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Center for
Financial Security
UNIVERSITY OF WISCONSIN-MADISON



Panel 5: Labor Markets and Working Conditions

Retirement and Disability Research Consortium
22nd Annual Meeting
August 6, 2020

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THE CHANGING NATURE OF WORK

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22nd Annual Meeting of the Retirement and Disability Research Consortium

August 6, 2020

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Have job demands changed in the US recently? How these changes have influenced the capacity to work?

- Recent declines in SSDI applications and awards not explained by health
- Disability is the interaction between health and job demands
- Hypothesis: physical job demands have increased (and cognitive increased)
- Previous evidence:
 1. Share of workforce in physically (cognitively) demanding jobs in the U.S. has declined (increased) between 1970-2006 (Johnson, Mermin and Resseger, 2011)
 2. Similar for Europe: Handel 2012, OECD)
- Research Gaps: If job demands have changed....
 - Have jobs changed or the composition of jobs changed?
 - How changes in job demands affected work capacity?

Our Contribution

- Link measures of job demands in 2003 and 2018 for all occupations in the economy from O*NET to data on individuals' abilities in 2018 we collected in the RAND ALP
- Build on new measure of individual's work capacity comparing abilities to minimum ability levels required to perform all jobs in the economy.
- We examine:
 - 1) How job demands changed over time
 - 2) How changes decompose into within-occupation changes and changes in the distribution of jobs in the economy.
 - 3) How changes in job demands translate into changes in latent work capacity.

Data Sources

- O*NET:
 - Minimum levels of 52 ability requirements to perform all six-digit SOC occupations
 - Functional dimensions: Cognitive, Psychomotor, Physical and Sensory
 - Ability level: scale from 1 to 7 with 3 anchors (examples)
 - Importance: scale from 1 to 5.
- American Work Capacity and Abilities Survey 2018:
 - Nationally representative sample of working-age individuals (N=2,244 ages 25-70)
 - Ask individuals to rate their own level of ability on a scale 1-7 using the same O*NET anchors, but regardless of their job

Measuring Work Capacity

- Occupation-Specific Work Capacity
 - **Intuition:** fraction of the occupation individual can do
 - Compares individual's ability levels to minimum levels required for an occupation
 - Index is the weighted-sum of all the times the ability level is equal or higher than minimum required level, across 52 abilities.
 - Weight is the relative importance of each ability for that occupation.
- Total Work Capacity
 - **Interpretation:** fraction of jobs in the economy an individual can perform
 - Weighted sum of occupation-specific work capacity across all 6-digit SOC occupations
 - Weight: the occupation's share of jobs in the economy by education level.

O*NET Rates Occupations on 52 Abilities in 4 Domains

Cognitive

Oral Comprehension
 Written Comprehension
 Oral Expression
 Written Expression
 Fluency of Ideas
 Originality
 Problem Sensitivity
 Deductive Reasoning
 Inductive Reasoning
 Information Ordering
 Category Flexibility
 Mathematical Reasoning
 Number Facility
 Memorization
 Speed of Closure
 Flexibility of Closure
 Perceptual Speed
 Spatial Orientation
 Visualization
 Selective Attention
 Time Sharing

Psychomotor

Arm-Hand Steadiness
 Manual Dexterity
 Finger Dexterity
 Control Precision
 Multi-limb Coordination
 Response Orientation
 Rate Control
 Reaction Time
 Wrist-Finger Speed
 Speed of Limb Movement

Physical

Static Strength
 Explosive Strength
 Dynamic Strength
 Trunk Strength
 Stamina
 Extent Flexibility
 Dynamic Flexibility
 Gross Body Coordination
 Gross Body Equilibrium

Sensory

Near Vision
 Far Vision
 Visual Color Discrimination
 Night Vision
 Peripheral Vision
 Depth Perception
 Glare sensitivity
 Hearing Sensitivity
 Auditory Attention
 Sound Localization
 Speech Recognition
 Speech Clarity

