The new hazardous jobs and worker reallocation*

Gaetano Basso, Tito Boeri, Alessandro Caiumi e Marco Paccagnella

July, 9th 2020, VisitINPS Conference

** The views expressed are those of the authors and do not necessarily reflect those of the Bank of Italy nor those of OECD or of its member countries*

New margin of labor market adjustment

- Epidemiological risk was not perceived before Covid-19, and is distributed unevenly across jobs
- Many jobs involving epidemiological risk are in non-essential activities: correlation between health and labor market risk
- Restructuring of unsafe jobs and matching of safe workers to safe jobs and of safe workers to unsafe jobs may involve long intervening unemployment spells and large productivity losses

Recent (but fast growing) literature

- Mostly on the US and mostly on the estimation of the share of jobs that can be performed from home/with low physical proximity.
- Dingel and Neiman (2020): O*NET surveys, US; Boeri et al. (2020): O*Net and ELFS; Hensvik et al. (2020): American Time Use Survey (ATUS) data, US; Mongey et al. (2020): O*NET surveys and ATUS data, US.
- Gottlieb et al. (2020): 57 developing countries. Gap wrt OECD countries driven by self-employment.
- Borjas and Cassidy (2020): Current Population Survey (CPS) data, US. Deteriorating position of immigrants: higher concentration of job loss and lower job finding rates than natives.

Our contribution

- Safe jobs beyond remote/smart working
- Coverage of all the EU LFS countries in addition to the US
- Focus on heterogeneity: not only jobs (including size of firms, essential or not essential), but also workers (gender, age, education, migrant status)
- Potential implications in terms of workers' reallocation and workers-to-jobs matching along the new dimension

Extended definition of safe jobs

1. How many jobs can be carried out remotely?
2. And including those involving limited physical contacts and only with co-workers?
3. And including those involving limited physical contacts with co-workers and also with external customers?

Plan

- Accounting
- Heterogeneity across firms: sectors, essential/non-essential jobs, occupations, firms, regions
- Heterogeneity across workers: age, gender, education, earnings, contract type, dependent vs self-employment, family size
- The twice vulnerable workers (job loss and health status)
- Wages, matching and job-worker reallocation
- Policies: social protection, wage insurance and training.

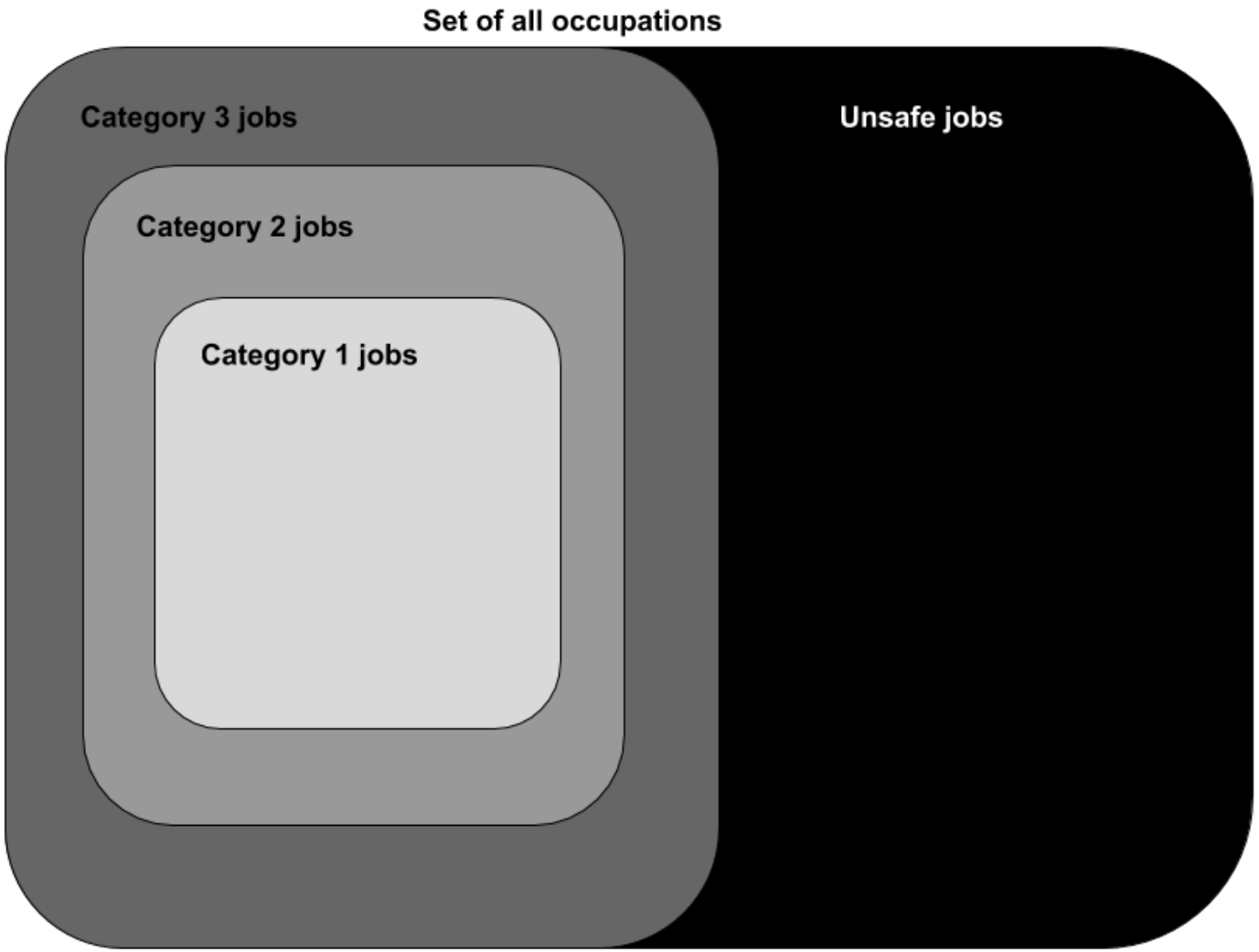
Accounting: methodology

- 3 levels of safety:
  1. Work can be done remotely (as Dingel and Neiman,2020);
  2. Cannot be done remotely but with low personal interactions and only with co-workers;
  3. As in 2 but also with external customers (more contacts and more mobility)
- We look for absolute measures (unlike Mongey et al., 2020, and Barbieri et al., 2020)
- Occupational 1/0 dummies at granular occupational O*Net-SOC classification (968 occupations).
- Question-specific thresholds. Dummy = 1 if positive in all questions
- Mapping into SOC and ISCO-3 digits using 2018 employment weights

Examples of questions/thresholds

- **Level 1**: how frequently does your current job require electronic email? (positive if average respondent states «once a month or more»)
- **Level 2**: “How physically close to other people are you when you perform your current job?” (positive if average worker “I work more distant than arm’s length”)
- **Level 3**: as 2 but for average worker “performing for or working directly with public is important, very important or extremely important”

3 job categories



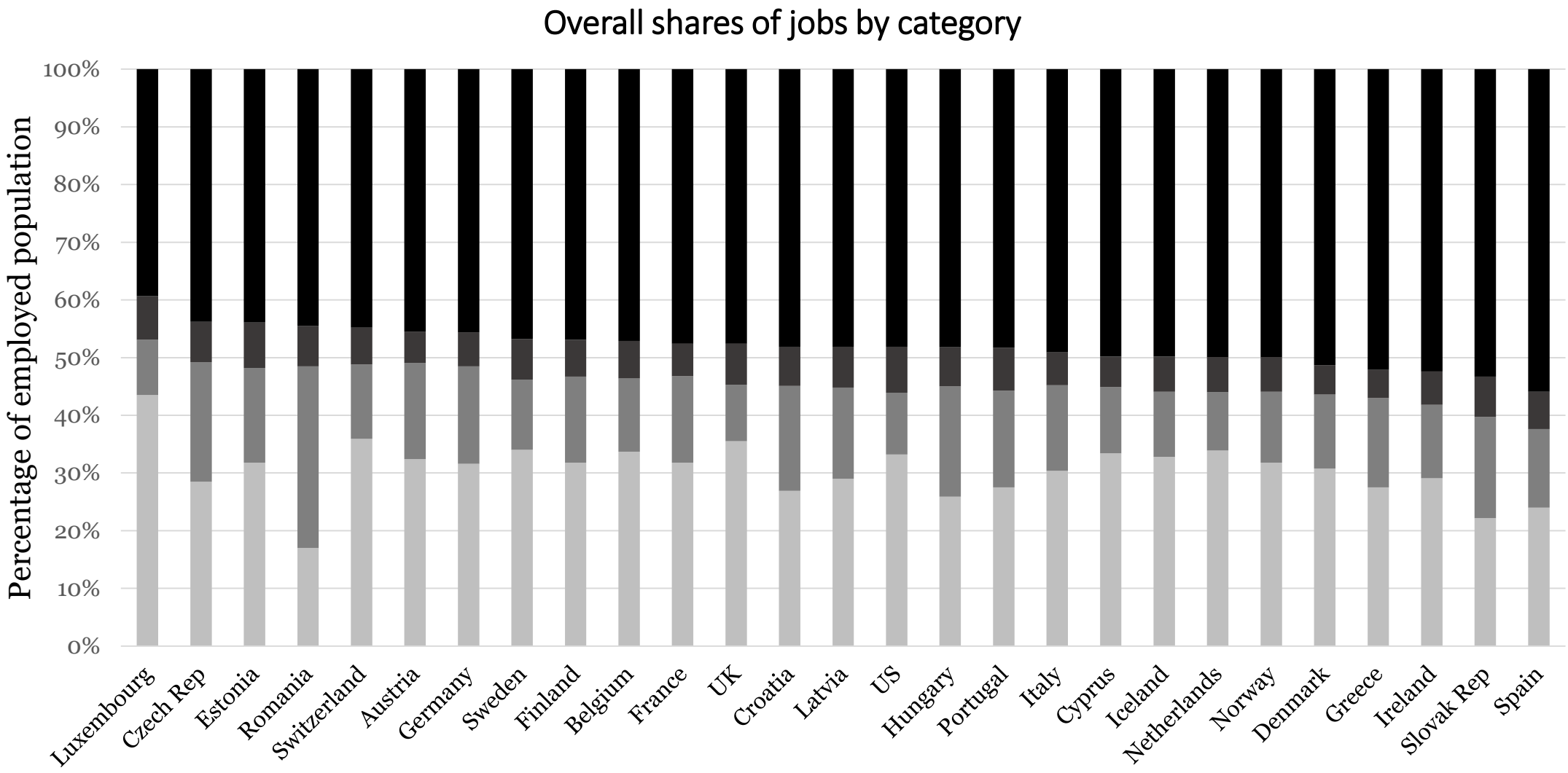
Examples of occupations in our categories

- Category 1: finance professionals (ISCO 3d: 241)
- Category 2 (and not 1): mixed crop and animal producers (613)
- Category 3 (and not 2): heavy truck and bus drivers (833)
- Residual: medical doctors (221)

Data

- US CPS and EU LFS including: Austria, Belgium, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Luxembourg, the Netherlands, Norway, Portugal, Romania, the Slovak Republic, Spain, Sweden, Switzerland, and the United Kingdom
- Average sample size: about 200,000 obs per country (90,000 obs when restricting to employed individuals)
- Problems in representing small occupations (e.g., market-oriented skilled forestry, fishery and hunting workers - 138 obs on average per country) and sectors (e.g. extraterritorial organizations and bodies - 59 by country))
- We work using LFS weights

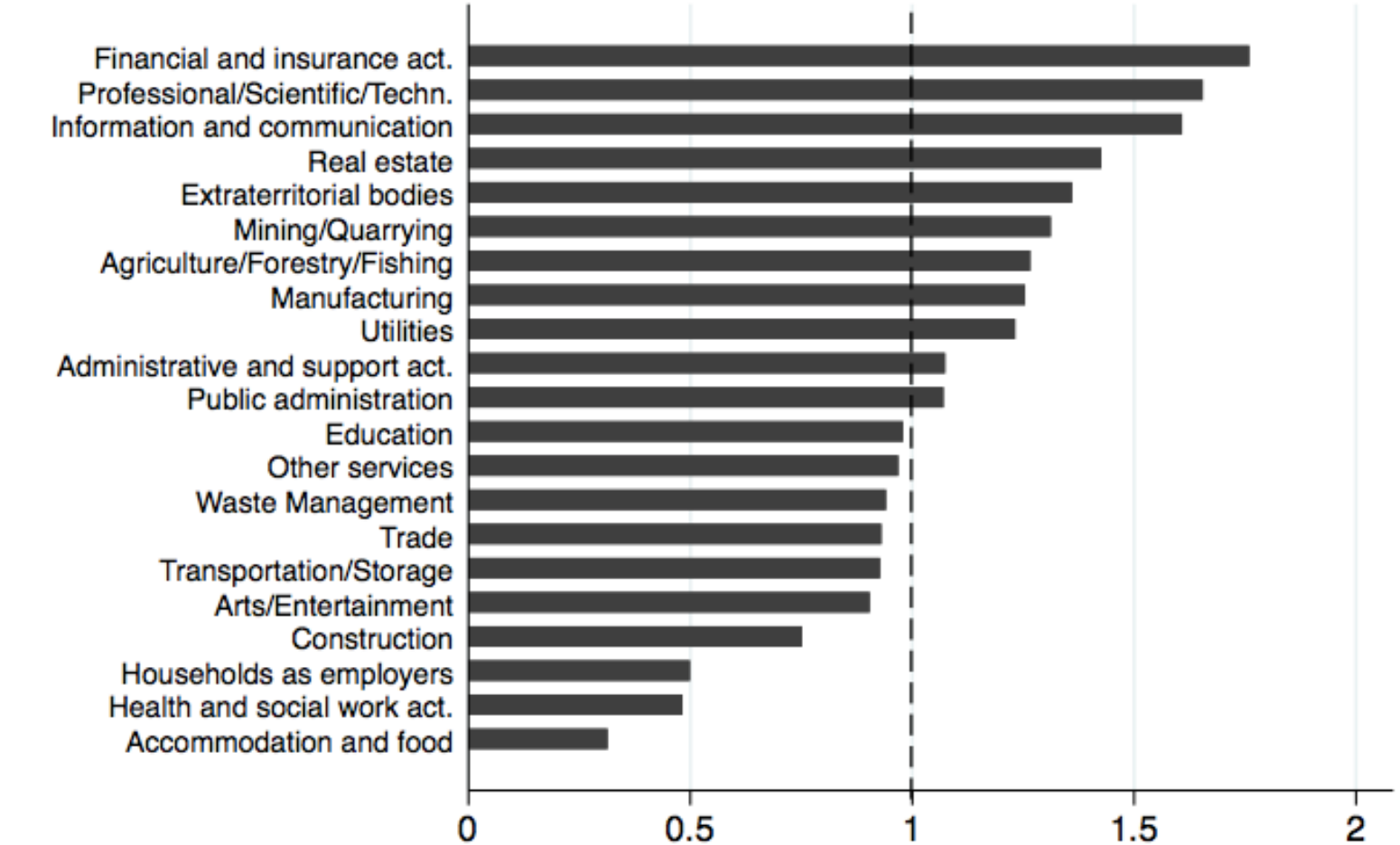
How many safe jobs?



