The Changing Nature of the C-suite Job

Evidence from Job Descriptions

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Motivation

Increasing importance of ICTs and intangible capital in production (Corrado et al, 2005, Haskel and Westlake, 2018)

- Computerized information, Innovative Property, Economic Competencies

Contemporaneous changes in task content and requirements of jobs

- Decline in routine jobs, increasing share of employment and wages for jobs with **high cognitive content** (Autor et al, 2003)
- But also increasing importance of **coordination skills**, as many forms of intangibles complement knowledge-intensive, collaborative, networked activities (e.g. process redesign, creative activities; Deming and Khan, 2018, Deming 2017)

Human interaction requires a capacity that psychologists call theory of mind–the ability to attribute mental states to others based on their behavior, to "put oneself into another's shoes" (Deming, 2017)

Are C-suite jobs changing too?

Shift in technology and capital structure can have a multiplicity of possible effects on the C-suite

Direct substitution of routine tasks, as in lower levels of the hierarchy

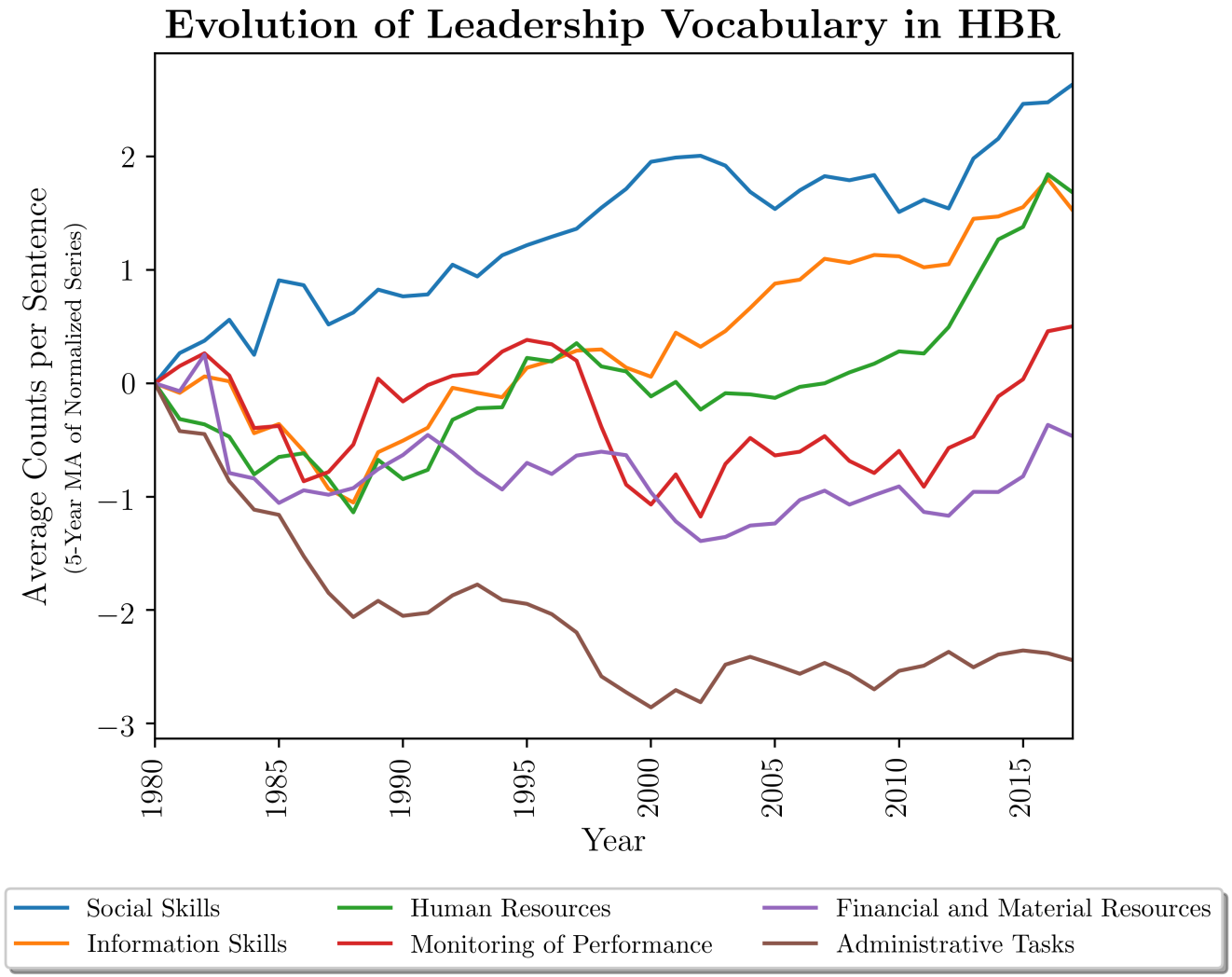
Indirect effects through shifting nature of workplace skills, which may induce change in the organization of managerial attention

- Increase in more complex problems passed on to the C-suite (Garicano 2000)

  Increase in demand for executive information processing skills
- Increase in the need to coordinate workers (Drucker, 1967; Bandiera, Hansen, Prat and Sadun 2020)

  Increase in demand for social and interactive skills

Trends in Harvard Business Review Language



Notes: We extract every sentence in the Harvard Business Review that contains the string 'leader', and compute for each year from 1980 the average word counts per sentence (for 25,996 sentences) from six dictionaries that capture particular skill clusters. The above plots a five-year moving average of the normalized average count time series.