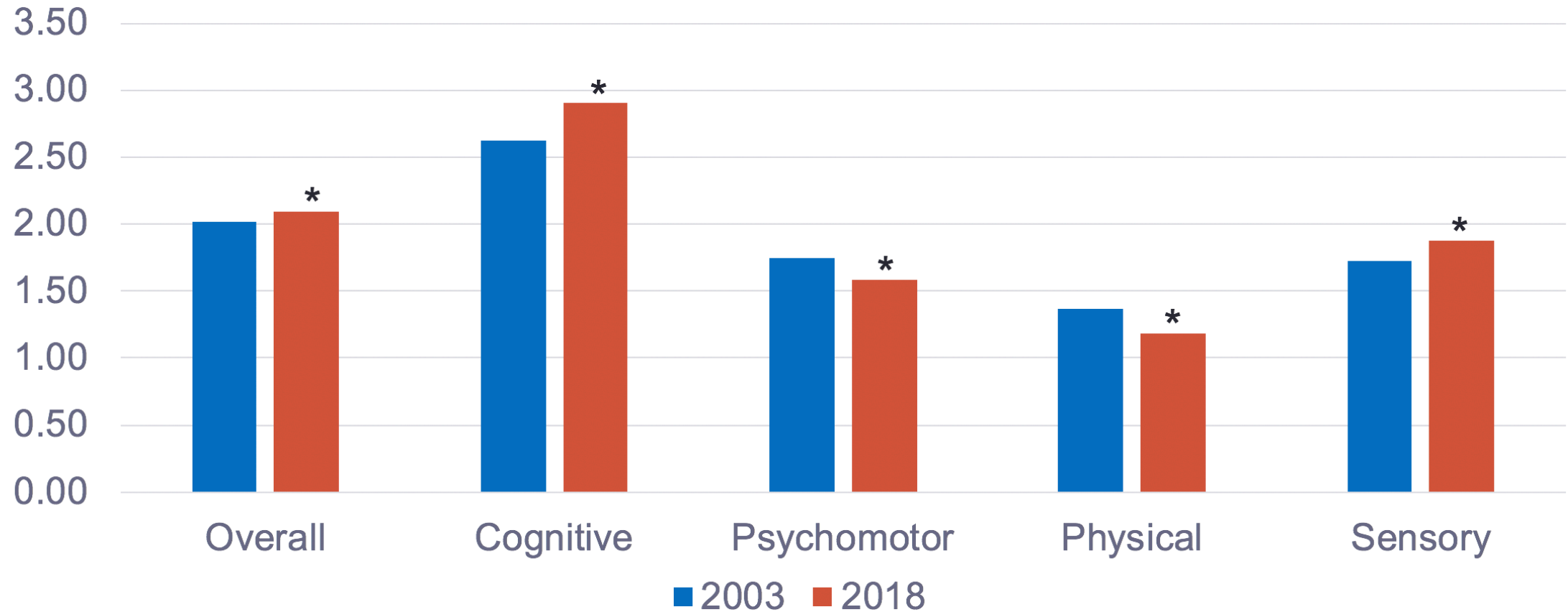
1) Comparing Job Demands Over Time

Example

	Construction Laborers		
	2003	2018	% Diff
Employment share	0.89%	1.44%	0.55%
Job Demands			
Overall	1.49	2.53	69.8%
Cognitive	1.08	2.38	120.0%
Psychomotor	2.07	2.76	33.3%
Physical	2.51	2.72	8.4%
Sensory	0.88	2.45	177.3%