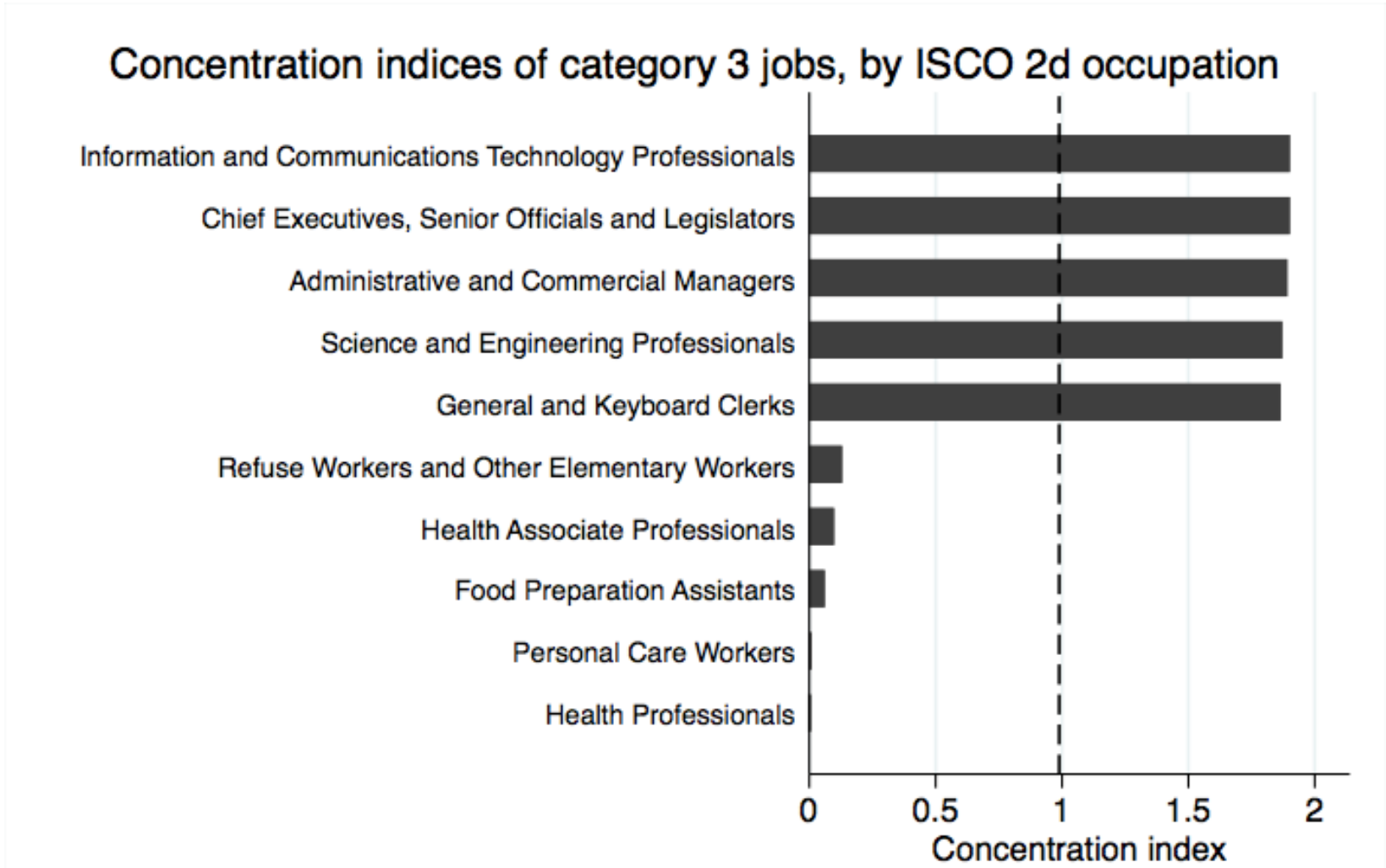
Plan

- Accounting
- Heterogeneity across firms: sectors, essential/non-essential jobs, occupations, firms, regions
- Heterogeneity across workers: age, gender, education, earnings, contract type, dependent vs self-employment, family size
- The twice vulnerable workers (job loss and health status)
- Wages, matching and job-worker reallocation
- Policies: social protection, wage insurance and training

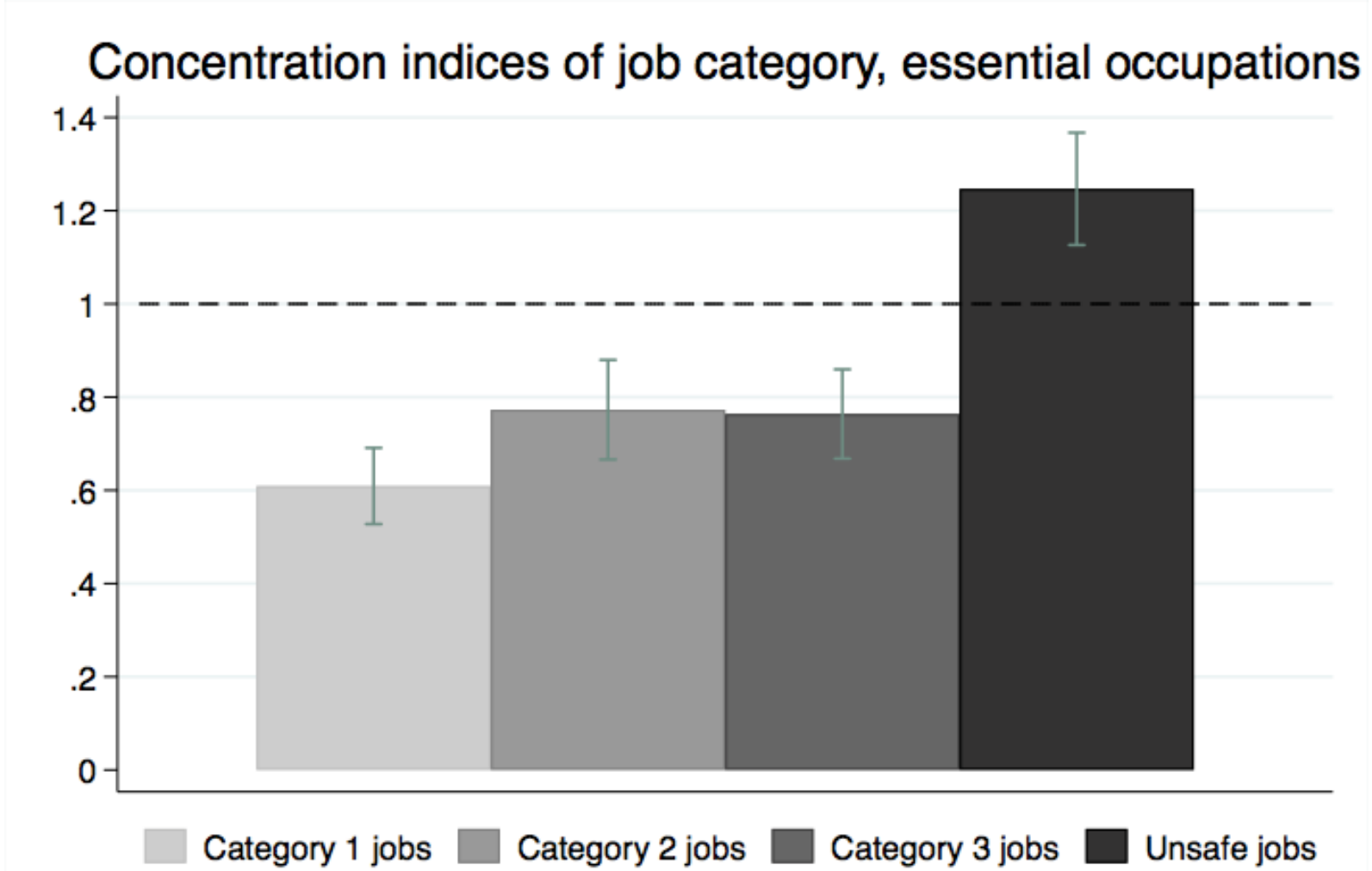
Concentration indices of category 3 jobs, by economic sector



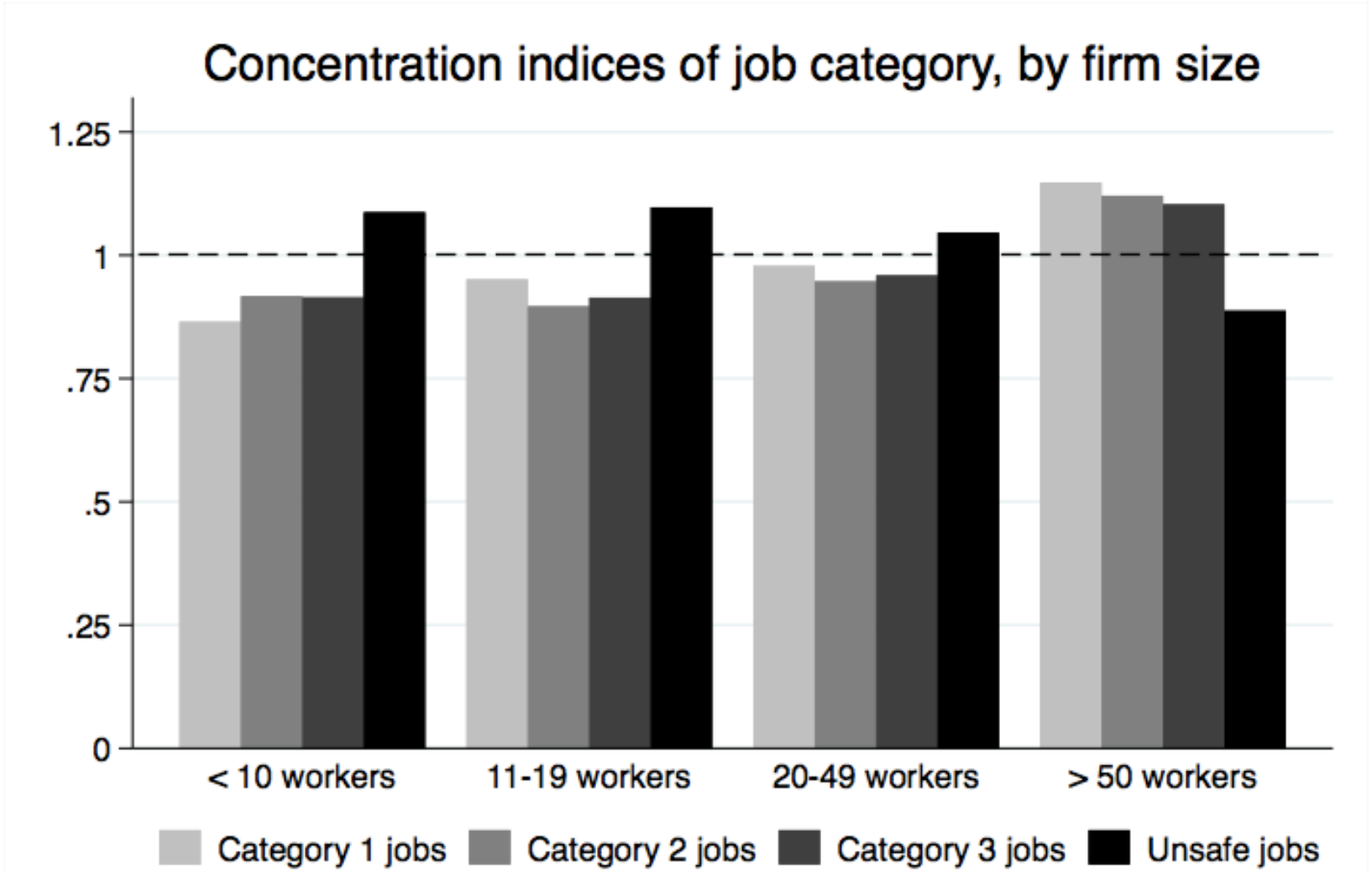
Note: ratio of percentage of category 'i' jobs in sector 'j' to percentage of category 'i'. over workforce
27 countries, 2018 data.