This paper examines the demand for C-suite skills at the **firm** level

Large corpus of detailed C-suite job descriptions spanning 17 years: skills, qualifications and capabilities demanded by firms

New classification approach to organize free-text descriptions into well defined categories of skills and tasks demanded by firms over time

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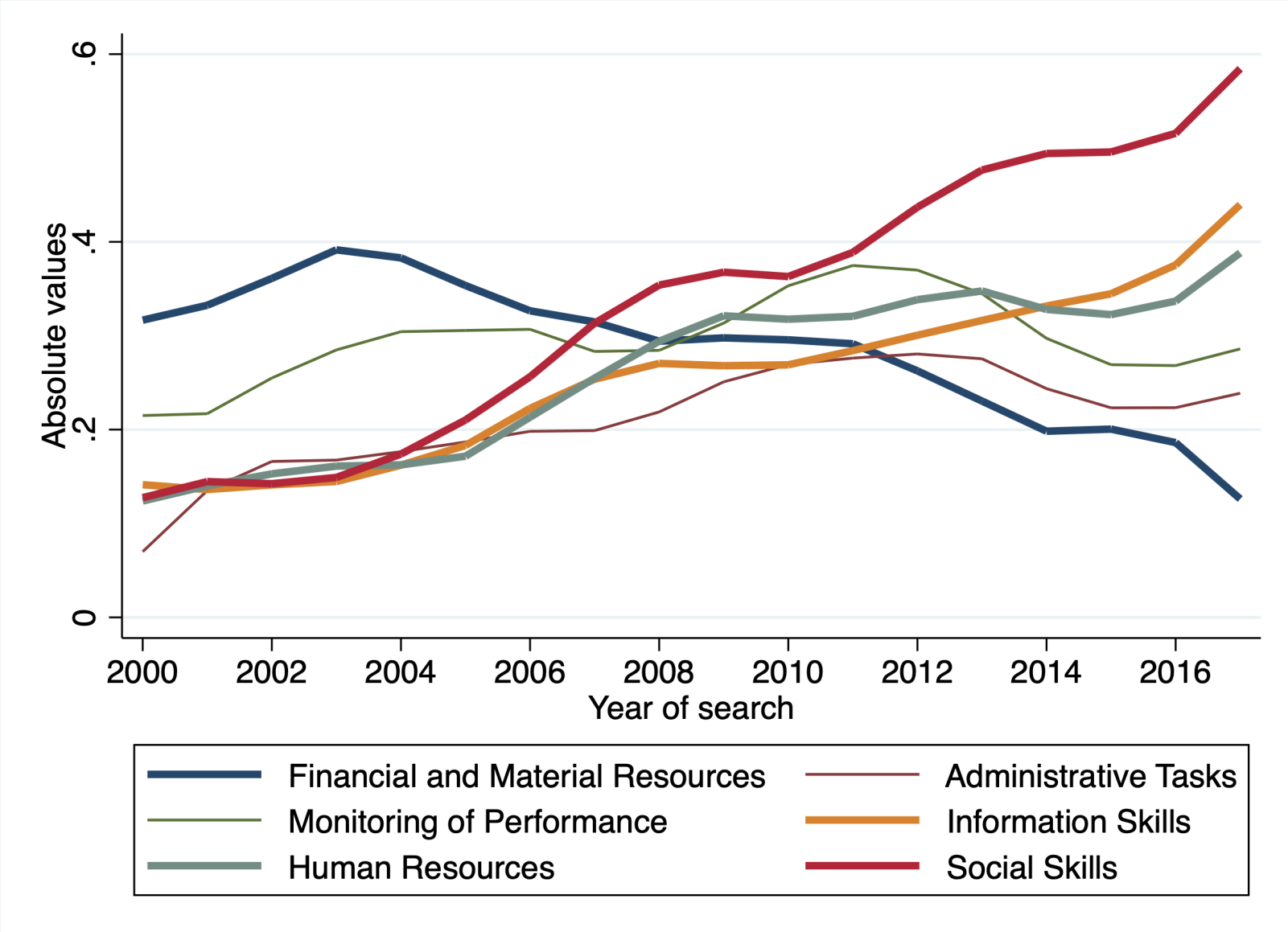
Variation in demand for different bundles of C-suite skills across time, countries, industries, firms, and teams

- Management of interactions, information and people (A) vs. management of financial and material resources (B)
- (A) more predominant in intangible-intensive industries, and in firms expanding scope (especially services and technology)
- (A) increasing over time, especially for CEOs in the US

Increasing importance of management of interactions, information and people, **absolute** terms (US CEOs)



Implications

Shifts in both cognitive and coordination skills, mirroring broader labor market trends

- Complementarity across different skills carries on to the C-suite

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However, C-suite labor market is much thinner relative to general population, which may have implications for optimal matching of managers and firms (Bandiera et al, 2015, 2020)

- Are mismatches more likely? Do (mis)matches affect adoption and productivity of intangibles?
- How should we think about managerial training?

Outline

Data

Partnership with a top-5 global executive search firm

- "Corporate headhunters are more powerful than ever" *The Economist, February 2020*
- 80 to 90% of Fortune 250 or FTSE 100 companies pay headhunters to find their C-suite managers, even when the successor is likely to be internal

Search for a C-suite manager takes anywhere from 90 days to a year

- Typically, board forms a committee to oversee the process, works in cooperation with headhunter (even if an internal candidate has been identified)

Board and headhunter craft a **document** describing what company looks for

- Rich and firm-specific description of required competencies to be circulated to viable candidates
- Document has a similar structure, but different language across firms

Documents

Entire corpus of job descriptions for C-suite searches conducted by the company between 2000 and 2017 (4700 documents, 3846 firms)