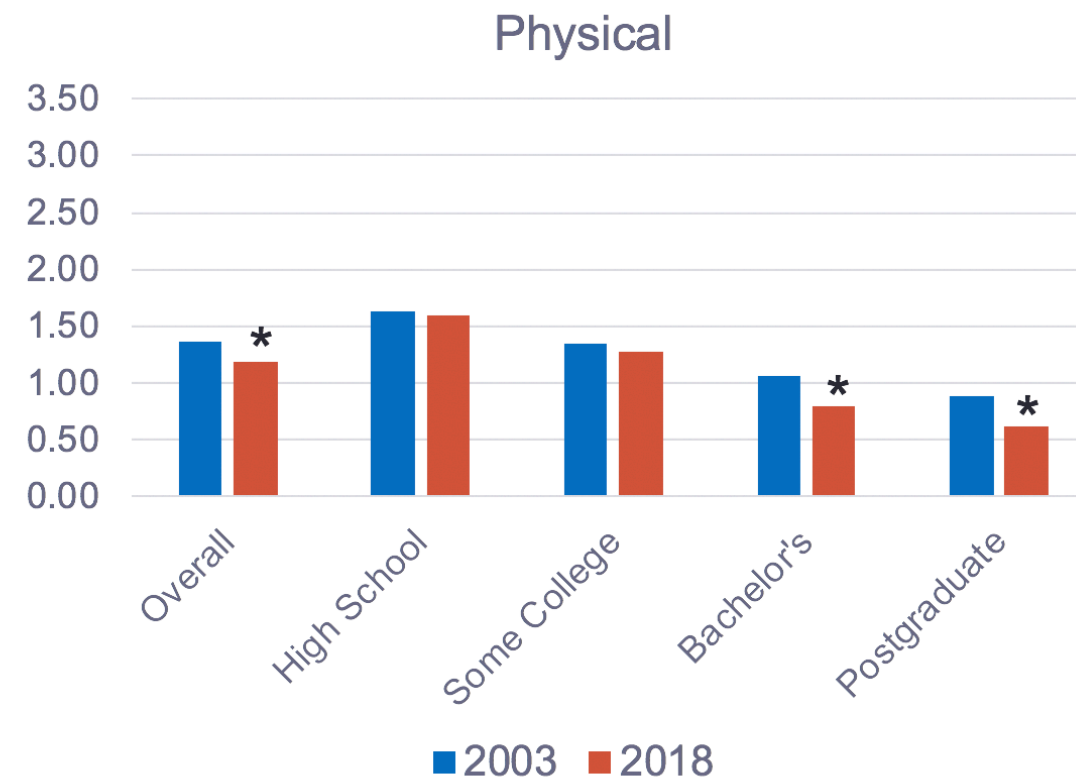
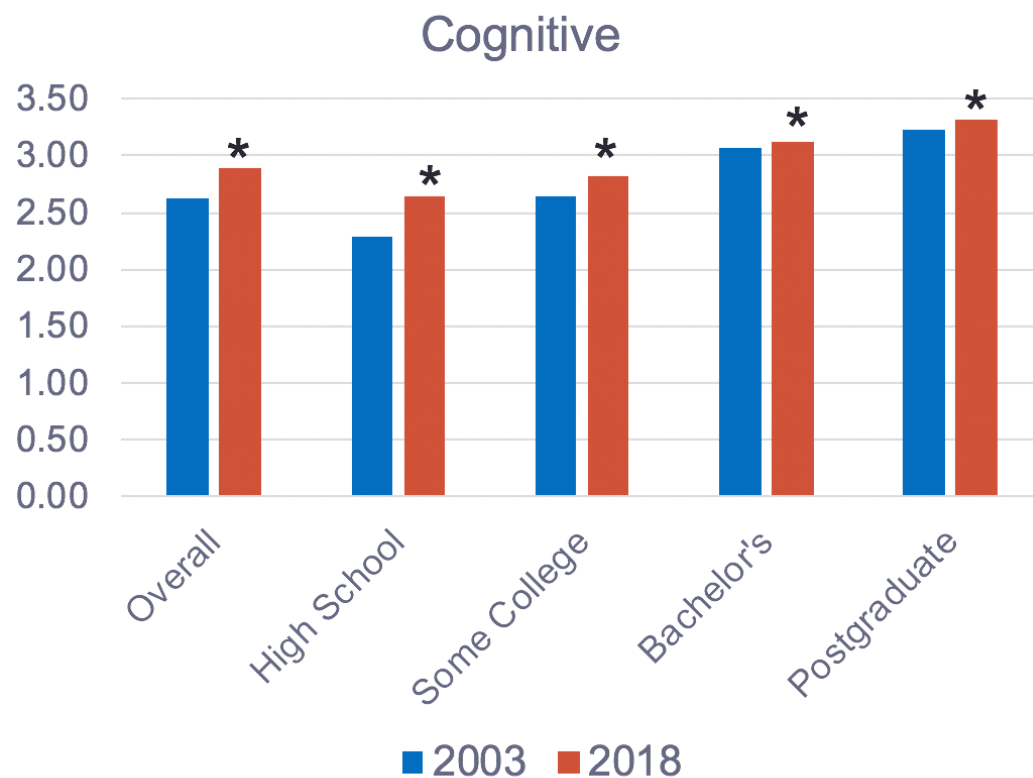
- Cognitive increases:
 - Perceptual Speed (495%)
 - Written Expression (430%)
 - Speed/Flexibility of closure (370%)
- Physical decreases:
 - Finger Dexterity (-55%)
 - Reaction Time (-45%)
 - Manual Dexterity (-18%).