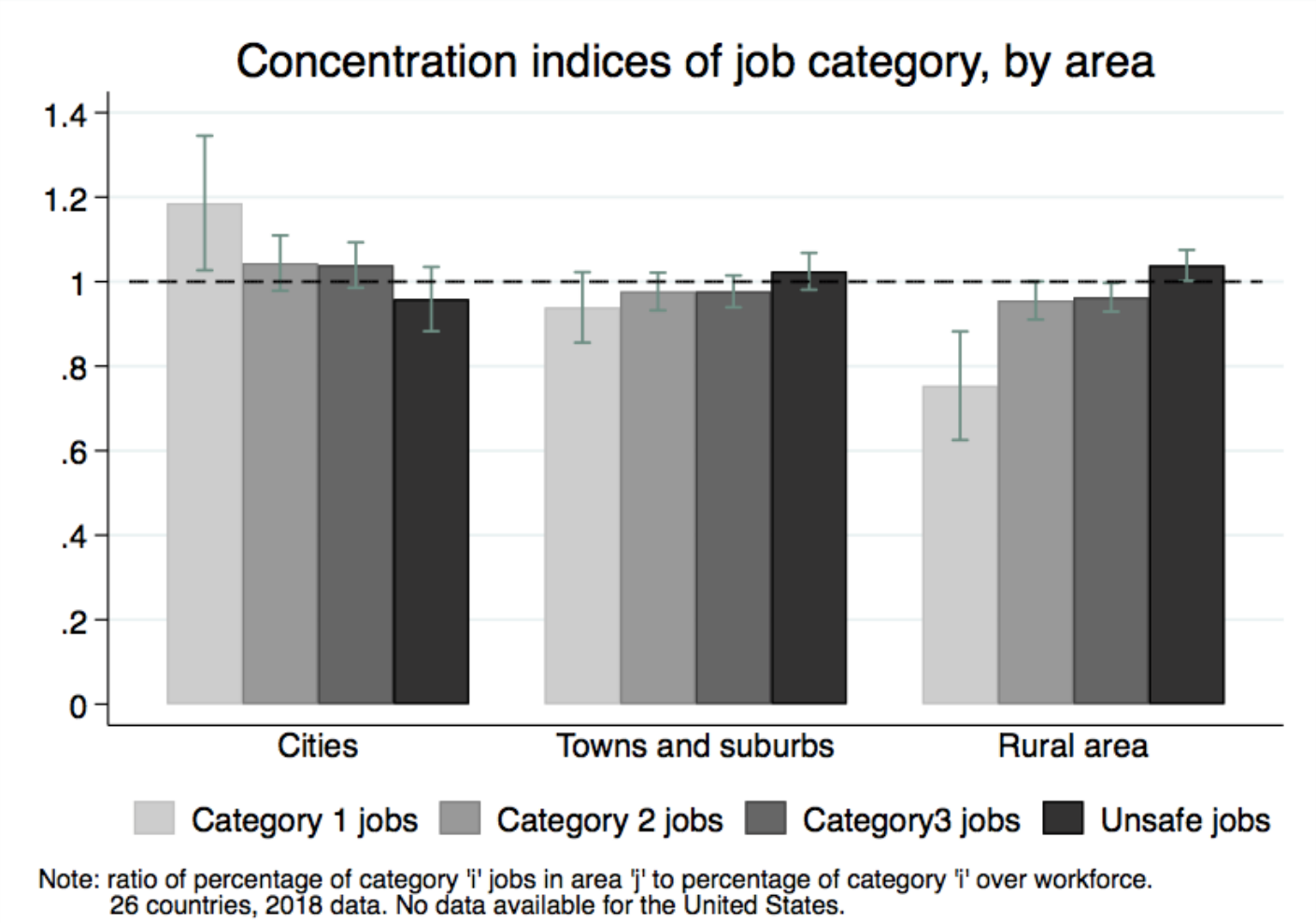
Note: top 5 and bottom 5 occupations. ISCO code 95 dropped due to O*NET-INAPP inconsistencies.
Ratio of percentage of category 3 jobs in occupation 'j' to percentage of category 3 over workforce.
23 countries, 2018 data.



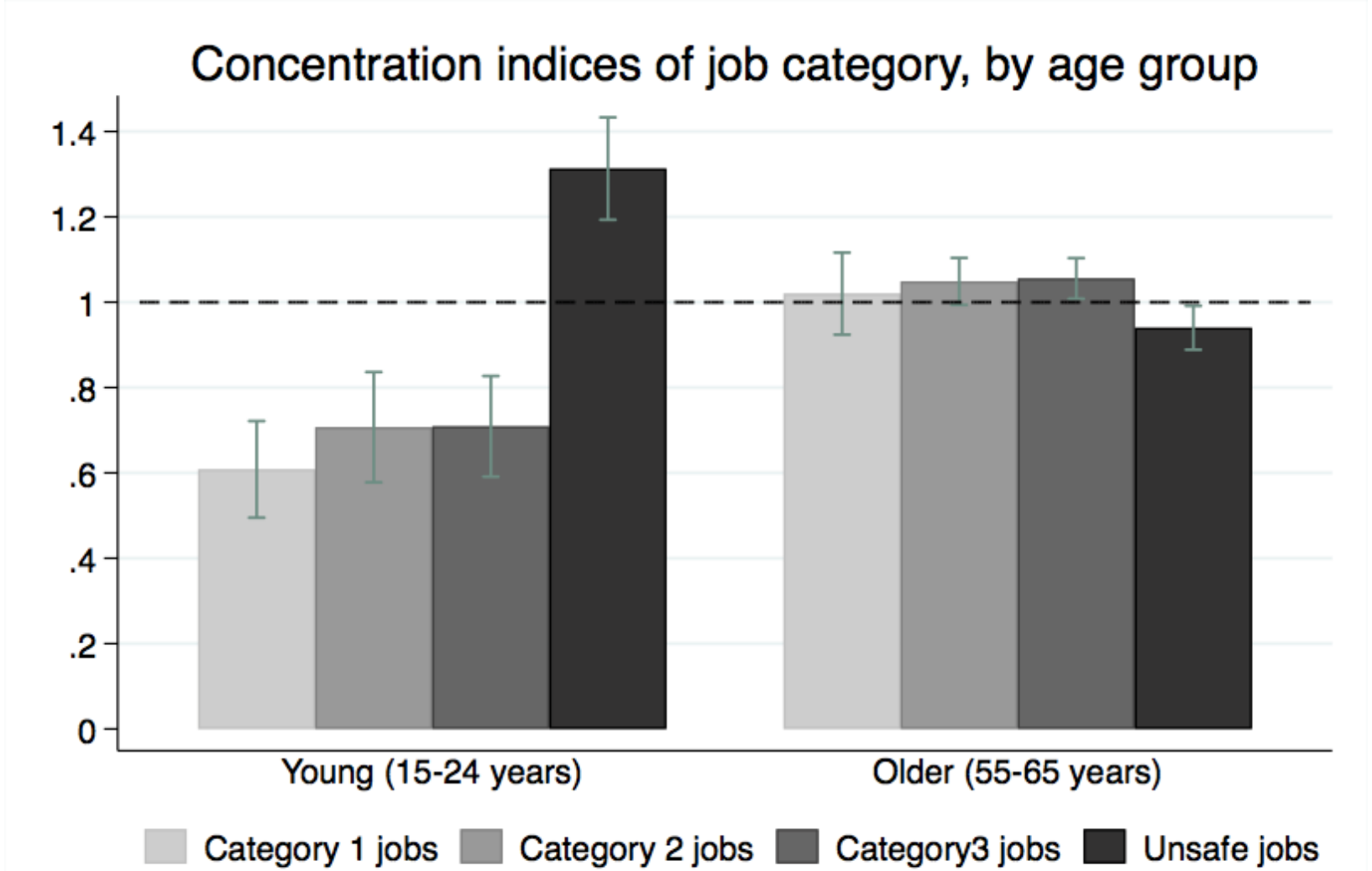
Note: ratio of percentage of category 'i' in essential jobs to percentage of category 'i' over workforce.
27 countries, 2018 data.



Note: ratio of percentage of category 'i' jobs in group of firms 'j' to percentage of category 'i' over workforce.
26 countries, 2018 data. No data available for the United States.