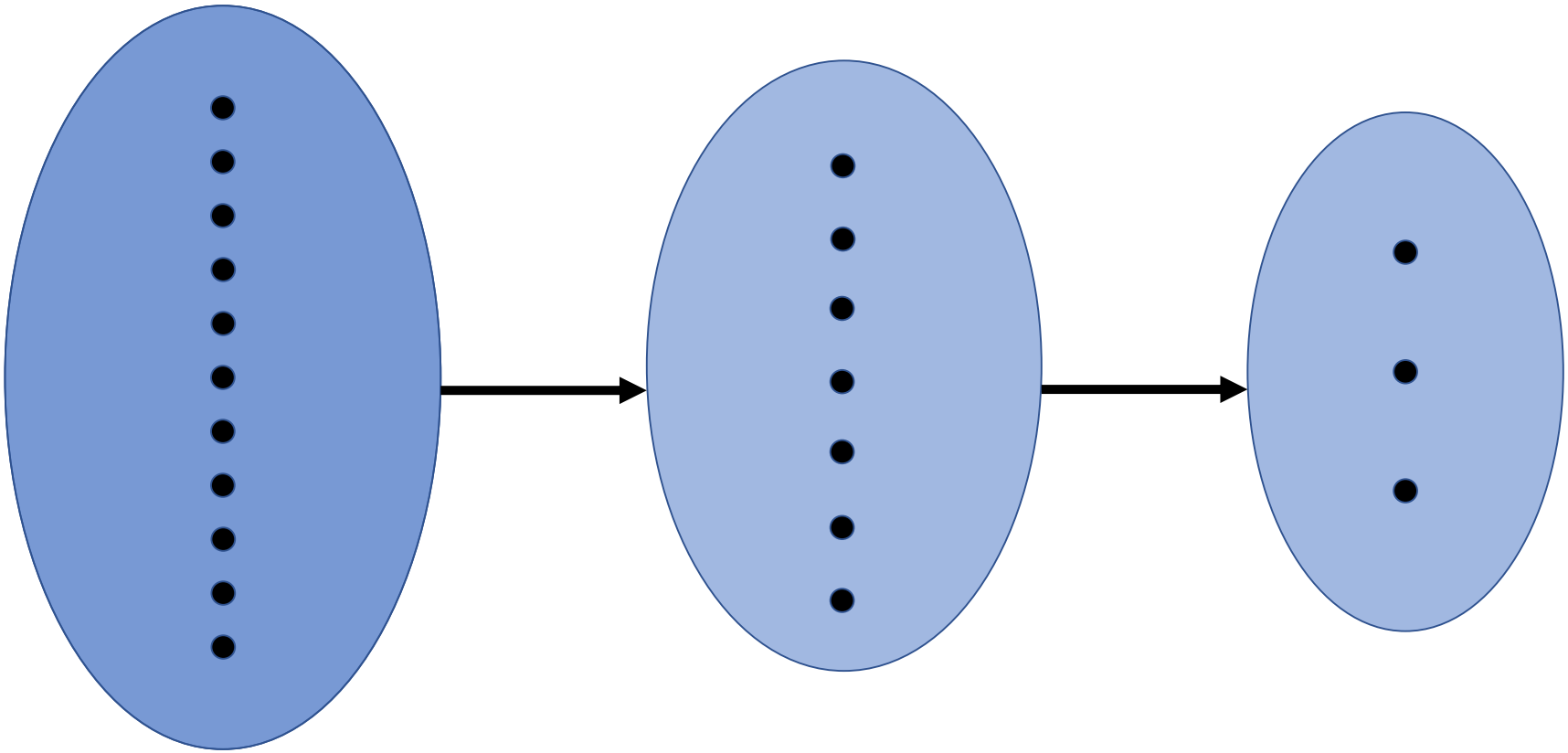
- 43% CEO, 35% CFO, 14% CIO, 8% CMO and CHRO
- Large firms: median employment=1500, sd=53,000; 26% publicly listed, 59% engaged in M&A activity within period of search
- 60% US firms, 28% Europe; 20% Manufacturing, 40% FIRE, Business and legal services
- 1,483 searches done by the same firm across managerial positions and/or over time (431 firms)

Additional data

- Industry level: routine intensity (Autor and Dorn, 2013 and BLS), share of intangible capital (INTAN), demand for analytical skills (Burning Glass)
- Firm level: size and public status (Orbis, Capital IQ), IT investments (Harte Hanks), M&A activity (Capital IQ)
- Search level (in progress): appointed manager, consideration set, compensation

Outline

Overall Classification Strategy



Job Ad Examples

You have the courage of your own convictions even in the face of seemingly insurmountable obstacles

You are able to recognize your own biases or preferences and keep these in perspective

You have the character to say no but do it in a way that minimizes the damage that might otherwise be caused

You demonstrate the following core competencies

You can rally all parties towards an effective timely end result

O*NET Examples of skills, tasks, work activities for C-suite executives

Direct, plan, or implement policies, objectives, or activities of organizations or businesses to ensure continuing operations, to maximize returns on investments, or to increase productivity.

Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.

Compiling, coding, categorizing, calculating, tabulating, auditing, or verifying information or data.

Talking to others to convey information effectively.

Persuading others to change their minds or behavior.

Developing constructive and cooperative working relationships with others, and maintaining them over time.

Similarity in Embedding Space

We project each job ad and each O*NET item into an embedding space constructed with word2vec (Mikolov 2013) applied to Harvard Business Review corpus

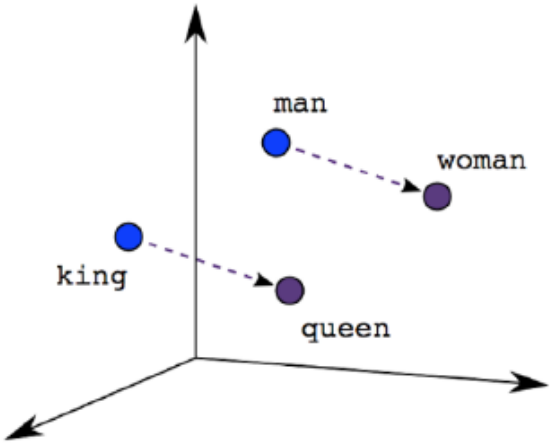
- HBR contains 14,000 articles with 50,000,000 total and 77,000 unique terms, covers period 1922-2019

This approach allows us to obtain embeddings specific to management rather than generic contexts (of independent interest)

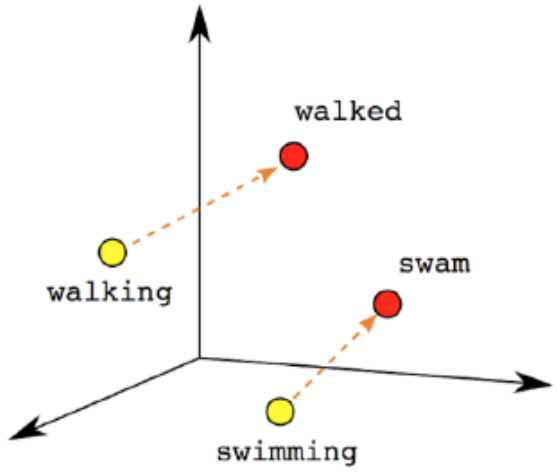
Propose a test for whether the task is present by comparing actual similarity with that from simulated distribution with random job ad

- For every ONET task, skill, activity, dummy=1 if the specific task is present in the document
- For every ONET cluster, compute fraction of tasks, skills, activities included in the document

