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Digitalization and Entrepreneurship: New labour market transition patterns

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Digitalization as an enabler of entrepreneurship

- ❖ Digitalization reduces entrepreneurship entry barriers
 - Better access to information, digital social networks, online entrepreneurship education programs (e.g., MOOCs)
 - Reduction of uncertainty;
 - Improving entrepreneurial abilities.
 - Better access to financial resources
 - Fintech services, crowdfunding and –investing.

- ❖ Digitalization has led to the emergence of new entrepreneurial opportunities
 - Share economy, platform economy
 - Better use of resources;
 - New types of (precarious?) self-employment.
 - Digital entrepreneurship
 - Business creation in the ICT sector is an important output of a country's digital transformation (European Commission, 2018).

Our contribution

Research question:

- Does digitalization influence an individual's decision to become an entrepreneur *indirectly* by affecting his or her current wage occupation?

Main channel of influence:

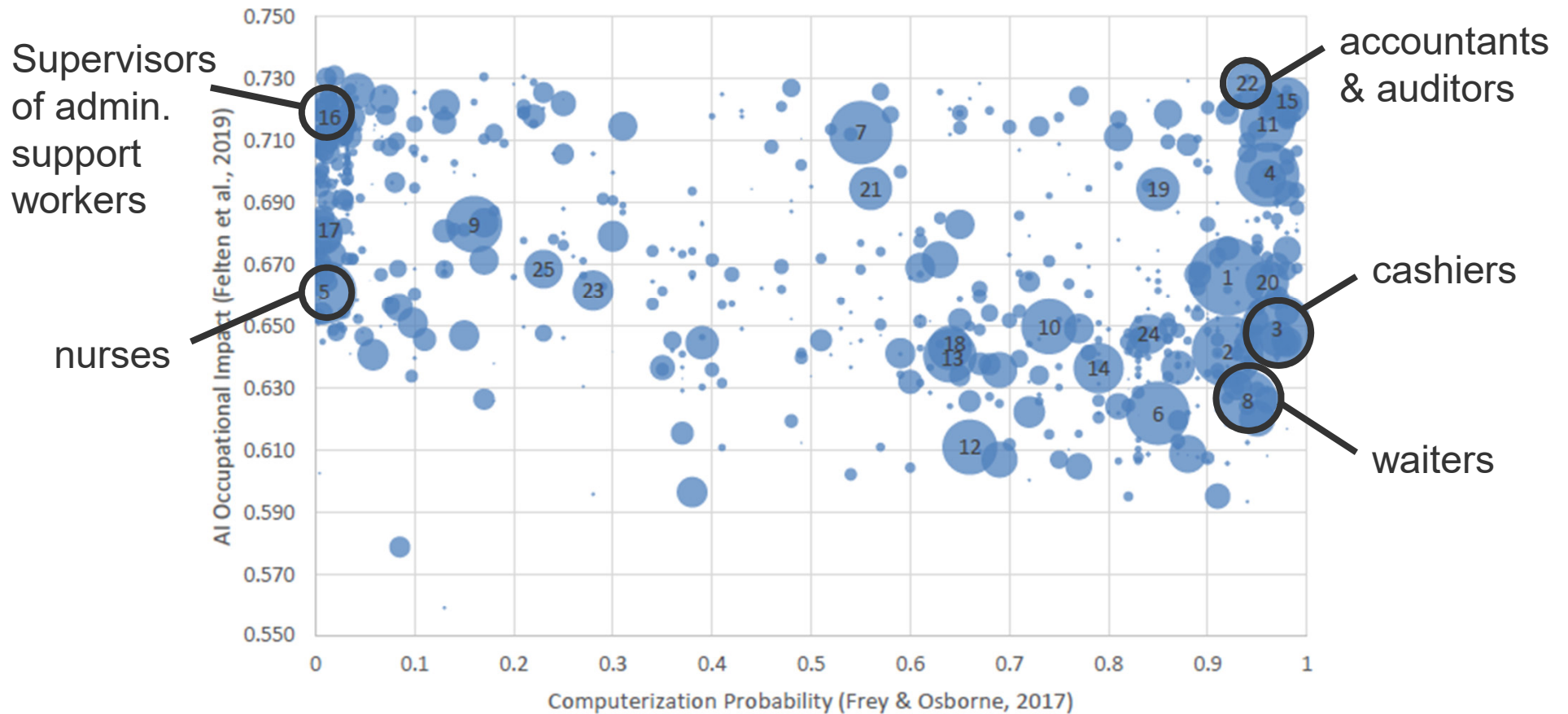
- Digitalization affects an individual's opportunity costs of becoming an entrepreneur.
 - *Increase* in opportunity costs if digital technologies positively impact productivity and wages of workers in their occupations;
 - *Decrease* in opportunity costs if digital technologies make workers obsolete.
- Thus, different types of digital technologies – *destructive vs. transformative* - need to be taken into consideration!
- Heterogeneous effects: different types of workers and forms of self-employment

Measures of the impact of digitalization on occupations

	Computerization probability (CP)	AI Occupational Impact (AIOI)	Suitability for machine learning (SML, sdSML)
Source	Frey and Osborne (2017)	Felten et al. (2019)	Brynjolfsson et al. (2018)
Time reference	Next 10-20 years (viewed from 2013)	2010-15	Near future (viewed from 2018)
Focus	Digital automation	Artificial intelligence (AI)	Machine learning
Measurement	Experts' predictions for 71 occupations, classification of 702 occupations using machine learning techniques.	AI progress measured by the Electronic Frontier Foundation mapped to 52 job requirements from O*NET and aggregated to occupation level.	Scoring of 2069 direct work activities from O*NET through a crowdsourcing platform, then aggregation to the occupational level.
Operationalizes	Labor-displacing digitalization	Labor-reinstating digitalization	Labor-displacing (SML) and labor-reinstating (sdSML) digitalization

- Validation of AI impact measures in Fossen and Sorgner (2019).
- We merge our measures of digitalization of occupations to the CPS and ASEC by using 5-6 digit occupational codes (SOC).