Average Job Demands by Year



Note: * $p < 0.05$

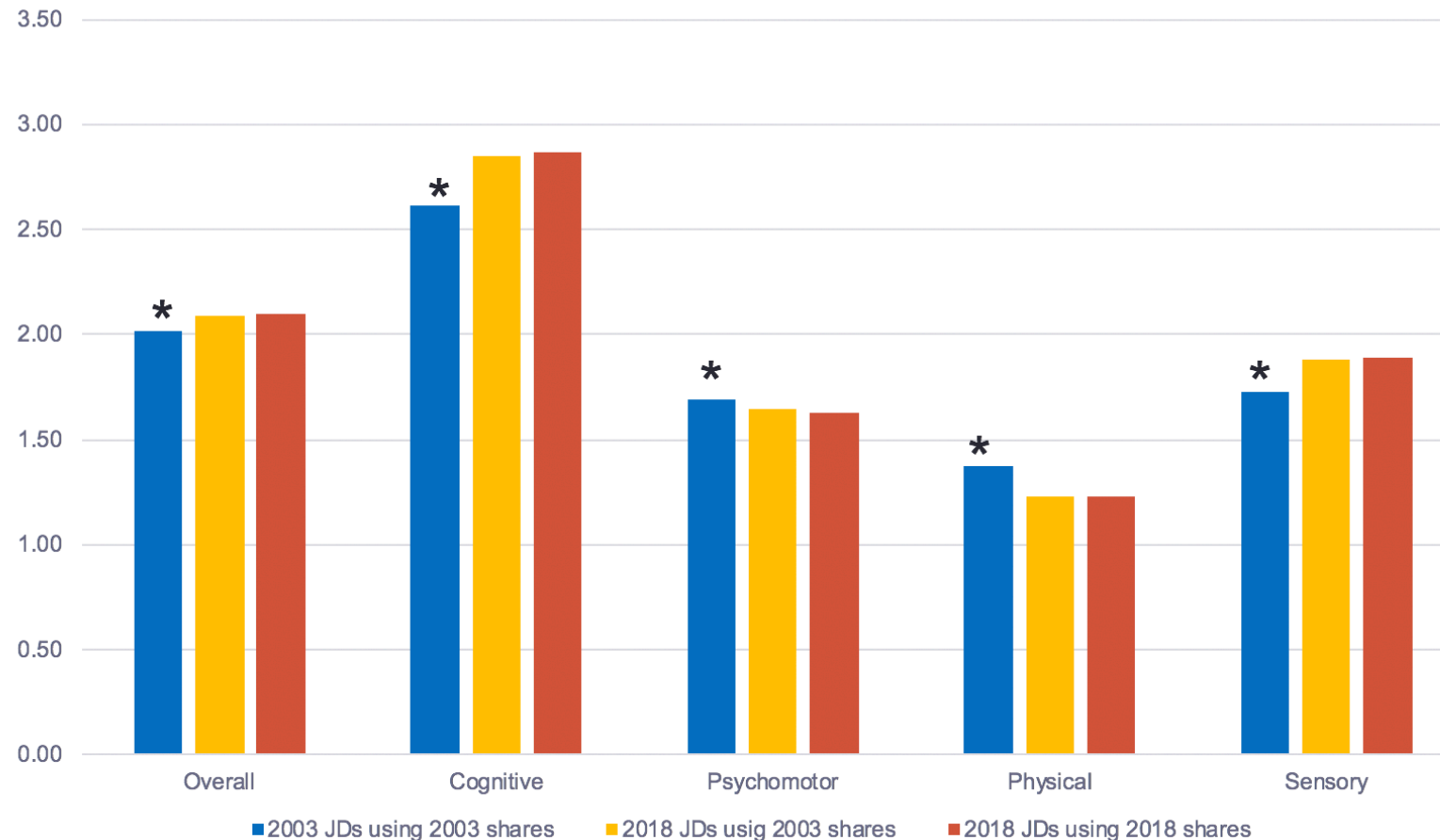
Job Demands by Education



Note: * $p < 0.05$

2) Decomposing Changes in Job Demands

Job Demands by Year: Occupations present both in 2003 and 2018 (n=675)