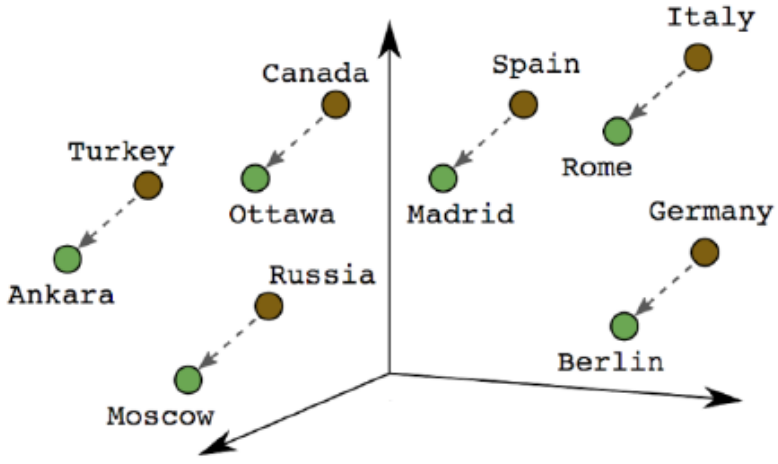
Word2vec and Analogies



Male-Female



Verb Tense



Country-Capital

HBR Analogies between Companies and Products

Company	Product(s)	Company	Closest Vector(s)
General Motors	Automobile/Car	Walt Disney	Bike/Movie/Movies/ Memorabilia/Cinema
Goldman Sachs	Banking	Google	Internet/ World Wide Web Yahoo
Walmart	Retail/Retailing	Intel	Personal Computers /Microprocessor/Optics Computer Industry Manufacturing Semiconductor
Dow	Chemicals	Am Exp	Fin Services

Notes: In each row of the above table, we form a vector in an embedding space defined by the embedding vector for the third column plus the (average) embedding vector for the term(s) in the second column minus the embedding vector for the term in the first column. We then rank each term in the HBR vocabulary according to the similarity between its embedding vector and this composite vector.

O*NET Clusters

We group O*NET items into clusters using a k-means clustering algorithm ($K = 6$). Resulting clusters generally accord with pre-existing O*NET group labels:

1. Management of Material and Financial Resources
   - "Monitoring and controlling resources and overseeing the spending of money"
2. Administrative Tasks
   - "Prepare or present reports concerning activities, expenses, budgets, government statutes or rulings, or other items affecting businesses or program services"
3. Monitoring of Performance
   - "Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action"
4. Information Skills
   - "Analyzing information and evaluating results to choose the best solution and solve problems"
5. Management of Human Resources
   - "Recruiting, interviewing, selecting, hiring, and promoting employees in an organization"
6. Social Skills
   - "Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times"

Clusters: Summary Statistics

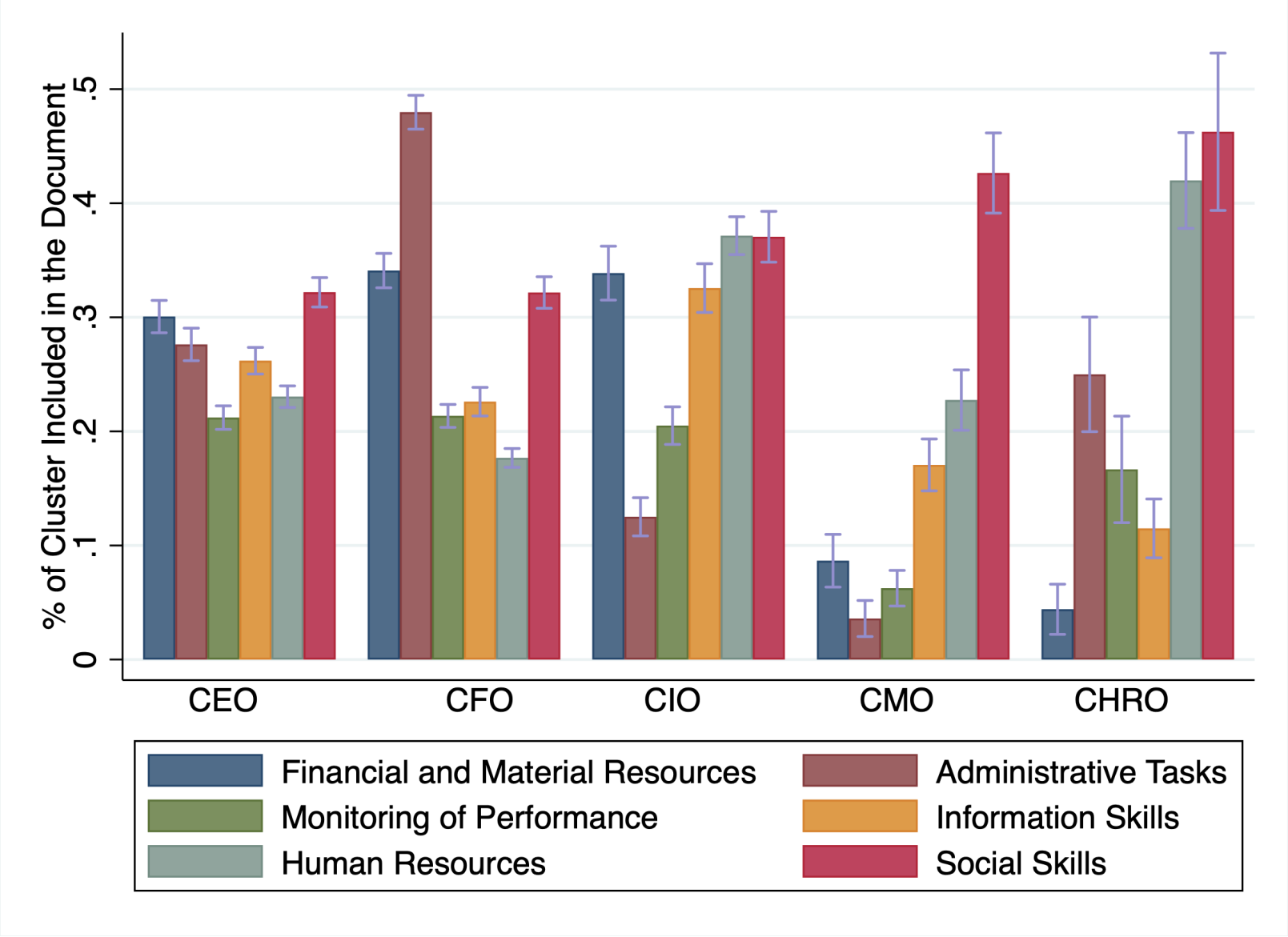
Summary Statistics

	Obs	Mean	Std. Dev.	Min	Max
Management of Material and Financial Resources	4,707	0.31	0.32	0	1
Administrative Tasks	4,707	0.32	0.33	0	1
Monitoring of Performance	4,707	0.20	0.22	0	1
Information Skills	4,707	0.25	0.27	0	1
Management of Human Resources	4,707	0.23	0.21	0	1
Social Skills	4,707	0.34	0.29	0	1

