non-pecuniary factors)

Ineffective Compensation Responses

	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

Figure: Responses of Compensation to TRP

1. Firms do not increase the wage rate more than other firms in the talent market
2. → Increasing wages does not appear to be an effective way to retain talent if all other firms in the local talent market increase their talent wages.

Lack of Employee Satisfaction Responses

Non-pecuniary factors: career opportunity, leadership, work-life balance, and corporate culture (satisfaction reviews from Glassdoor microdata)

	Satisfaction of All Employees			Satisfaction of Talent		
	t (1)	$t + 1$ (2)	$t + 2$ (3)	t (4)	$t + 1$ (5)	$t + 2$ (6)
TRP	-0.093 (0.098)	-0.234** (0.109)	0.128 (0.133)	0.016 (0.203)	-0.285 (0.260)	0.062 (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

Figure: Responses of Satisfaction to TRP

Increasing Job Postings

	Job Posting		
	t (1)	$t + 1$ (2)	$t + 2$ (3)
TRP	0.445*** (0.123)	0.228 (0.158)	-0.019 (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

Figure: Responses of Job Postings to TRP

- ▶ The job posting response is swift and short-lived → Firms post more jobs in response to the concurrent year's TRP as they want to prepare for losing talent in the near future.

Reduced Talent Productivity

Reduced talent productivity lowers the marginal product of capital and reduces firm investment.

Talent Productivity: Total sales/Total number of talents

	Talent Productivity		
	t (1)	$t + 1$ (2)	$t + 2$ (3)
TRP	-0.800 (1.919)	-3.192** (1.386)	-2.083 (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

Figure: Responses of Talent Productivity to TRP

Superstar vs. Laggard Firms: Heterogeneous Investment

	Physical Investment (1)	Total Investment (2)
TRP × Superstar	3.319*** (0.818)	5.614*** (1.542)
TRP	-1.821*** (0.518)	-2.684*** (0.893)
Superstar	-0.811* (0.426)	-0.714 (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

Figure: Heterogeneous Investment Effect: Superstar vs. Laggard firms

- Sum of reported coefficients in each column is positive → Superstar firms' investment is immune to TRP

Superstar vs. Laggard Firms: Talent Flows

<i>Panel A: Heterogeneous Talent Flows</i>						
	Talent Outflow Rate			Talent Inflow Rate		
	<i>t</i> (1)	<i>t</i> + 1 (2)	<i>t</i> + 2 (3)	<i>t</i> (4)	<i>t</i> + 1 (5)	<i>t</i> + 2 (6)
TRP × 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

- ▶ Institutional resilience: Superstar firms' capital investment may be less susceptible to talent outflows
- ▶ Talent resilience: Superstar firms' talent may be less attracted to outside options

Elastic Retention vs. Job Satisfaction

	Talent Wage Premium			Satisfaction of Talent		
	t (1)	$t + 1$ (2)	$t + 2$ (3)	t (4)	$t + 1$ (5)	$t + 2$ (6)
TRP \times Superstar	0.110*** (0.041)	0.099** (0.042)	0.062 (0.043)	0.061 (0.404)	1.484*** (0.508)	-0.162 (0.533)
TRP	-0.009 (0.027)	0.013 (0.029)	-0.005 (0.027)	0.178 (0.217)	-0.258 (0.274)	-0.061 (0.305)
Superstar	-0.029** (0.014)	-0.023** (0.012)	-0.018 (0.012)	-0.010 (0.157)	-0.418*** (0.160)	0.199 (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

Figure: Heterogeneous Talent Retention Responses

- ▶ Elastic retention: Talent's wage premiums in superstar firms are significantly more elastic \rightarrow increase retention efforts
- ▶ Job satisfaction: Talent's job satisfaction in superstar firms is more elastic to TRP

Implication for Aggregate Investment

Original Q Model

$$\text{Inv}_{i,t+1} = \sum_s \beta_s \cdot \text{YearDummy}_s + \alpha Q_{i,t} + \text{FirmFE} + \epsilon_{i,t}$$

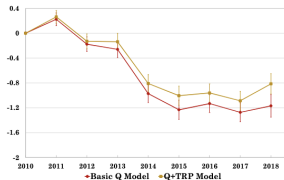
Q and TRP Model

$$\text{Inv}_{i,t+1} = \sum_s \zeta_s \cdot \text{YearDummy}_s + \alpha Q_{i,t} + \gamma \text{TRP}_{i,t} + \text{FirmFE} + \epsilon_{i,t}$$

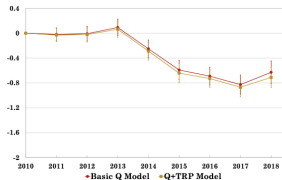
The difference between β_s and ζ_s represents the contribution of TRP for widening the investment-Q gap.