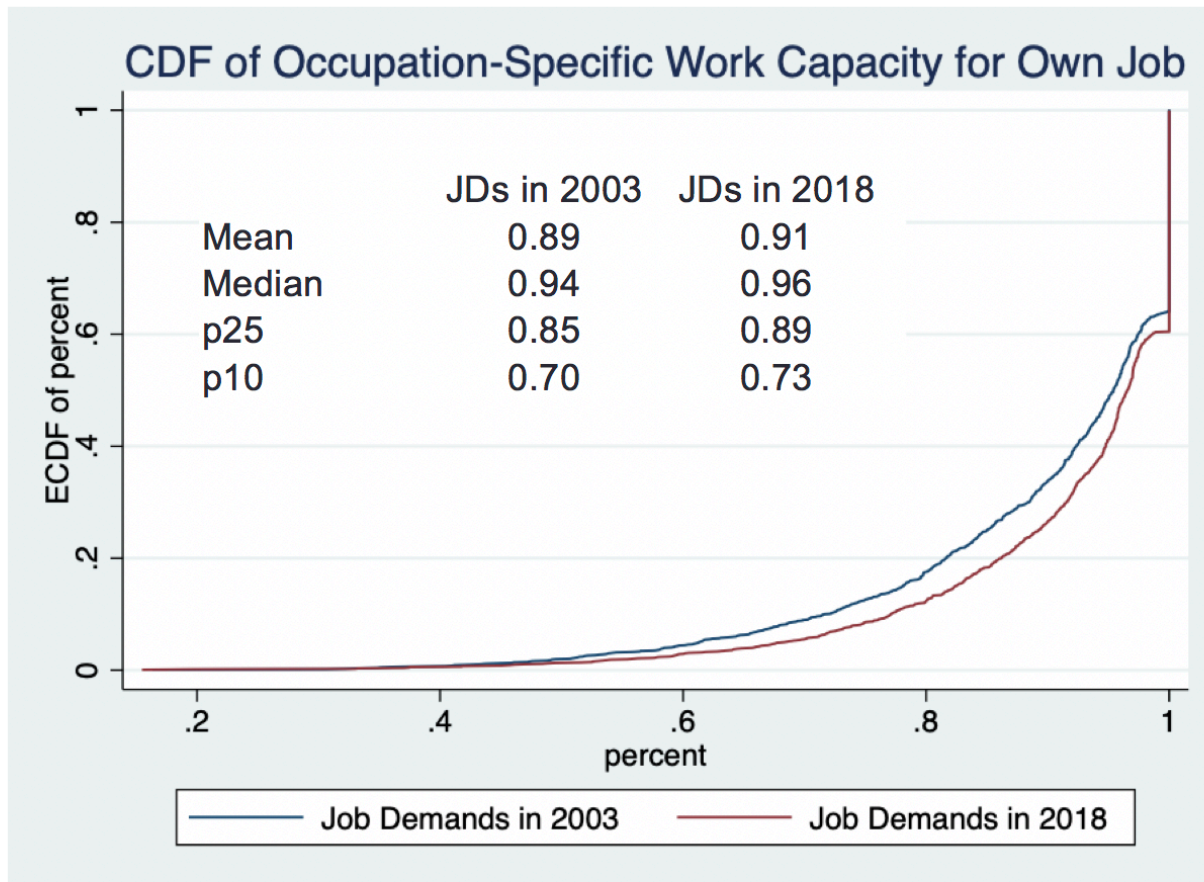
Decomposing Changes in Job Demands

- *Within-Occupation Change*: Weighted sum (across occupations) of the difference in job demands between 2003 and 2018, where the weight is the occupation share in 2003.
- *Between-Occupation Change*: Weighted sum (across occupations) of the difference in occupation shares between 2003 and 2018, where the weight is the job demand in 2018.