Clusters are correlated within documents, but not perfectly

- One factor with eigenvalue greater than 1, loads positively on Information, HR and Social, negatively on Financial and Material Resources, Administration and Performance.
- Pairwise correlation between Financial and Material Resources and Social is 0.46 (p-value=0.000)

Clusters by C-title



Outline

We explore the variation in clusters across a variety of margins

Time variation

- Across and within firms (using repeated searches)

Industry variation (controlling for time)

- Routine intensity, share of intangibles and demand for analytical skills below the C-suite (BG data)

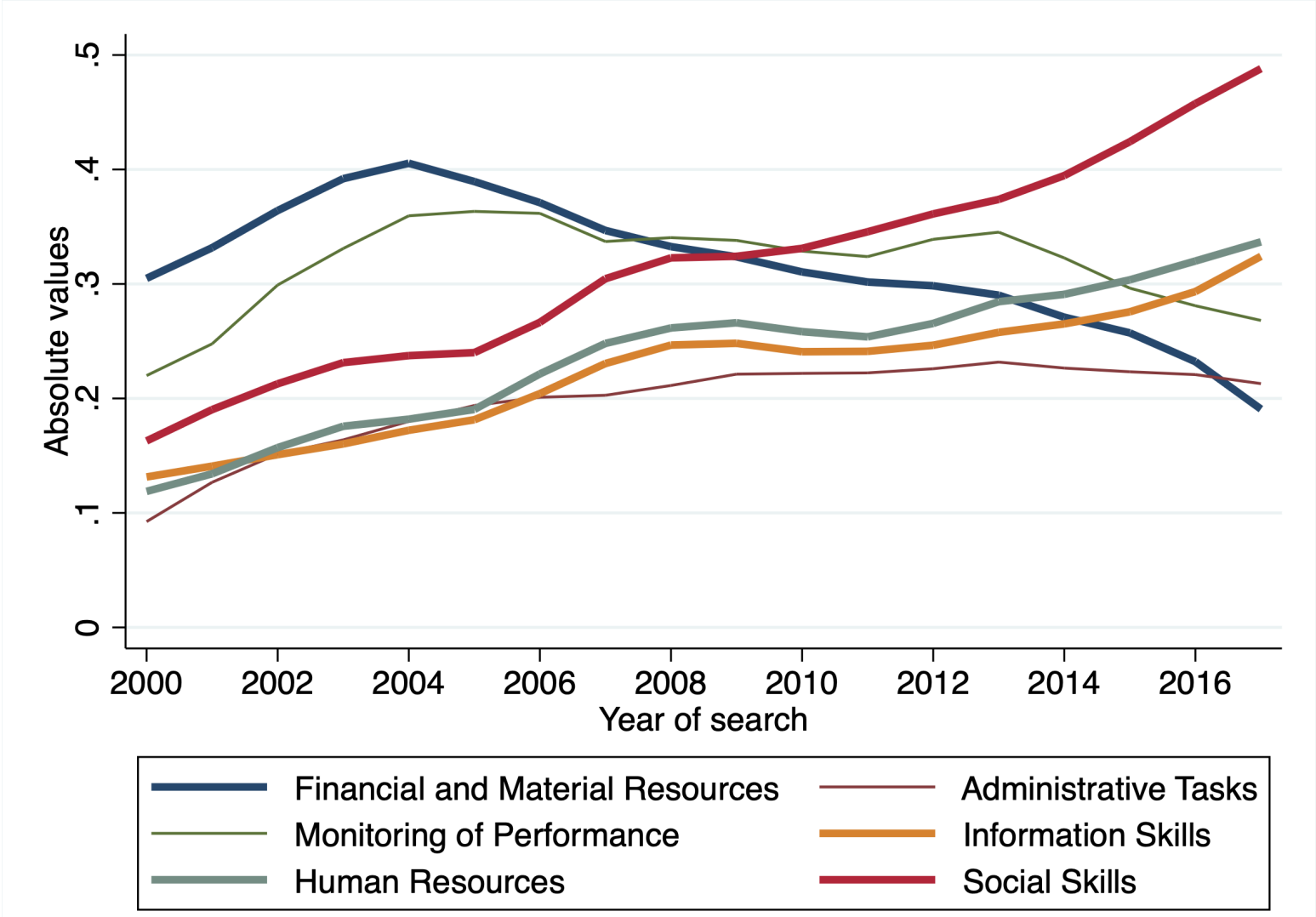
Firm variation (controlling for time and industry)

- Firm size, public listed status, M&A activity
- Team composition
- IT investments