Implication for Aggregate Investment

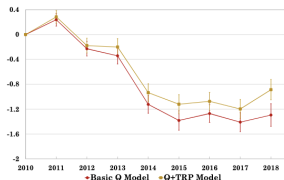
Panel A: Average Firms' Investment-Q Gap



Panel B: Superstar Firms' Investment-Q Gap



Panel C: Laggard Firms' Investment-Q Gap



Panel D: Aggregate Investment-Q Gap

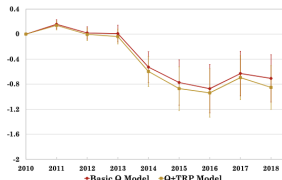


Figure: TRP and Investment-Q Gap

Implication for Industry Concentration

$$CR_{i,t+1} = \beta \cdot TRP_{i,t} + X_{i,t} + \text{IndFE} + \text{YearFE} + \epsilon_{i,t}$$

	CR4 of Industry _{t+1}	
	(1)	(2)
TRP	1.169** (0.521)	0.962** (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

Figure: TRP and Industry Concentration

Conclusion

Research Question: How does talent market competition affect the firm's growth (firm's investment)?

1. **Talent retention pressure negatively affects firm capital investment**
2. For an average firm, the challenges of using pecuniary compensation in retaining talent are fierce, as outside firms also make similar raises.
3. Talent market competition dampens the growth of laggard firms but not superstar firms.
4. Rising talent market competition has contributed to the rise in industry concentration but not the decline in aggregate U.S. investment.

Discussion

Comments

1. Solid empirics (variable construction, testing model of underlying mechanisms, and implications)
2. Refining the classical matching function by Cobb-Douglas.
3. Understanding the job switching in the context of local talent market competition.
4. Using microdata (firms' talent retention pressure) to answer a macro problem (aggregate investment and industry concentration).

Matching Function

- ▶ $L > 0$: size of the labor force
- ▶ mL : # of job matches, uL : # of unemployed, and vL : \$ of vacant jobs
- ▶ Assume the number matches given by *matching function*

$$mL = F(uL, vL)$$

that is increasing, concave, and has constant return to scale so that

$$m = F(u, v)$$

Matching Function

- ▶ Job finding rate f

$$fu = m = F(u, v) \rightarrow f = \frac{F(u, v)}{u}$$

- ▶ Vacancy filling rate q

$$qv = m = F(u, v) \rightarrow q = \frac{F(u, v)}{v} = \frac{fu}{v}$$

- ▶ With constant returns to scale

$$f = F(1, \frac{v}{u}) = f(\theta)$$

$$q = F(\frac{u}{v}, 1) = q(\theta) = \frac{f(\theta)}{\theta}$$

where $\theta = \frac{v}{u}$ is known as **labor market tightness**

Matching Function

- ▶ Job finding rate $f(\theta)$ is increasing in labor market tightness.
- ▶ Vacancy filling rate θ is decreasing in labor market tightness.

If $F(u, v) = u^\alpha v^{1-\alpha}$ for $0 < \alpha < 1$, then

$$f(\theta) = \theta^{1-\alpha} \quad q(\theta) = \theta^{-\alpha}$$

Talent Job Finding Rate

of successful matches (follows a Cobb-Douglas matching function)

$$x(V_0, sN_0) = (V_0)^\gamma (sN_0)^{1-\gamma}$$

Job finding rate

$$\frac{x(V_0, sN_0)}{sN_0} = \left(\frac{V_0}{sN_0}\right)^\gamma$$

where

- ▶ V_0 : Total job vacancies at $t = 0$
- ▶ N_0 : Total talent employees at $t = 0$
- ▶ s : Share of employed talent in the firm engages in the on-the-job search process.

Equilibrium Share of Employed Talent Searching for Jobs

- ▶ Assume that employees have no information about matching satisfaction to new firms before they work there for a while. The expected matching satisfaction of OJS is $\frac{1}{2}$
- ▶ Only employees with low satisfaction will engage in OJS

Equilibrium share of employed talent searching for jobs

$$\underbrace{\left(\frac{V_0}{sN_0}\right)^\gamma \left(\frac{1}{2} - s\right)}_{\text{marginal benefit of OJS}} = \underbrace{c}_{\text{marginal cost of OJS}}$$

Talent Retention Pressure

Equilibrium s is an increasing function of $\frac{V_0}{N_0}$ and a decreasing function of c , and denote $s = g(\frac{V_0}{N_0}, c)$

Talent market competition

$$\theta = \frac{V_0}{N_0}$$

Talent retention pressure, the average probability for each of its talent to find a job in other firms

$$\psi = s \times \left(\frac{V_0}{sN_0} \right)^\gamma + (1 - s) \times 0 = \theta^\gamma [g(\theta, c)]^{1-\gamma}$$