	Total Change	Within-Occupation		Between-Occupation	
Overall	0.081	0.077	94.4%	0.005	5.6%
Cognitive	0.242	0.226	93.1%	0.017	6.9%
Psychomotor	-0.152	-0.134	88.6%	-0.017	11.4%
Physical	-0.144	-0.145	100.8%	0.001	-0.8%
Sensory	0.163	0.159	97.6%	0.004	2.4%
N	675				

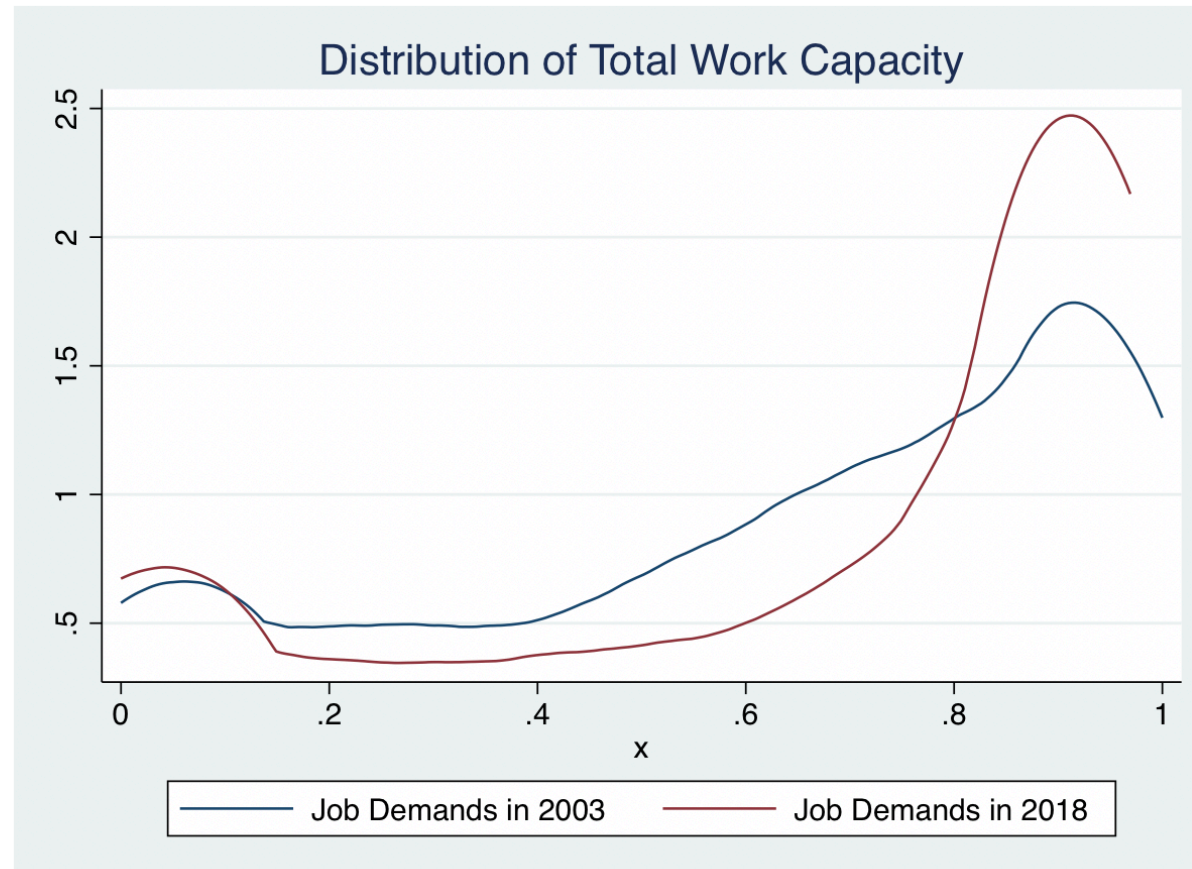
3) Linking Changes in Job Demands to Changes in Work Capacity