Team variation within the same firm

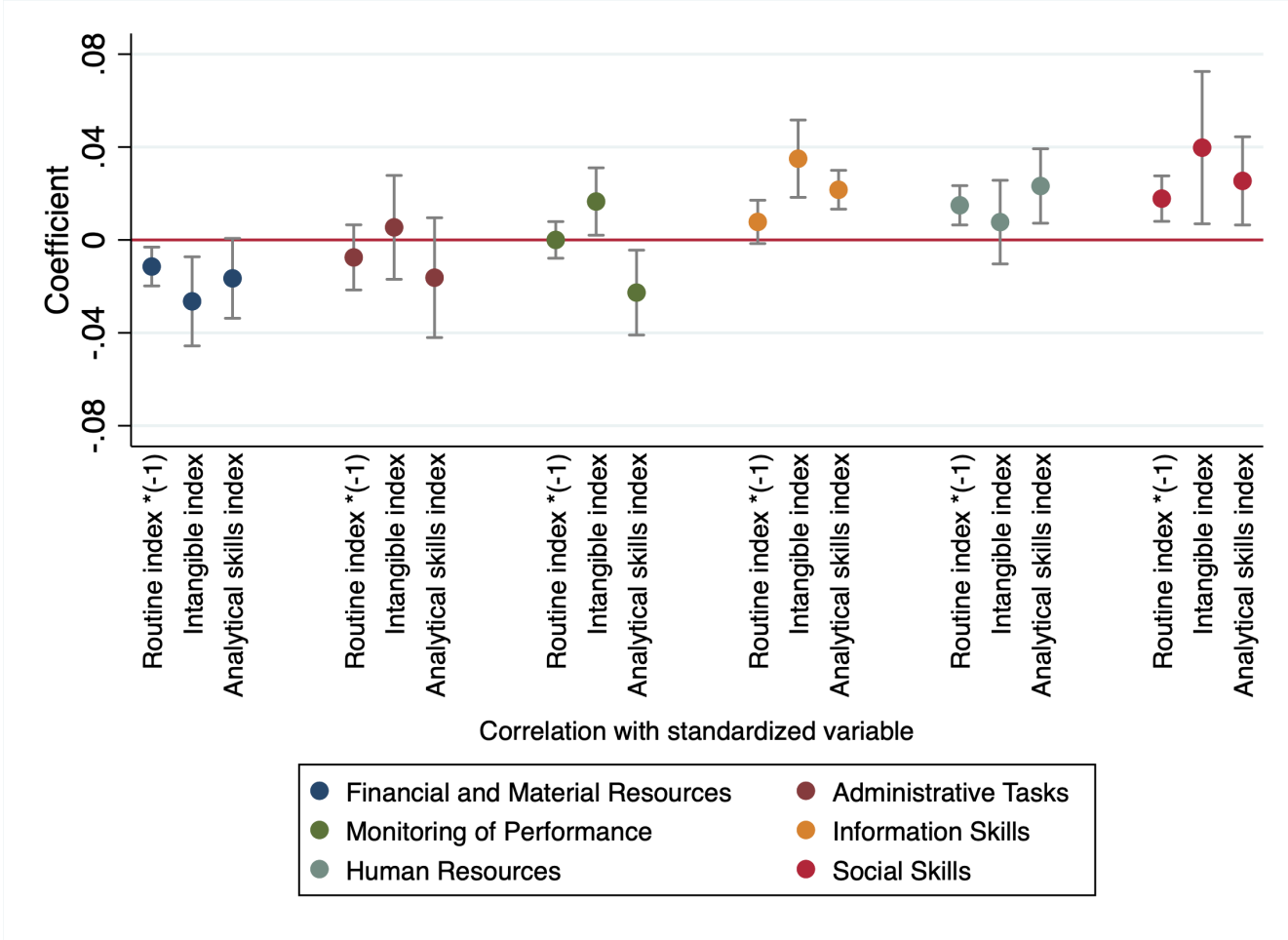
- Clusters across C-suite positions

Variation over **time**



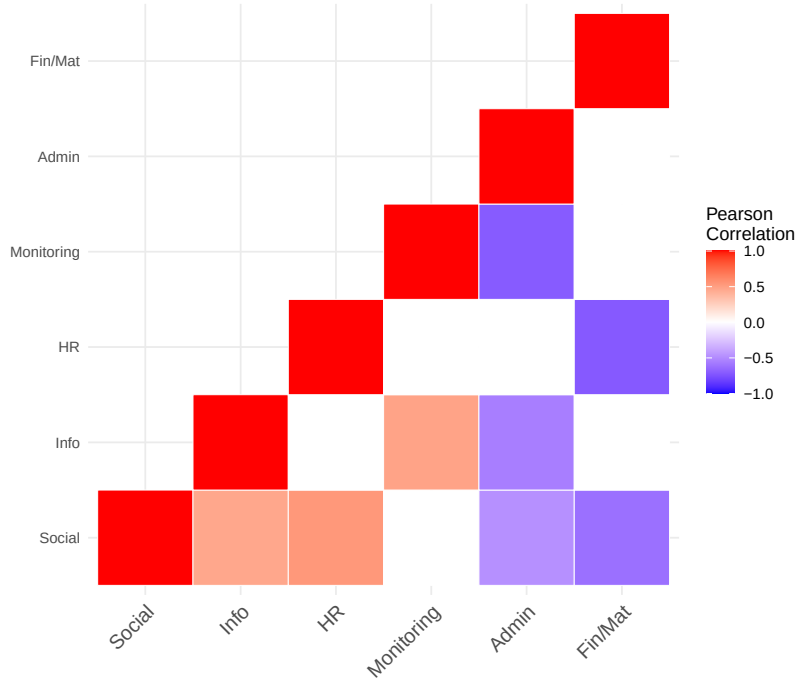
Notes: C-suite skill clusters over time, smoothed estimates (bandwidth 0.3). Trends are significant when we control for industry & country dummies, or if we include office location or firm fixed effects (subsample of 625 firms, 1483 searches). Trends are significantly stronger for US based CEO searches.

Variation across **industries**: Routine tasks, Intangible capital, Demand for analytical skills