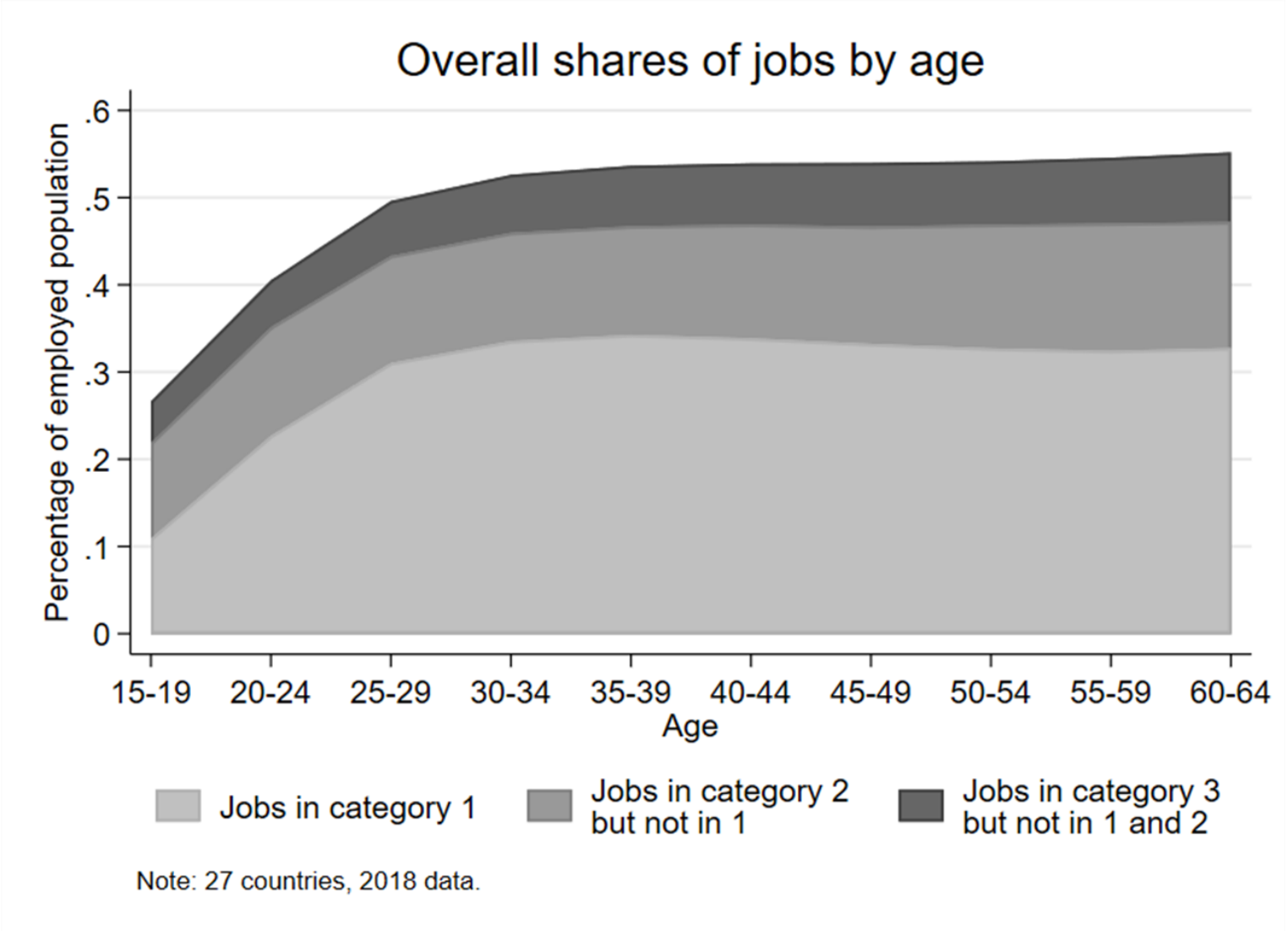


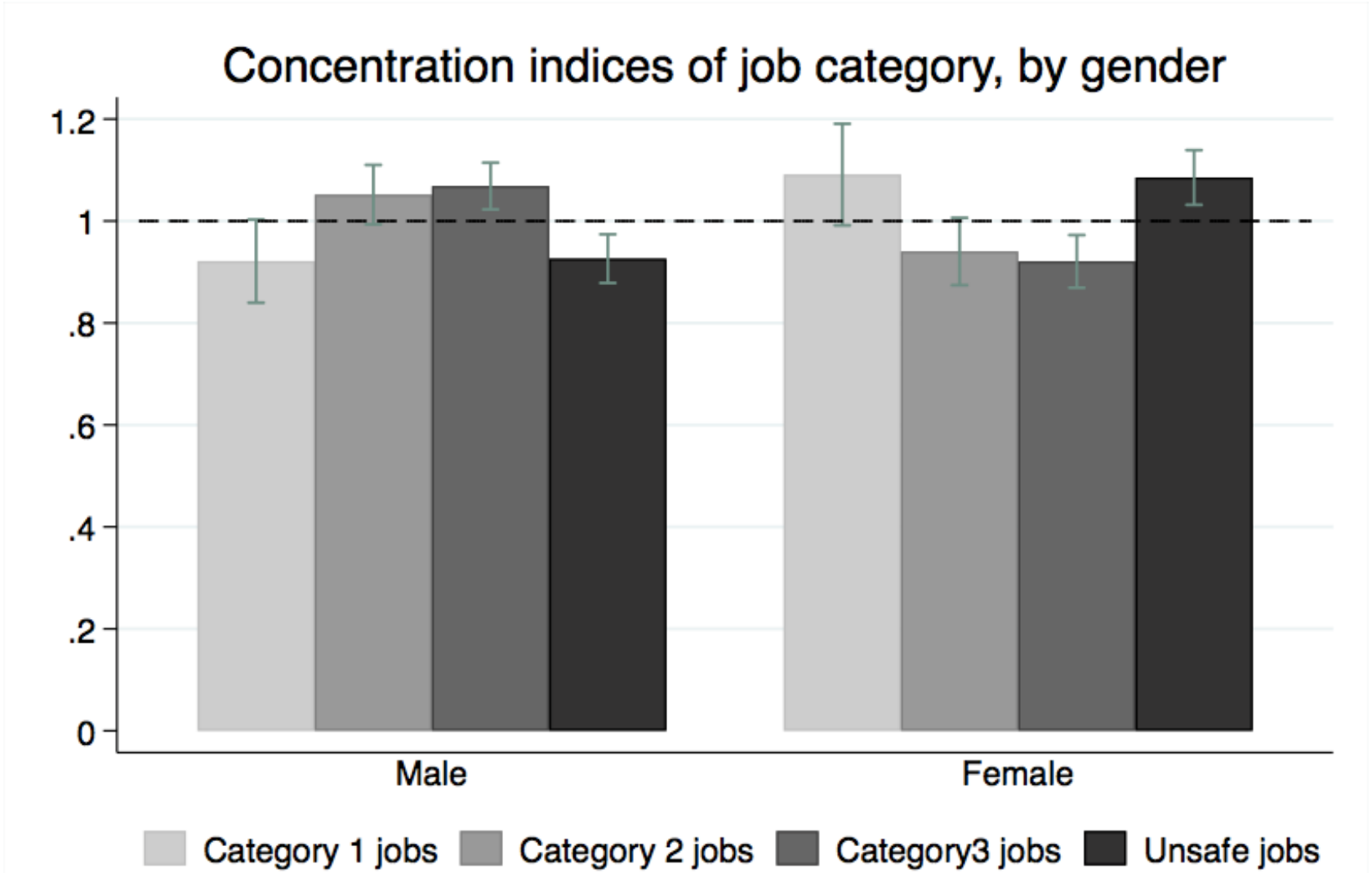
EU LFS methodology. **Cities**: at least 50% lives in high-density clusters, defined as contiguous grid cells of 1 km^2 with a density of at least 1,500 inhabitants per km^2 and a minimum population of 50,000; **rural areas**: more than 50% of the population lives in rural grid cells, defined as grid cell outside high-density clusters and urban clusters (cluster of contiguous grid cells of 1 km^2 with a density of at least 300 inhabitants per km^2 and a minimum population of 5,000); **towns**: less than 50% of the population lives in rural grid cells and less than 50% live in high-density clusters.



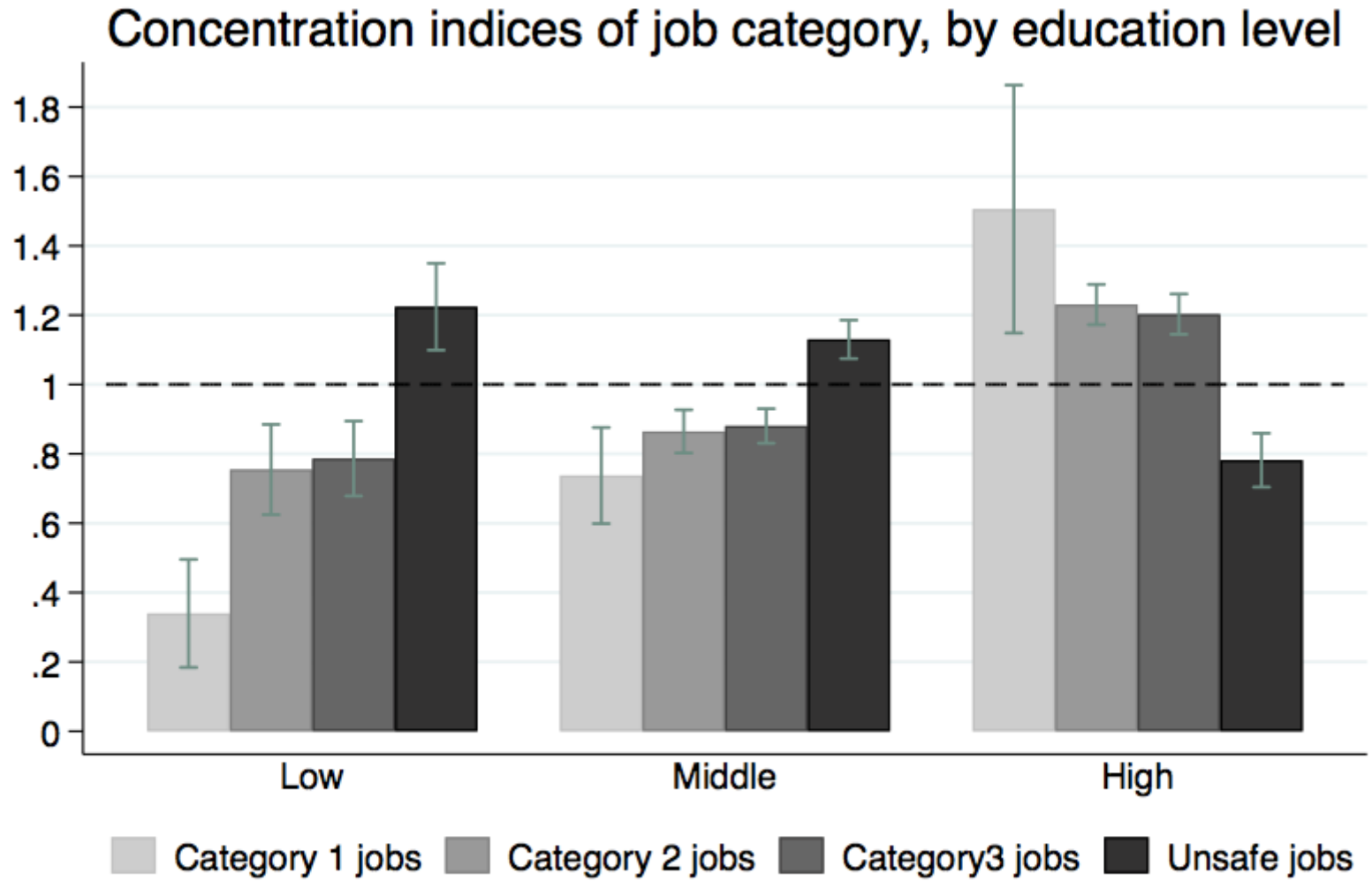
Note: ratio of percentage of category 'i' jobs in age group 'j' to percentage of category 'i' over workforce.
27 countries, 2018 data.

Selection or digital illiteracy?

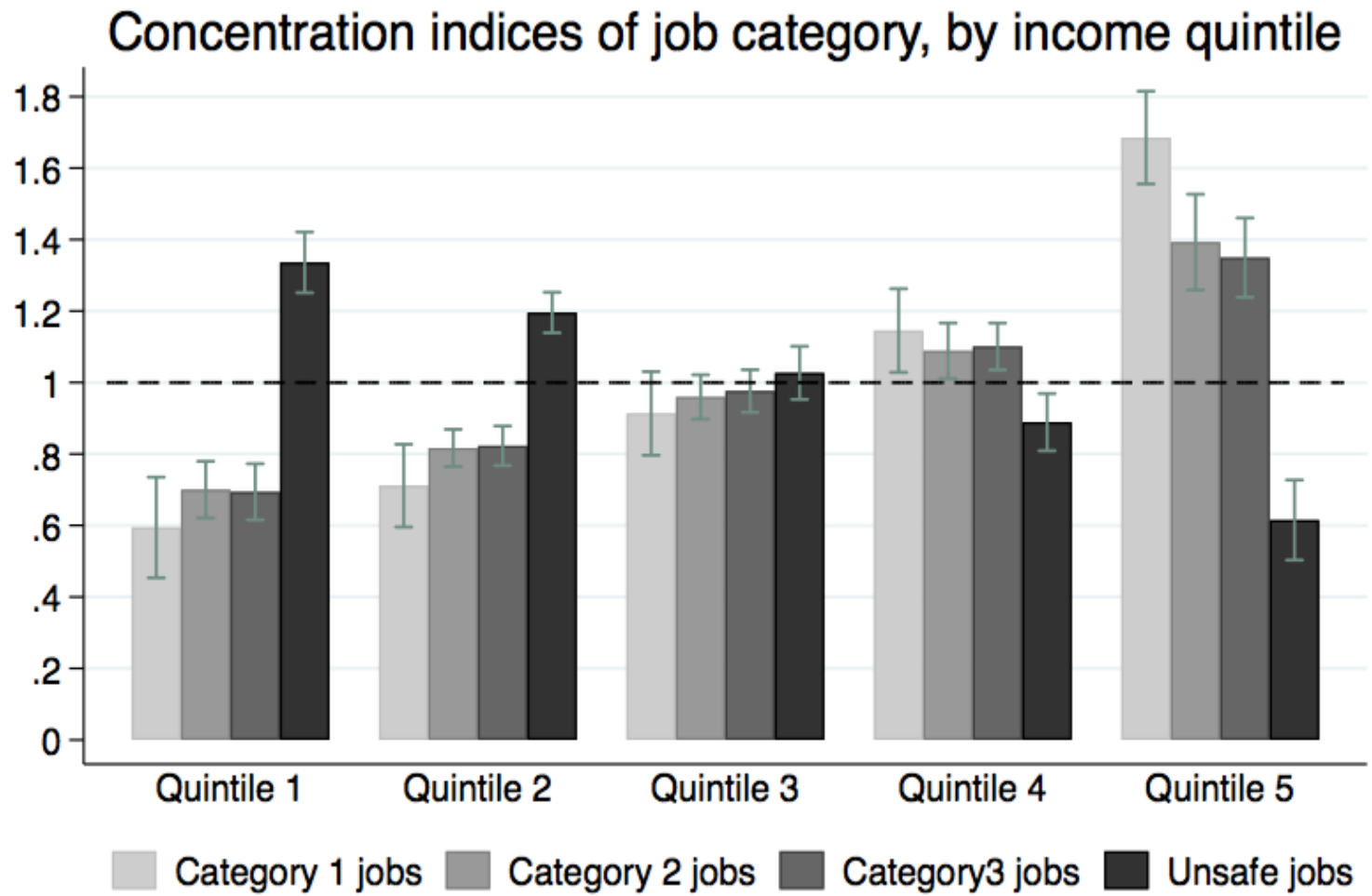




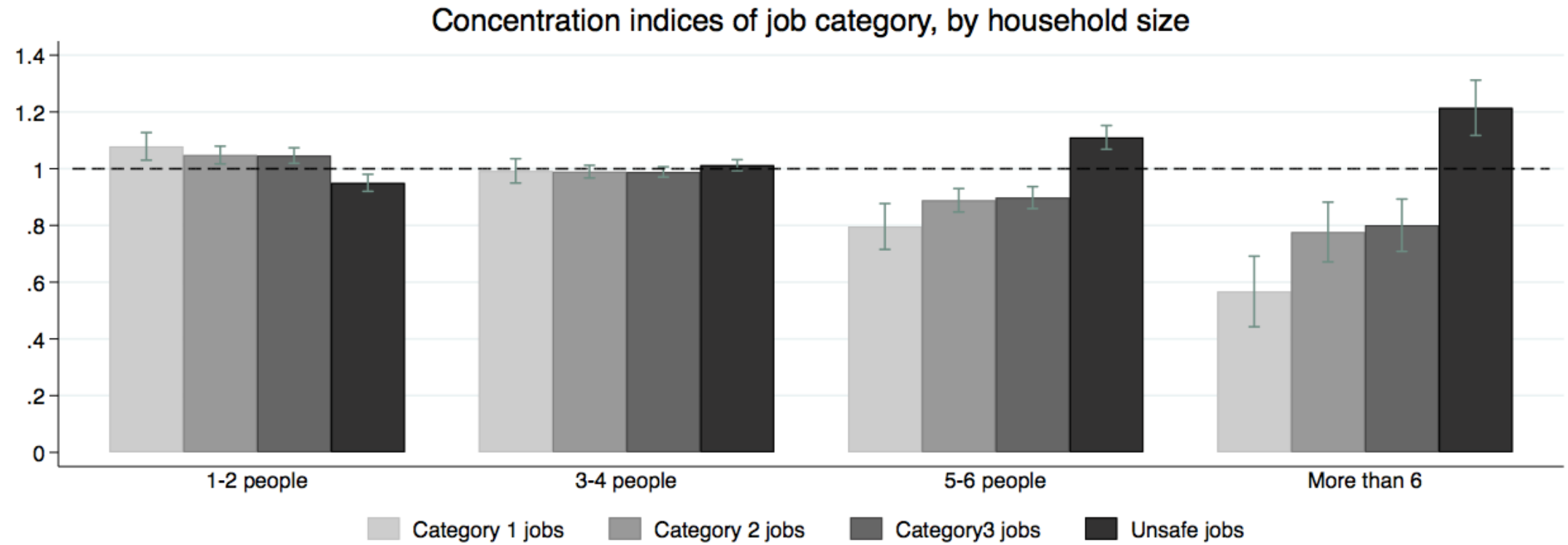
Note: ratio of percentage of category 'i' jobs in gender group 'j' to percentage of category 'i' over workforce.
27 countries, 2018 data.