Individuals can perform a greater fraction of the abilities required to do their own jobs in 2018



- Sub-sample of workers (n=1,229)
- The average worker could do 89% of their own job in 2003 but 91% in 2018.
- The percentage of workers that could do at least 75% of their own job increased from 85% in 2003 to 89% in 2018.

Individuals can do a higher fraction of jobs in the economy in 2018 with the same abilities



Conclusions

- Between 2003 and 2018 overall job demands slightly increased.
- Cognitive and sensory job demands significantly increased, particularly among low-skill jobs, while physical and psychomotor job demands decreased, particularly among high-skill jobs.
- Changes in job demands largely explained by *within* occupation changes.
- Changes in job demands translated into an increase in the individuals' ability to perform jobs in 2018 than they would have been able to perform with the same abilities in 2003.

THANK YOU

Summary Statistics, ALP Sample

Characteristic	% (Weighted)		
Percent female	51.2%	Labor status	
Percent married	68.5%	Working now	68.0%
Percent white non-Hispanic	68.5%	Unemployed and looking	2.8%
Percent black non-Hispanic	11.7%	Temporarily laid off	0.5%
Percent Hispanic	15.9%	Disabled	7.0%
Other race	3.9%	Retired	16.5%
Age group		Homemaker	4.9%
35-39	12.8%	Health Status	
40-44	16.5%	Excellent	8.1%
45-49	11.8%	Very good	34.6%
50-54	15.9%	Good	39.2%
55-59	12.7%	Fair	14.1%
60-64	14.8%	Poor	4.0%
65-71	15.4%	Work-limiting health problem	21.0%
Education		Receive SSDI	9.5%
High school or less	39.3%	Number of observations	1,934
Some college	27.5%		
Bachelor's degree	17.1%		
Postgraduate	16.1%		

Note: Sample excludes individuals with any missing abilities or health information.

Firm Willingness to Offer Bridge Employment

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6 August 2020



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Extending Working Lives

- Improves financial well-being of retirees
- Improves cognitive and physical health
- Workers want flexibility over hours and weeks
- Meaningful work is an important motivator

Limited Evidence of Firm Effects

- How available are jobs with attractive attributes?
 - Will firms offer jobs with attractive working conditions?
 - If so, who do they offer these jobs to?
- Will firms allow current workers who are planning near-term retirement to adjust working conditions?
- What is the cost to the firm of making these adjustments?

Surveying Hiring Managers and HR Representatives

- Partner with Indeed.com
 - Indeed: world's largest online job site.
 - Nearly 60M unique visitors per month, 1.5M companies
 - Half of total job applicants; 6 times as many hires as other sites
 - Job postings, employers, and job seekers represent a wide range of industries, geography, and firm sizes
- Target hiring managers and HR representatives, using screener questions

Screening Question

Please select all of the duties that you have responsibility for at your firm. Select as many as necessary.