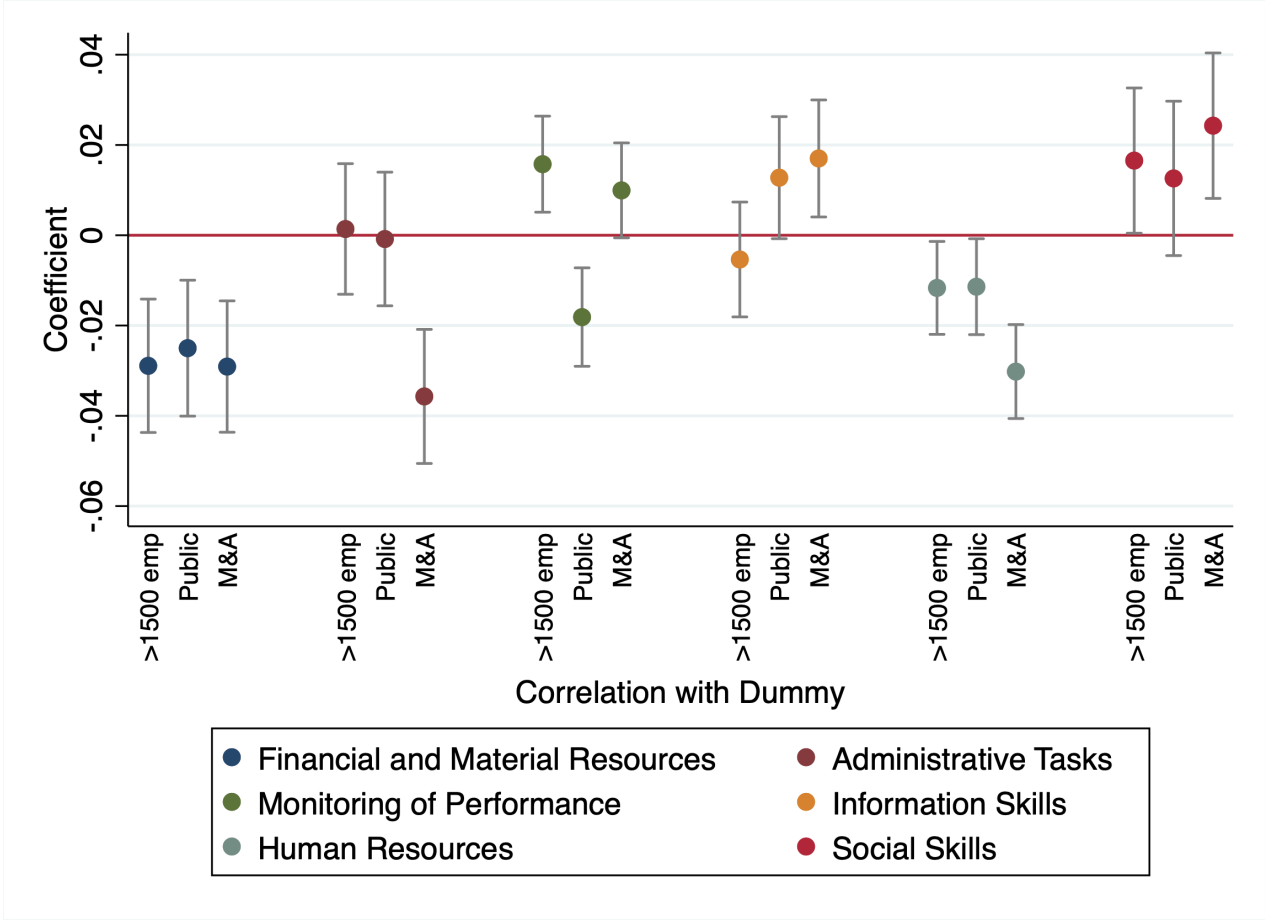
Notes: Each dot corresponds to a different regression. All regressions estimated by OLS, include controls for country and period of search, type of position, industry dummies, noise. **Routine task**: SIC2 level, 2000-2017, sample, Autor and Dorn (2013) occupational classification matched with BLS occupation by industry data. **Intangible capital**: SIC1xcountryxyear, 2010-2017, INTAN. **Analytical skills**: NAICS2xyear, 2010-2017, US only, BG. Errors are clustered at the same level of the industry variable.

A closer look at **industry** skill demands



Notes: We compute a 6 X 6 correlation matrix where the (i,j) element is the correlation between the regression coefficients estimated on 30 Burning Glass skills families from an OLS model for cluster(i) and cluster(j). The skill families organize 6,957 skills that appear in online job ads, expressed as the count of words in these families over the total counts of all skills that appear in a particular industry and year. The heatmap then color codes these correlations. Only significant coefficients are reported.

Variation across **firms**, controlling for country, industry and period fixed effects



Notes: Each dot corresponds to a different regression. All regressions estimated by OLS, include controls for period of search, type of position, SIC2 dummies, noise.

A closer look at **firm** level M&As: Variation across and within firms

Table 1. CEO Skills and M&A activity

	(1)	(2)	(3)	(4)	(5)	(6)
	Management of Material and Financial Resources		Administrative Tasks		Management of Performance	
M&A activity (0,5) years after search	-0.016*	-0.009	-0.051***	0.013	0.001	-0.011
	(0.009)	(0.033)	(0.008)	(0.031)	(0.006)	(0.024)
Observations	4,703	1,310	4,703	1,310	4,703	1,310
Firms	3,846	625	3,846	625	3,846	625
Country, SIC2, period, position, log(emp), noise	Y	Y	Y	Y	Y	Y
Firm FE	N	Y	N	Y	N	Y

	(1)	(2)	(3)	(4)	(5)	(6)
	Information Skills		Human Resources		Social Skills	
M&A activity (0,5) years after search	0.013*	0.061**	-0.032***	0.029	0.020**	0.084***
	(0.008)	(0.028)	(0.006)	(0.022)	(0.009)	(0.031)
Observations	4,703	1,310	4,703	1,310	4,703	1,310
Firms	3,846	625	3,846	625	3,846	625
Country, SIC2, period, position, log(emp), noise	Y	Y	Y	Y	Y	Y
Firm FE	N	Y	N	Y	N	Y

Notes: All columns estimated by OLS. Errors clustered at the firm level.