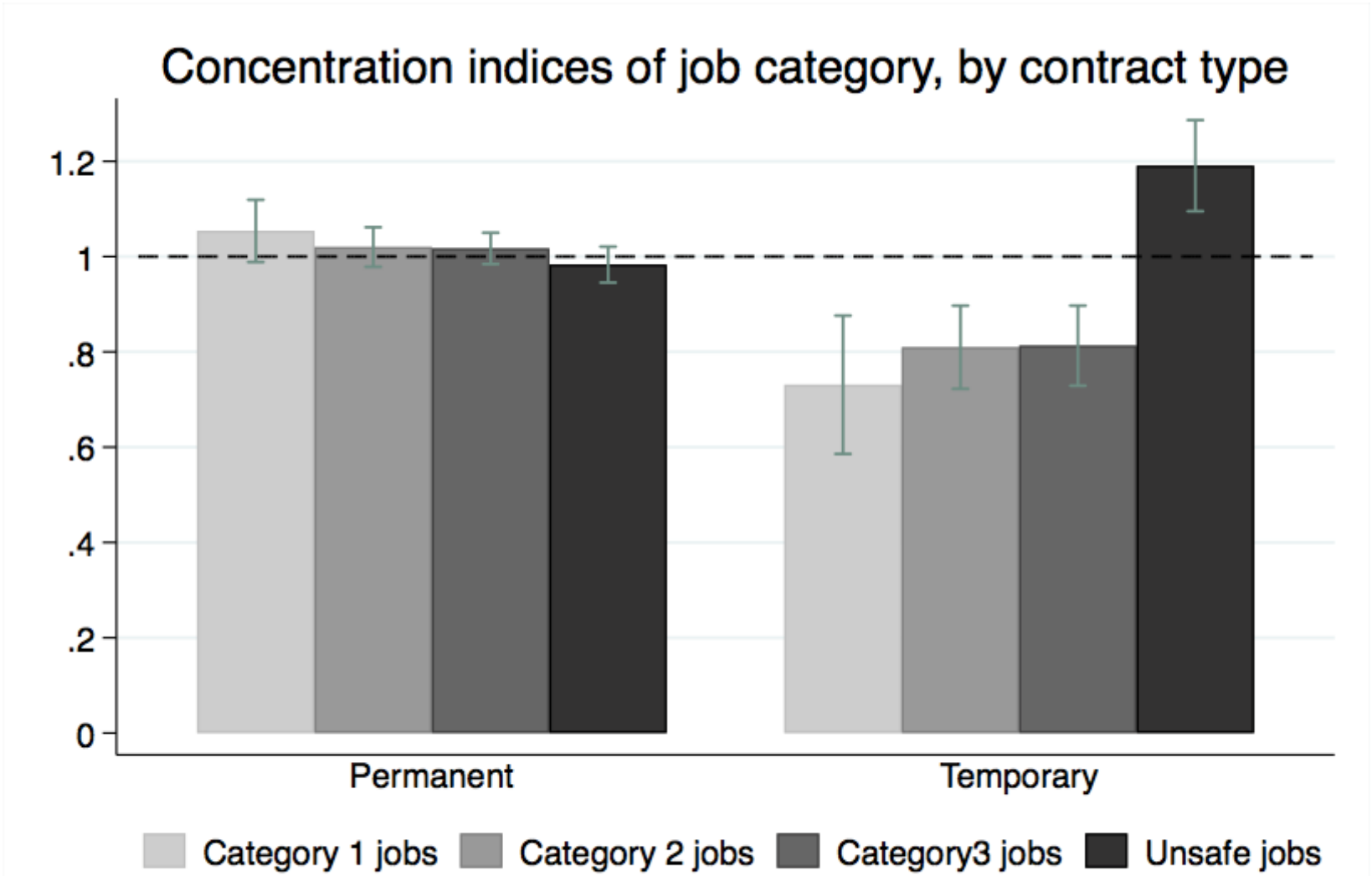
Note: ratio of percentage of category 'i' jobs in education group 'j' to percentage of category 'i' over workforce.
27 countries, 2018 data.



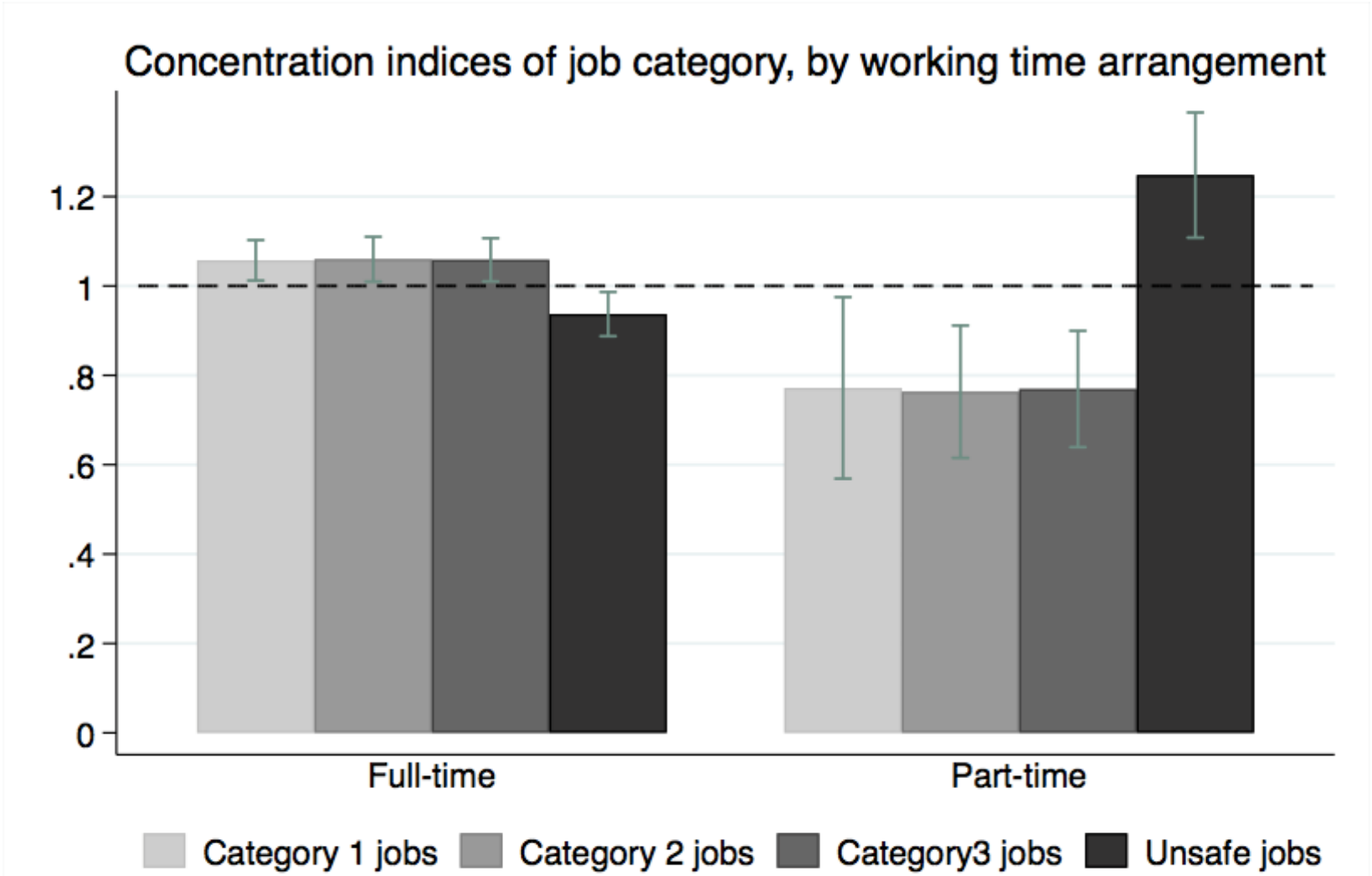
Note: ratio of percentage of category 'i' jobs in income quintile 'j' to percentage of category 'i' over workforce. 20 countries, 2018 data. The graph does not include Austria, the Czech Republic, Finland, Iceland, Norway, Spin and Sweden, for which data on income are not available.



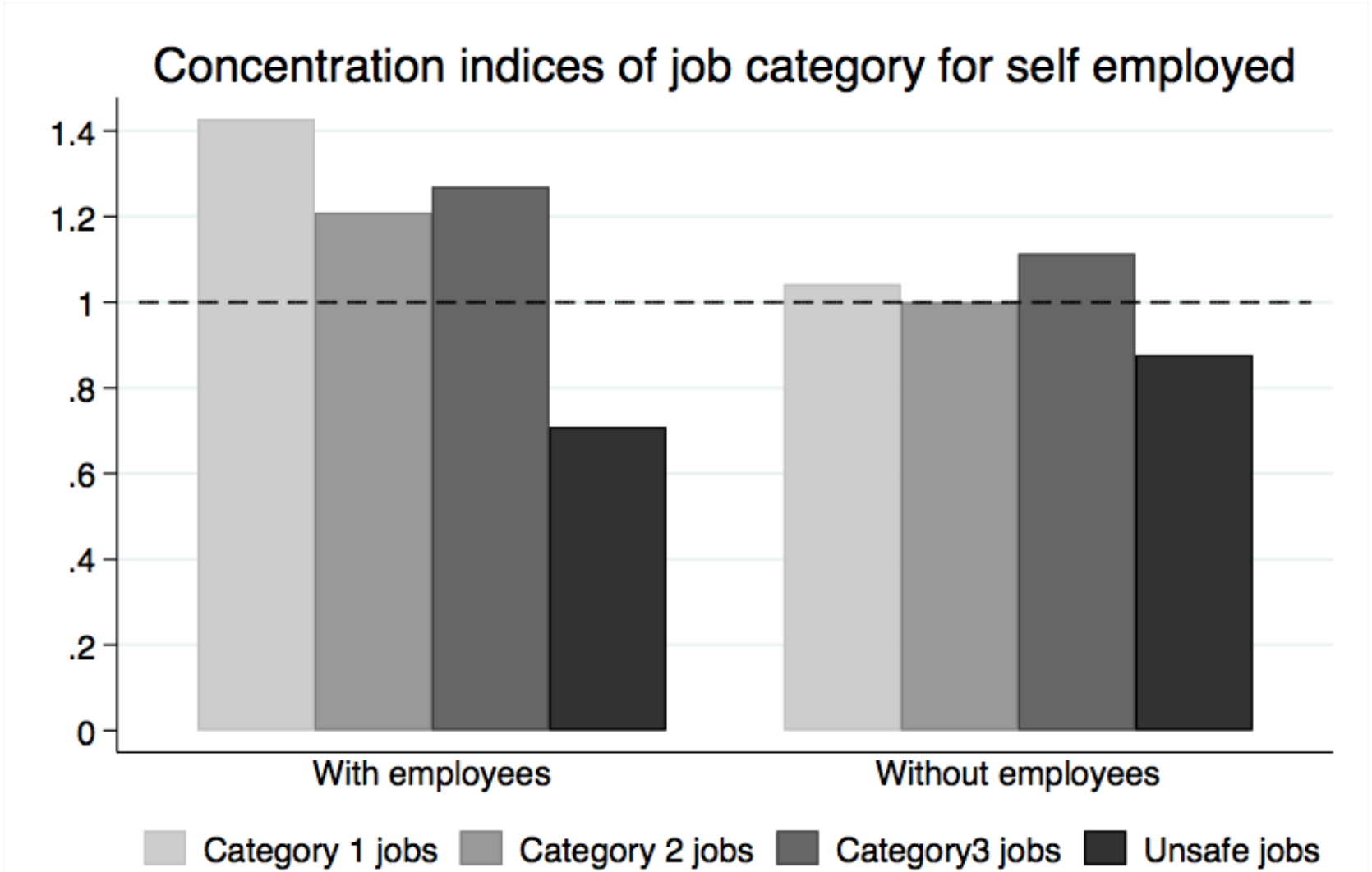
Note: ratio of percentage of category 'i' jobs in group 'j' to percentage of category 'i' over workforce.
27 countries, 2018 data.