Destructive (x-axis) vs. transformative (y-axis) impacts of digitalization on work



Notes: Each bubble represents an occupation. The size of the bubbles reflects total US employment in the occupations (Bureau of Labor Statistics, 2018). The largest 25 occupations are labelled, Table 2 shows the legend. Fossen and Sorgner (2019a) provide a similar graph, but they use scores in advances in AI provided by Felten et al. (2018), whereas this graph uses the updated AI Occupational Impact scores from Felten et al. (2019).

Individual-level data

Current Population Survey (CPS) used for transition models:

- Provided by the U.S. Census Bureau
- Jan. 2011 – Oct. 2018
- Matched monthly data (IPUMS-CPS)
- Rotating panel structure allows tracking month-to-month employment changes

Dependent variable - transitions into different types of entrepreneurship:

- Incorporated, unincorporated, digital entrepreneurship

Individual-level control variables:

- E.g., educational attainment, gender, age, age², marital status, # children in hh, ethnicity, industry fixed effects, metropolitan area dummy, regional fixed effects (U.S. Federal States), residence in a metropolitan area.

We estimate the probabilities of individual labour market transitions by means of a multinomial logit model.

Correlation between AI impact measures and automation bottlenecks

	CP	AAI	SML	sdSML
Digitalization impact measures:				
CP: Computerization probability (Frey & Osborne, 2017)	1			
AAI: Advances in AI (Felten et al., 2018)	-0.6277	1		
SML: Suitability for ML (Brynjolfsson et al., 2018)	0.1857	-0.1315	1	
sdSML: Within-occupation std. dev. of SML	-0.1219	0.0415	-0.1097	1
Automation bottlenecks (Frey & Osborne, 2017):				
Finger dexterity	0.1671	0.1975	-0.2531	-0.1448
Manual dexterity	0.3994	-0.0999	-0.2733	-0.0887
Cramped work space	0.1748	0.1569	-0.4083	-0.0537
Originality	-0.8051	0.7039	0.0199	0.0774
Fine arts	-0.3983	0.058	0.1143	0.1394
Social perceptiveness	-0.7504	0.5387	0.0587	0.0265
Negotiation	-0.6107	0.5013	0.1191	-0.0473
Persuasion	-0.6503	0.5328	0.0831	-0.0339
Assisting and caring for others	-0.3622	0.1981	-0.0955	0.0264

Main results

	Entry into unincorporated entrepreneurship	Entry into incorporated entrepreneurship
Destructive digitalization	+ for the full sample, for employees with a university degree, mid-aged, those in ICT occ.	- for low skilled and older employees.
Transformative digitalization	- for the full sample of employees.	+ for employees with a high-school degree and older individuals

Note: the effect sign is relative to the baseline transition probability

Additional results from follow-up studies (1)

Fossen & Sorgner (2019): New Digital Technologies and Heterogeneous Wage and Employment Dynamics in the United States: Evidence from Individual-Level Data. IZA Discussion Paper Series, No. 12242.

- Highly educated individuals' jobs are more affected by labor-displacing and labor-reinstating digital technologies (both in terms of job stability and wage growth);
→ But: Highly educated individuals have more choices when their job is affected.
- Women are less likely to switch to self-employment compared to men, and their wage growth is more negatively affected when their jobs are affected by labor-displacing digitalization.
- No pronounced differences with regard to workers' age.

Additional results from follow-up studies (2)

Fossen, McLemore, & Sorgner: The Regional Impacts of Digitalization of Work on Entrepreneurship in the United States. *Forthcoming* in Keyhani, M. et al. (eds.): *Handbook of Digital Entrepreneurship*, Edward Elgar.

- New digital technologies are important elements of regional digital entrepreneurial ecosystems.
- Indications of regional disparities in the level and type of entrepreneurial activities due to digitalization.

Conclusions and avenues for future research

- New digital technologies affect entry into self-employment indirectly by impacting workers' jobs.
 - Increase in the level of necessity entrepreneurship could be expected due to labour-displacing digital technologies. More growth-oriented entrepreneurship as a result of labour-reinstating digitalization.
- AI impact measures are available at the (very narrowly defined) level of occupations and they were developed for the U.S.
 - Limited transferrability of AI impact scores to countries other than the U.S.
 - Individual-level data are needed that include information about job tasks
- Covid-19 crisis impacts:
 - Acceleration of digitalization processes and of digital skills acquisition
 - Quantitative vs. qualitative changes in self-employment?
 - Amplified regional divides in outcomes of digital entrepreneurship ecosystems.

References

- European Commission (2018). Digital transformation scoreboard 2018: EU businesses go digital: Opportunities, outcomes and uptake.
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- Fossen, F. & A. Sorgner (2021): Digitalization of work and entry into entrepreneurship. *Journal of Business Research*, 125, 548-563.
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