- ☐ Negotiating wages and benefits of potential or new hires
- ☐ Accommodating requests for changes in work schedules
- ☐ Making promotion decisions
- ☐ Managing employees
- ☐ Hiring new employees
- ☐ Retention of current employees
- ☐ Making termination decisions
- ☐ Making decisions about changes in benefits and wages for current employees of the firm
- ☐ I'm not responsible for any of these



We Survey Respondent, Firm, and Job Attributes

- Respondent attributes: age, race, sex, education
- Firm attributes: size of firm, % part-time, age of firm, industry
- Job Attributes: Most common occupation at firm, pay, telework, hours, days, PTO, caregiver leave etc.

Experimental Setup

- In each experiment, the respondent (HR or hiring manager) is asked to select between two job offers on behalf of his or her firm.
- Wages are randomized
- Job attributes are randomly assigned:
 - hours per week, hours per day, working remotely, schedule flexibility, working weekends and nights, work shifts, paid time off (days) and family leave benefits.

Listed below are two work arrangements for this position (Aeronautical Engineer) for a current worker at your firm. The worker would like to start shifting into retirement in the next year or two. She will accept either offer.

Regardless of the offer you choose, the job responsibilities remain the same. The jobs are identical in all other ways (health insurance, retirement benefits, etc.).

Please choose the job offer that is best for your firm. Recall that the worker currently works for your firm, wishes to retire in the next year or two, and she will accept either offer.

Which job arrangement would your firm prefer?

- ☐ Arrangement A: The position requires 45 hours per week worked over 5 days per week, and pays \$89,000 / year.
- ☐ Arrangement B: The position requires 45 hours per week worked over 4 days per week, and pays \$67,844 / year.

Listed below are two work arrangements for this position (Aeronautical Engineer) for a current worker at your firm. The worker would like to start shifting into retirement in the next year or two. She will accept either offer.

Regardless of the offer you choose, the job responsibilities remain the same. The jobs are identical in all other ways (health insurance, retirement benefits, etc.).

Please choose the job offer that is best for your firm. Recall that the worker currently works for your firm, wishes to retire in the next year or two, and she will accept either offer.

Which job arrangement would your firm prefer?

- ☐ Arrangement A: The worker receives 20 days of paid time off per year and is paid \$89,000 / year.
- ☐ Arrangement B: The worker receives 10 days of paid time off per year and is paid \$102,931 / year.

Estimating Costs of Provision

- Given answers to these questions, we are able to non-parametrically estimate the cumulative distribution function (CDF) of firms' willingness to provide the amenity.
- Consider cases in which Job A provides an amenity and wage w_A while Job B pays wage w_B and does not provide the amenity. The fraction of firms selecting Job B identifies
- $P(\text{Firm Cost} > w_B - w_A)$.

Below are your responses to earlier questions. Please indicate which of these items it is POSSIBLE for a typical worker in this position to **negotiate** over at your firm.

	POSSIBLE	IMPOSSIBLE
Average Salary/Hourly Pay: \$89,000 / year	<input type="radio"/>	<input type="radio"/>
Hours per Week: 45	<input checked="" type="radio"/>	<input type="radio"/>
Days per Week: 5	<input checked="" type="radio"/>	<input type="radio"/>
Schedule Flexibility: Worker completely determines schedule	<input type="radio"/>	<input type="radio"/>
Work Remotely: Yes	<input type="radio"/>	<input type="radio"/>
Paid Vacation: 20 days per year	<input type="radio"/>	<input type="radio"/>
Nights/Weekends: Required	<input type="radio"/>	<input type="radio"/>
Shifts: Not required	<input type="radio"/>	<input type="radio"/>
Paid Family Leave Benefits: Yes	<input type="radio"/>	<input type="radio"/>

How Difficult is it to Change Working Conditions

You are almost done with the survey. We have just a couple short questions left.

How difficult would it be for a full time worker in this job position with 2 years of work experience to permanently...

	Impossible	Extremely difficult	Difficult	Neither difficult nor easy	Easy	Very easy	Automatic upon request
...reduce her work hours to 20 hours per week?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...reduce her days at the office per week to 2-3 days?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...reduce her job responsibilities?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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