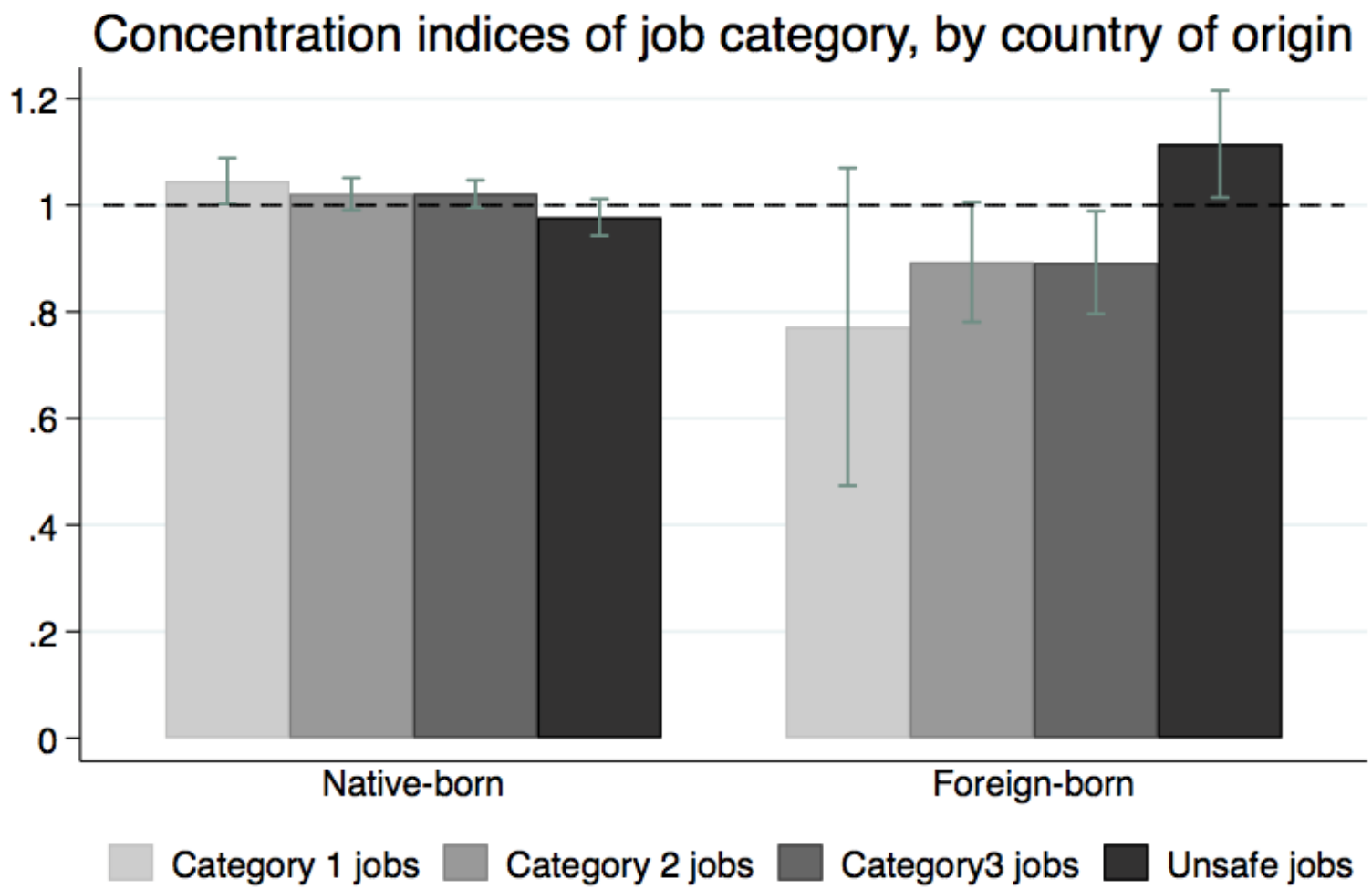
Note: ratio of percentage of category 'i' jobs in contract group 'j' to percentage of category 'i' over workforce.
26 countries, 2018 data. No data available for the United States.



Note: ratio of percentage of category 'i' jobs in contract group 'j' to percentage of category 'i' over workforce.
27 countries, 2018 data.



Note: ratio of percentage of category 'i' jobs in group 'j' to percentage of category 'i' over workforce.
United States, 2018 data.



Note: ratio of percentage of category 'i' jobs in group 'j' to percentage of category 'i' over workforce.
27 countries, 2018 data.

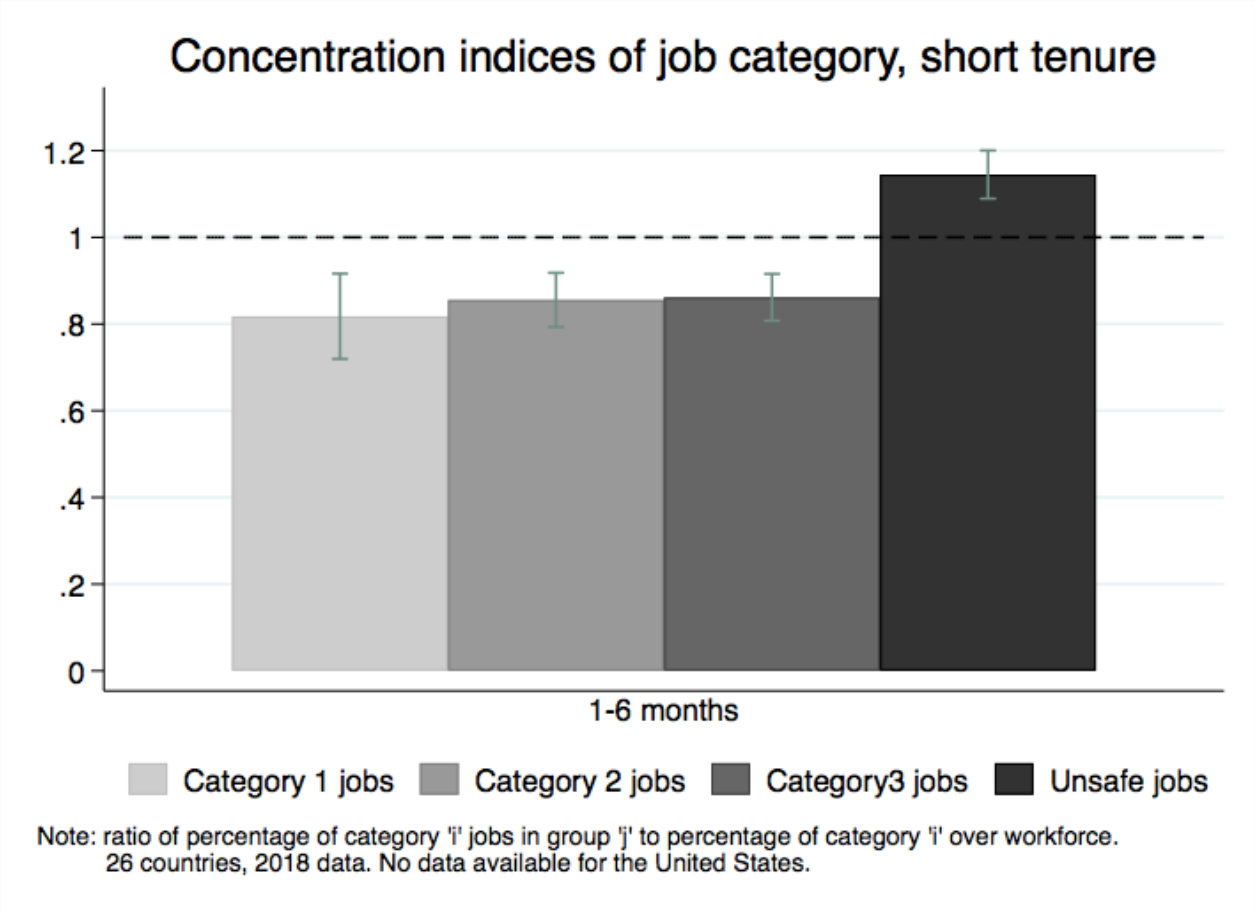
Plan

- Accounting
- Heterogeneity across firms: sectors, essential/non-essential jobs, occupations, firms, regions
- Heterogeneity across workers: age, gender, education, earnings, contract type, dependent vs self-employment, family size
- The twice vulnerable workers (job loss and health status)
- Wages, matching and job-worker reallocation
- Policies: social protection, wage insurance and training

Covid-19 is not a Great Leveller

- Job-related epidemiological risk involves a rather specific worker profile, broadly corresponding to the same characteristics associated with a high risk of job loss: double disadvantage
- Risks positively correlated:
- Large literature points to long lasting negative effects of job loss on health
- Evidence that labor market related hardship increases risk of contracting Covid-19: bad nutrition, insufficient sleep, biological wear and tear increase risk of infection

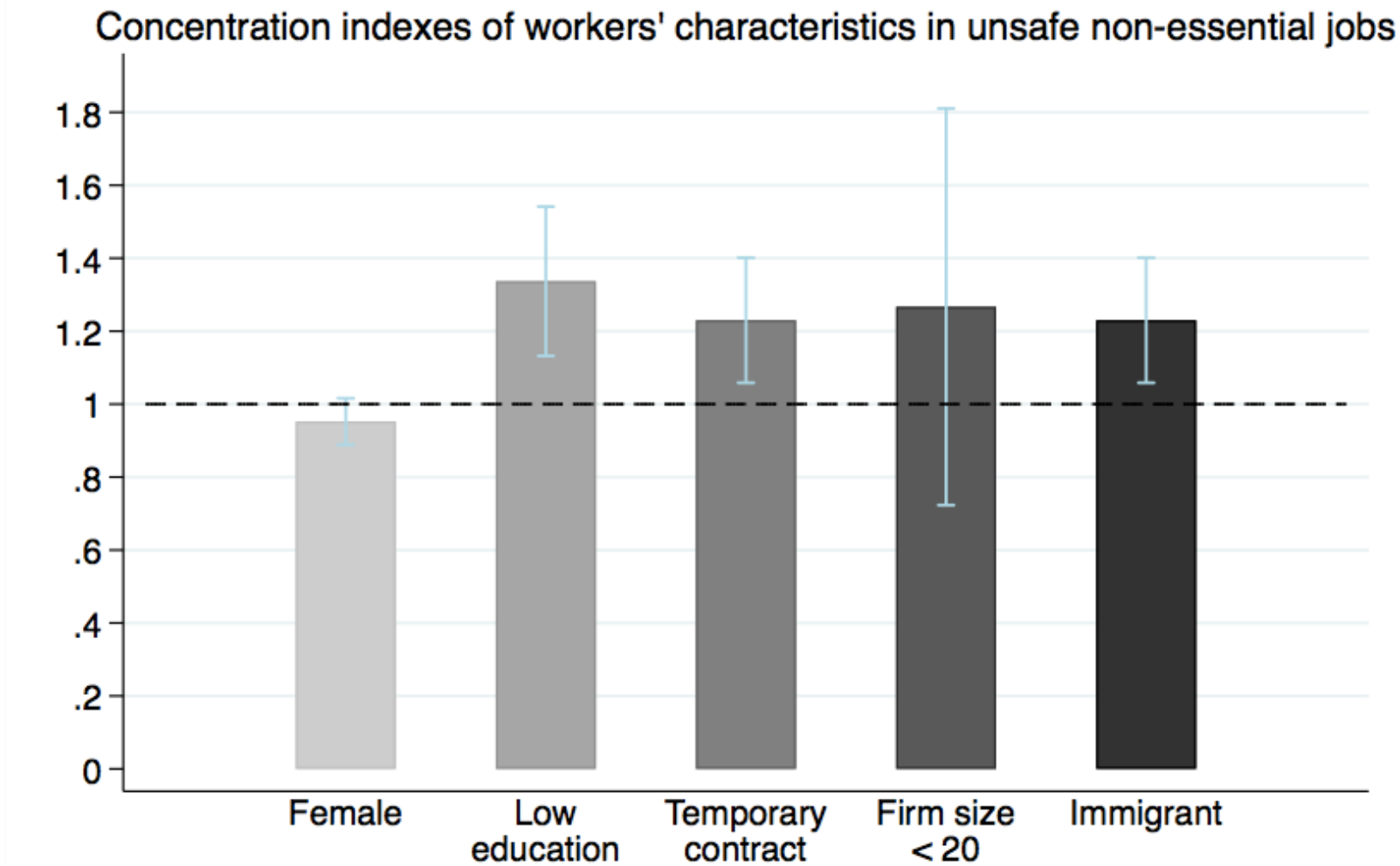
High risk of job loss.
More turnover in unsafe jobs



