

TECHNOLOGY, SKILLS, AND GLOBALISATION: EXPLAINING INTERNATIONAL DIFFERENCES IN ROUTINE AND NONROUTINE WORK USING SURVEY DATA

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We create worker-specific measures of non-routine cognitive analytical and personal, routine cognitive and manual task contents. We apply them to 42 countries in PIAAC, STEP and CULS surveys. The routine intensity of tasks is lower in more developed countries, also within particular occupations. Differences in computer use at work explain 36% of the cross-country differences in tasks. Offshoring and international differences in the supply of skills each explain almost 10% of these differences.

CONTRIBUTION OF THIS PAPER

- ✓ A task is a "a unit of work activity that produces output" (Acemoglu & Autor 2011). Skills are worker's abilities to perform various tasks. Tasks are usually measured with O*NET data under the assumptions that (i) tasks are uniform within occupations and (ii) occupations are identical around the world.
- ✓ We construct task content measures which are consistent with the Acemoglu & Autor (2011) measures but allow cross-country comparisons as they are measured at the worker level and are country-specific.
- ✓ We evaluate the role of technology, globalisation, skills, and structural change for the international differences in the task content of jobs.

METHODOLOGY - MEASURING TASKS WITH SURVEY DATA

- ✓ Merge O*NET with the US PIAAC, and calculate the Autor & Acemoglu (2011) task contents.
- ✓ Identify combinations of PIAAC questions which provide the best approximation of the Autor & Acemoglu (2011) measures at the level of 4-digit occupations in the US.
- ✓ Apply these chosen combinations to 32 countries covered by PIAAC (OECD and partner countries), 9 developing countries covered by STEP, and China (China Urban Labor Survey).
- ✓ Define routine task intensity (RTI) that ↑ with the relative importance of routine tasks, ↓ with the relative importance of non-routine tasks: $RTI = \ln(r_{cog}) - \ln\left(\frac{nr_{analytical} + nr_{personal}}{2}\right)$
- ✓ Standardise every measure using its distribution in the US (0=US average, 1-US std).

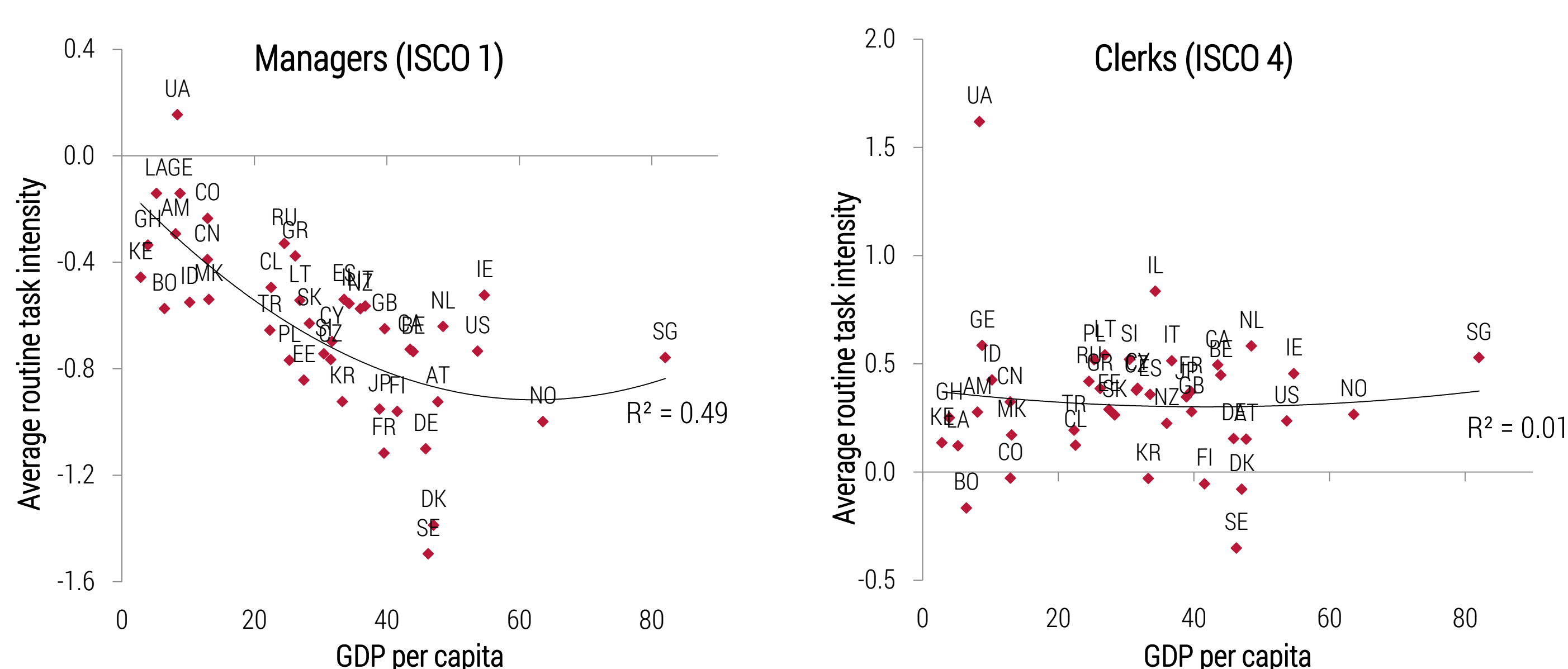
Construction of our task content measures