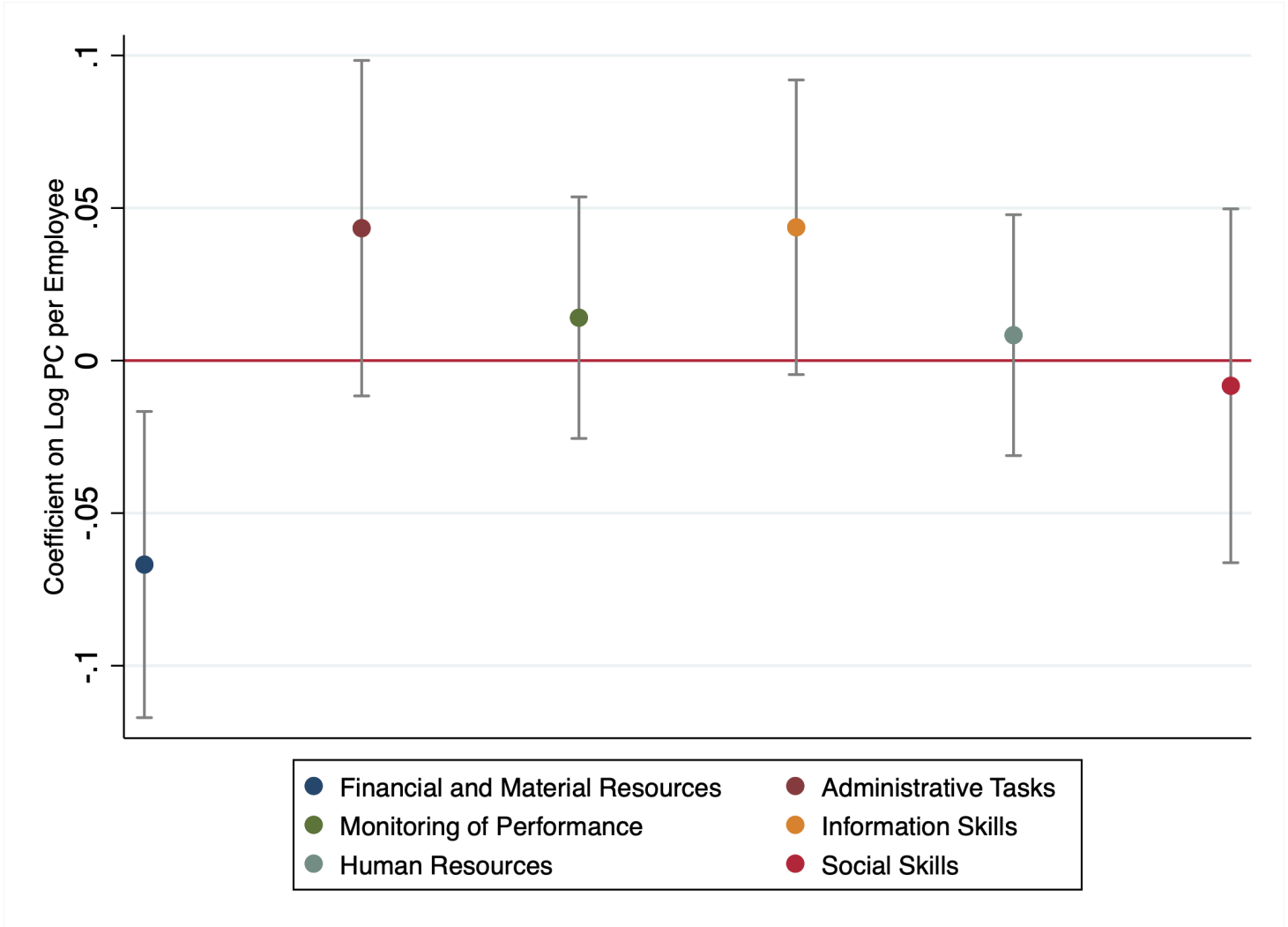
A closer look at **firm** level M&As: Variation across industry of target company

Table 2. CEO Skills and M&A activity: by industry

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Information Skills				Social Skills			
M&A activity (0,5) years after search	0.013*				0.020**			
	(0.008)				(0.009)			
M&A not in services		0.009				0.011		
		(0.008)				(0.011)		
M&A in services		0.017*				0.028**		
		(0.009)				(0.011)		
M&A not in intangible intensive industry			0.016*				0.013	
			(0.009)				(0.011)	
M&A in intangible intensive industry			0.011				0.025**	
			(0.009)				(0.011)	
M&A not in tech industry				0.012				0.019*
				(0.008)				(0.010)
M&A in tech using industry				0.006				0.021
				(0.011)				(0.014)
M&A in tech producing industry				0.023**				0.019
				(0.011)				(0.014)
Observations	4,703	4,703	4,703	4,703	4,703	4,703	4,703	4,703
Firms	3,846	3,846	3,846	3,846	3,846	3,846	3,846	3,846
Country, SIC2, period, position, log(emp), noise	Y	Y	Y	Y	Y	Y	Y	Y

Notes: All columns estimated by OLS. Errors clustered at the firm level.

Firm level IT Investments



Notes: Sample of 555 firms matched with Harte Hanks data, 2010-2017. Each dot corresponds to a different regression. All regressions estimated by OLS, and include controls for period of search, log firm employment, log average establishment employment, type of position, SIC1 dummies, noise.

Summary of Industry and Firm Results

Table 3: Summary of Results

	Management of Material and Financial Resources	Administrative Tasks	Monitoring of Performance	Information Skills	Human Resources	Social Skills
Trends	-			+	+	+
Industry						
Routine intensity (reverse)	-			+	+	+
Intangibles	-		+	+		+
Analytical skills	-		-	+	+	+
Firm						
Employment	-		+		-	+
Publicly listed	-		-	+	-	
M&A activity	-	-	+	+	-	+
IT investments	-					

Notes: The table shows the sign of the coefficients of the different C-suite clusters with industry and firm level variables estimated in the previous slides. Only significant correlations are reported.

Variation across **teams**: Assortative matching

Table 4: Assortative matching

Pairwise correlations of CEO	SOCIAL with:		Management of Material and Financial Resources with:	
	CFO	OTHER C-Suite roles	CFO	OTHER C-Suite roles
Management of Material and Financial Resources	-0.0188	0.0854	0.1621	-0.0036
	0.7668	0.3395	0.0099	0.9679
Administrative Tasks	-0.0022	-0.0615	0.0439	0.0076
	0.9726	0.4922	0.4875	0.9321
Management of Performance	0.0979	0.0339	0.0164	-0.1051
	0.1212	0.7053	0.7953	0.2397
Information Skills	0.181	0.0751	-0.0022	0.011
	0.0039	0.4014	0.9721	0.9023
Human Resources	0.1272	0.0656	-0.0438	-0.0364
	0.0437	0.4637	0.4893	0.6842
Social Skills	0.2379	0.1694	-0.165	-0.0344
	0.0001	0.0569	0.0087	0.7006

Notes: Pairwise correlations (p-values under coefficients). N=431 firms with multiple searches across C-suite positions (typically CEO and CFO).

Explaining the results: what the firm says

The rise of technology, digital, and AI could be driving a doubling down on the distinct nature of executive judgment–creativity, interpersonal insight, empathy, etc.

Outside the firm, there is a growing number of partnerships, alliances, complex supply chains, interactions with regulators and the government, and an increasing role for CEOs to play as social leaders in society.

There is a constellation of issues–ESG, social value, purpose, longtermism, sustainability–that is increasingly being raised by directors. Originally this was because of investor pressure, but increasingly it is because of employee pressure.

New data to document nature and evolution of demand for C-suite managers' skills at the firm level

Results

- Increasing importance of skills related to interactions, people and information, decline of operational skills
- Cross sectional variation in skills demanded by firms (industry and firm level)
- Assortative matching

Next steps

- Broader skill composition: Boardex and Burning Glass matched data
- C-suite selection: consideration set, appointments and compensation

Future research

- Is the demand for greater social skills being met? What are implications for matching of firms and top managers? And performance?

Thank you