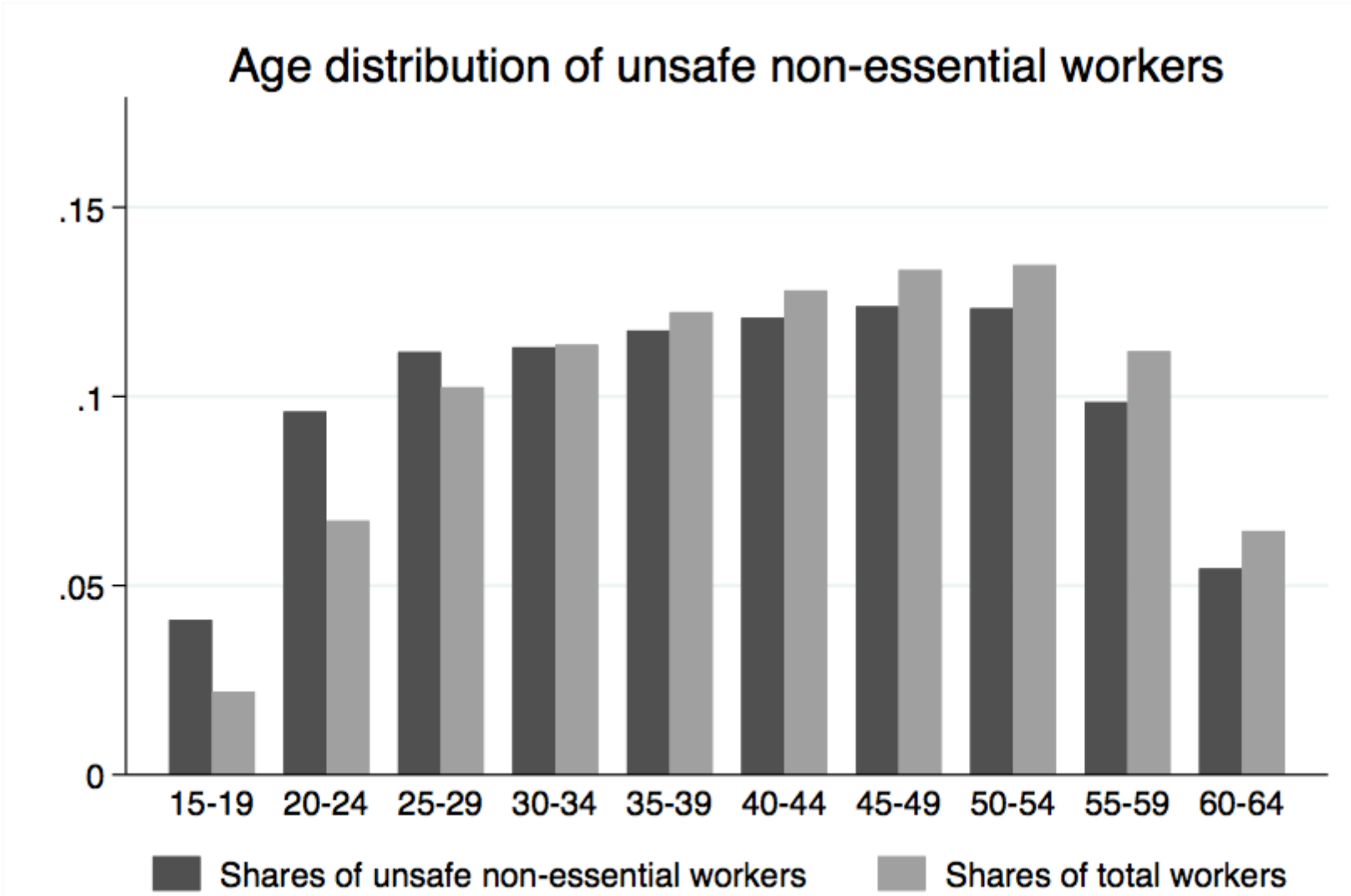
- 9.6% of workers have a tenure of less than 6 months.
- Among unsafe jobs this share is 11,5%.

Higher risk of job loss for unsafe and non-essential workers

- Around 140 million workers have a job in non-essential occupations in EU (two thirds of total EU employment).
- 58.5 million of those workers hold an unsafe job (27% of total EU employment).
- Who are they?
- How many are they?

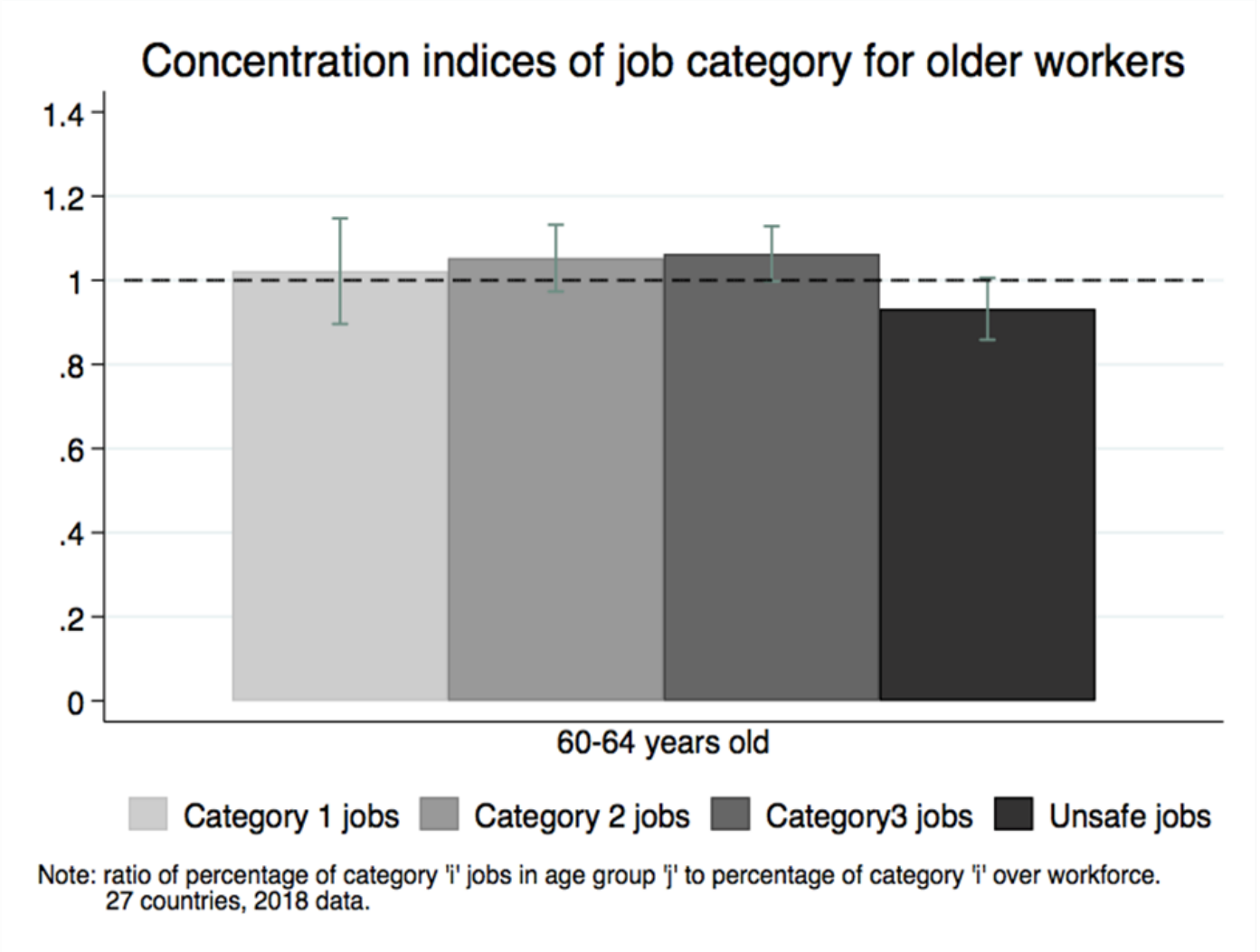


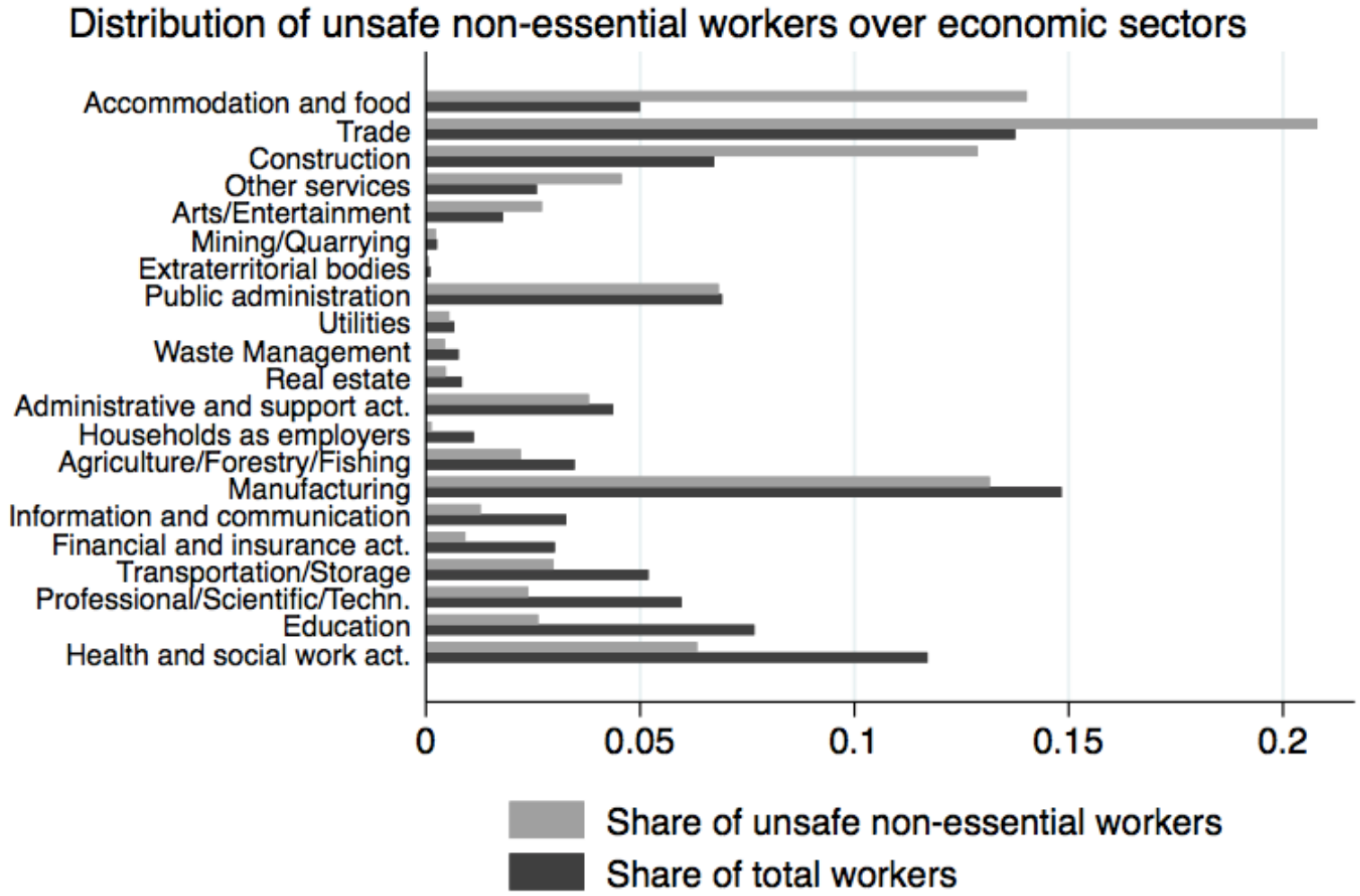
Note: ratio of percentage of worker's characteristic 'i' in unsafe non-essential jobs to percentage of worker's characteristic 'i' over workforce, pooling data from 26 countries of the sample (data for the US not analyzed).



Note: Data refer to 2018, pooling shares from 25 countries of the sample (no data for Latvia and the US).

Can we use early retirement?





Note: Sectors ordered by size of the gap between the two shares. Data refer to 2018, pooling shares from 26 countries of the sample (data for the US not analyzed).

How many?

- Individuals with

1. low levels of education,
2. currently employed in small units and
3. performing elementary occupations
4. in the non-essential sectors of “arts, entertainment and recreation”, “construction”, and “accommodation and food service activities”

- 4.2 million of individuals, representing 1.1% of the total workforce and 7.6% of the total employment in the three aforementioned sectors

Plan

- Accounting
- Heterogeneity across firms: sectors, essential/non-essential jobs, occupations, firms, regions
- Heterogeneity across workers: age, gender, education, earnings, contract type, dependent vs self-employment, family size
- The twice vulnerable workers (job loss and health status)
- Wages, matching and job-worker reallocation
- Policies: social protection, wage insurance and training

Ongoing sectoral reallocation

Declining

Labor supply (search intensity) is moving away from unsafe jobs (Hensvik et al., 2020)

Lower productivity (hence labor demand) in jobs that require more physical distancing

Example of accommodation and food service activities (83,8% in unsafe vs. 48,5% in total employment)

Expanding

- Expansion of the health sector may involve some components of manufacturing and services according to input-output tables
- Cleaners account for about 3% of total employment and may also be expanding
- Public sector at about 13% of total employment

Immigrants over-represented in «essential (mostly hazardous) jobs»

- Essential jobs keeping EU citizens healthy, safe and fed during the pandemic
- Fasani and Mazza (2020): approximately 31% of employed working-age individuals are essential workers in the EU
- Migrants are over-represented (13% vs 11% in total employment)
- Higher concentration of migrants in cleaners and helpers, mining and construction, machine operators and food processing
- 61% of essential jobs are unsafe (vs 48.5% in the total)

How to encourage safer workers to do essential and unsafe jobs?

- No epidemiologic risk premia before the pandemic
- We measure the riskiness of the job with the same index we use to identify jobs belonging to *category 3*, i.e. our broadest definition of “safe” jobs
- Our index is not a binary variable, but it takes values between 0 and 1 depending on the share of safe jobs in any given occupation belonging to the 3-digit ISCO
- Higher values of the index denote less exposure to risk in that occupation
- We first run our regression on CPS data for the United States (Table 1), and then we replicate the same exercise using data from the OECD Programme for the International Assessment of Adult Competencies (PIAAC) - 21 countries, survey in 2011-12 (Table 2)

	Baseline	Controls	Extended
Variables	Log(weekly earnings)	Log(weekly earnings)	Log(weekly earnings)
	(1)	(2)	(3)
Safe job	0.514***	0.324***	0.148***
	(0.0903)	(0.0584)	(0.0360)
Age		0.0828***	0.0339***
		(0.00555)	(0.00450)
Age sq		-0.000838***	-0.000308***
		(5.78e-05)	(4.92e-05)
Education (middle level)		-0.172	-0.0109
		(0.118)	(0.0975)
Education (high level)		0.647***	0.0976
		(0.151)	(0.117)
Foreign-born			-0.0832***
			(0.0118)
Area 1			0.0529***
			(0.00710)
Area 2			0.139***
			(0.00957)
Female			-0.170***
			(0.0135)
Part-time			-0.927***
			(0.0244)
Constant	6.329***	4.142***	5.337***
	(0.0671)	(0.135)	(0.132)
Observations	157,286	157,286	157,286
R-squared	0.078	0.273	0.481
Age # education	NO	YES	YES
Age sq # education	NO	YES	YES
No. children dummies	NO	NO	YES
No. children # gender	NO	NO	YES
Sector dummies	NO	NO	YES

Countries	Baseline	Controls	Extended controls	Observations for specifications (1) and (2)	Observations for specification (3)
	Safe job coeff	Safe job coeff	Safe job coeff		
	(1)	(2)	(3)	(4)	(5)
Austria	0.371***	0.247***	0.192***	2,823	1,721
	(0.0707)	(0.0518)	(0.0425)		
Flanders (Belgium)	0.222***	0.133***	0.102***	2,595	1,811
	(0.0578)	(0.0327)	(0.0299)		
Canada	0.381***	0.213***	0.106**	15,915	10,118
	(0.100)	(0.0699)	(0.0503)		
Czech Republic	0.273***	0.187***	0.128**	2,527	1,624
	(0.0771)	(0.0566)	(0.0563)		
Germany	0.458***	0.271***	0.137**	3,065	1,878
	(0.0934)	(0.0605)	(0.0550)		
Denmark	0.308***	0.175***	0.123***	4,316	3,155
	(0.0581)	(0.0316)	(0.0242)		
Spain	0.256***	0.118*	0.0230	2,338	1,464
	(0.0936)	(0.0614)	(0.0504)		
Estonia	0.397***	0.320***	0.231***	3,877	2,895
	(0.0905)	(0.0824)	(0.0569)		
Finland	0.319***	0.230***	0.140***	3,083	2,102
	(0.0637)	(0.0512)	(0.0417)		
France	0.324***	0.189***	0.153***	3,544	2,516
	(0.0748)	(0.0561)	(0.0453)		
England/N. Ireland (UK)	0.521***	0.406***	0.301***	4,639	2,880
	(0.0879)	(0.0635)	(0.0540)		
Ireland	0.319***	0.179**	0.148**	2,623	1,536
	(0.114)	(0.0760)	(0.0582)		
Italy	0.286***	0.147**	0.0782	1,673	901
	(0.0877)	(0.0632)	(0.0582)		
Japan	0.408***	0.293***	0.152***	3,146	1,909
	(0.110)	(0.0901)	(0.0509)		
Korea	0.458***	0.277***	0.184**	2,999	1,905
	(0.0965)	(0.0753)	(0.0804)		
Netherlands	0.444***	0.204***	0.157***	3,071	1,894
	(0.0869)	(0.0414)	(0.0295)		
Norway	0.309***	0.201***	0.100***	3,075	2,104
	(0.0668)	(0.0414)	(0.0303)		
Poland	0.337***	0.157**	0.0967	3,750	1,475
	(0.121)	(0.0651)	(0.0700)		
Slovak Rep.	0.346***	0.237***	0.143**	2,389	1,655
	(0.0797)	(0.0524)	(0.0549)		
Sweden	0.258***	0.219***	0.152***	2,765	1,891
	(0.0418)	(0.0387)	(0.0305)		
United States	0.550***	0.327***	0.182***	2,712	1,736
	(0.111)	(0.0782)	(0.0595)		

Recap of results on reallocation

- No wage premium for risky jobs, but rather a premium on safe jobs
- The premium narrows down as we add more covariates, i.e., as we make jobs more comparable
- Discount also in Asian countries where more awareness of the epidemiologic risks
- In addition to lack of information, unsafe jobs are more prevalent among workers with a relatively low bargaining position
- Risk of a decline of employment and production capacity in essential goods and services through a labor supply shortage (rather than of product demand): need for public support?

Plan

- Accounting
- Heterogeneity across firms: sectors, essential/non-essential jobs, occupations, firms, regions
- Heterogeneity across workers: age, gender, education, earnings, contract type, dependent vs self-employment, family size
- The twice vulnerable workers (job loss and health status)
- Wages, matching and job-worker reallocation
- Policies: social protection, wage insurance and training

Summarizing

- Roughly 50% of jobs are safe at state of the art technologies but important cross-country variation largely explained by sectoral specialization
- Older workers slightly more represented in safe jobs but partly due to selection
- Unsafe jobs for the most vulnerable: women, migrants, less-educated, fixed-term contracts, solo self-employed, part-timers and low-wage workers

Summarizing - cont'd

- Reallocation due to a new type of mismatch: to encourage workers to take up suitable jobs, wages should offer a premium for epidemiological risk (not the case before Covid-19)
- Early retirement does not seem to be an option
- About 60% of unsafe jobs are in non-essential occupations: major restructuring with sizeable productivity losses and a dramatic drop in labour demand
- Workers involved in this restructuring had already a vulnerable position in the labour market before Covid-19

Productivity losses involved in transforming unsafe into safe jobs

- Panel on Italian managers. So far data on a survey carried out the end of April 2020 (over 1,200 Italian managers interviewed)
- 76% of managers declared to have already adopted protective measures (protective equipment, barriers, etc.); 18% intended to adopt them in the near future
- However, according to 45% of managers, physical distancing would reduce the number of workers present at the workplace by at least 20%
- 40% of managers also declared that productive capacity would decrease due to the adoption of distancing measures

Policy response

- In many countries, employment protection and short-time work extended to small firms.
- In a few countries (e.g. Greece, Spain and Italy), economic layoffs banned.
- Necessary during the lockdown, but can only be temporary.
- Increasing number of people put at the margin of the labour market by the hiring freeze and the collapse of new business start-ups.
- Serious consideration to: i) better targeting the policies to the sectors, occupations and firms most hardly hit by the crisis; and ii) devising policies, such as combinations of STW and wage insurance, to encourage mobility of the twice-vulnerable workers.
- Employment opportunities even for unskilled workers in essential activities and in new disinfection-related jobs (not appealing: health risk and offer relatively low wages).

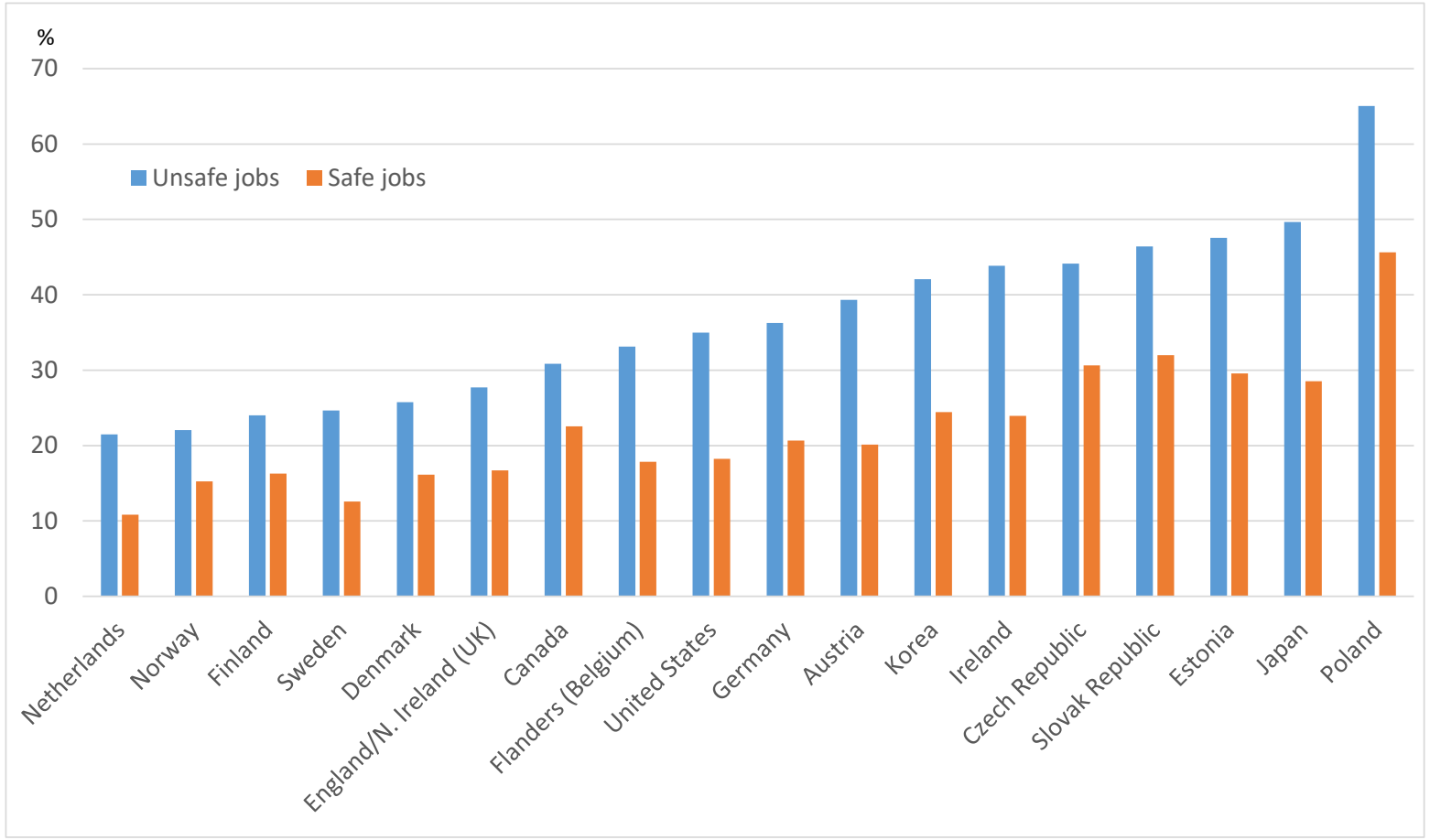
Double protection

- Double vulnerability issue requires double protection:
- Good and encompassing health infrastructure is essential in this juncture to prevent poverty related outbreaks of infection.
- Quick and encompassing social protection infrastructure is essential to prevent the spread of absolute poverty

Training

- On-the-job training and retraining of unemployed adults will play a major role in mitigating the negative effects of the pandemic.
- This time we know what to train for: digital skills.
- PIAAC data: assessment of Problem Solving in Technology-Rich Environment (PSTRE), aimed at evaluating the ability of adults to solve problems and perform a wide range of tasks using digital devices
- Adults taking the assessment are placed in 4 different proficiency levels

Percentage of workers scoring Below Level 1 in PSTRE in safe and unsafe jobs



Italian case

- Unfortunately PIACC section on digital literacy not carried out in Italy
- However, low level of digital literacy in 2011: only one worker out of two uses the pc at least once a month for work related issues. In France, Germany and the UK it was 3 out of 4.
- Problem related to the public sector. It explains the country lag. Everywhere else the public sector is almost entirely digital
- Why not introduce Cassa Integrazione also for civil servants who cannot be operational under the current circumstances conditioning full receipt of STW subsidies to attendance of digital training sessions?

Some references

Barbieri, T. , G. Basso, and S. Scicchitano (2020). “Italian workers at risk during the COVID-19 epidemic”. Banca d’Italia, Occasional Papers, forthcoming.

Boeri T., A. Caiumi and M. Paccagnella (2020). *“Mitigating the work-security trade-off while rebooting the economy*”. Covid Economics Vetted and Real-Time Papers, Issue 2.

Borjas, G.J. and H. Cassidy (2020). “*The adverse effect of the covid-19 labor market shock on immigrant employment*”. NBER Working Paper.

Dingel, J. and B. Neiman (2020). “*How many jobs can be done at home*?”. BFI White Paper.

Fasani, F. and J. Mazza (2020). “Immigrant key workers: their contribution to Europe’s COVID-19 response”. IZA DP No. 13178.

Gottlieb, C., J. Grobovšek, and M. Poschke (2020). “*Working from home across countries*”. Covid Economics Vetted and Real-Time Papers, Issue 8.

Hensvik, L., T. Le Barbanchon and R. Rathelot (2020). “*Job search during COVID-19 Crisis*”. IZA DP No. 13237.

Hensvik, L., T. Le Barbanchon and R. Rathelot (2020). “*Which jobs are done from home? Evidence from the american time use survey*”. CEPR Working Paper.

Mongey, S., L. Pilossoph and A. Weinberg (2020). “W*hich workers bear the burden of social distancing policies?*” BFI Working Paper.