Task content measure	Chosen PIAAC / STEP task items	Correlations with the Acemoglu & Autor (2011) measures across occupations in the US
Non-routine cognitive analytical	Reading news	0.77
	Reading professional titles	
	Solving problems	
Non-routine cognitive interpersonal	Programming	0.72
	Supervising	
	Presenting	
Routine cognitive	Changing order of tasks (reversed)	0.55
	Filling forms	
	Presenting (reversed)	
Manual	Physical tasks	0.74

DESCRIPTIVE RESULTS

- ✓ The more developed a country is, the higher is the average level of non-routine tasks.
- ✓ The level of routine cognitive tasks is the highest in Southern, Central and Eastern European countries.
- ✓ These patterns are the most pronounced among workers in high-skilled occupations (ISCO 1-3).

Average values of routine task intensity (RTI) by 1-digit occupations against GDP per capita



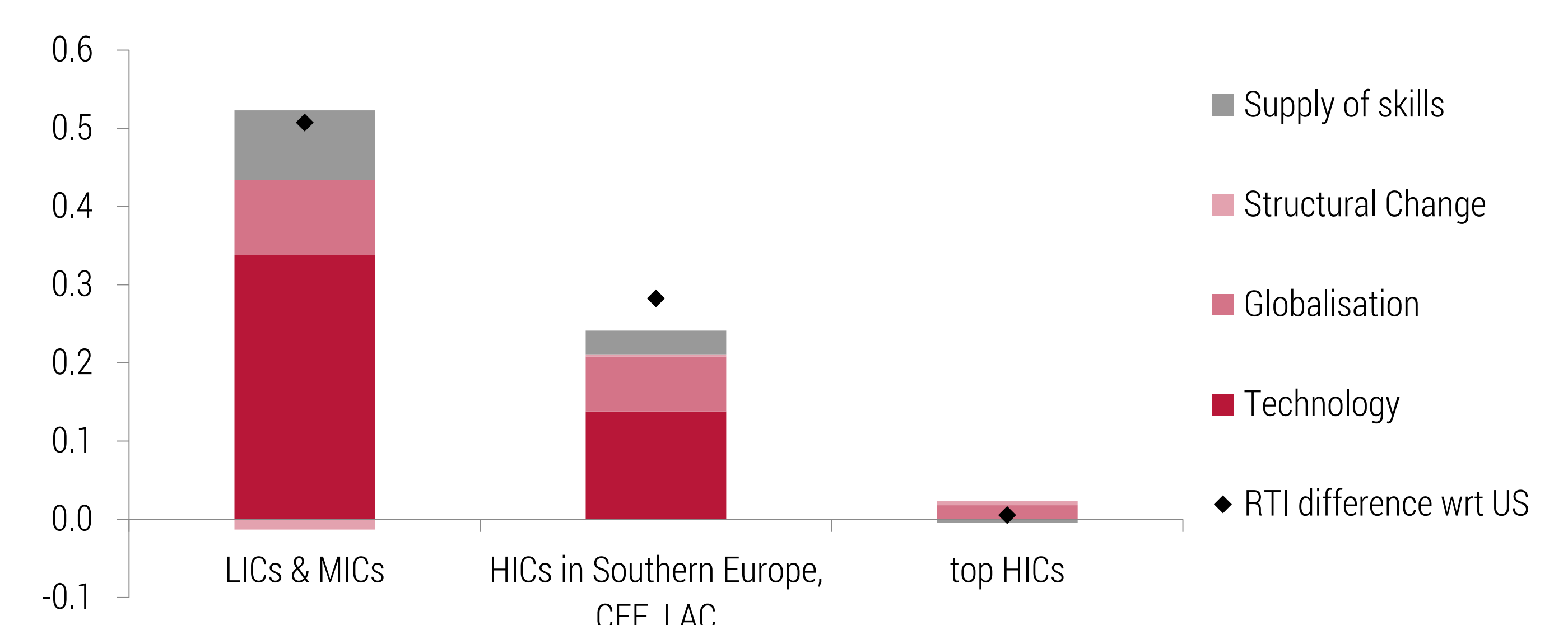
ECONOMETRIC RESULTS

The effect of skills, technology and globalisation on workers' routine task intensity (RTI). OLS at worker level

	All workers	High-skilled occ. (ISCO 1-3)	Middle-skilled occ. (ISCO 4-5)	Low-skilled occ. (ISCO 7-9)
Medium literacy skills (ref. lower)	-0.090***	-0.077***	-0.035	-0.003
High literacy skills (ref. lower)	-0.234***	-0.188***	-0.036	-0.067
Computer use	-0.794***	-0.508***	-0.618***	-0.681***
Foreign VA share (offshoring)	0.333**	-0.015	0.215	0.849***
Foreign VA* GDP per capita	-0.207	-0.329*	-0.197	-0.114
FDI / GDP	0.001	0.022***	0.006	-0.027***
No. of obs. / R ²	148,567 / 0.30	62,906 / 0.14	47,373 / 0.15	38,288 / 0.16

- ✓ Higher skills are associated with less routine tasks, mainly among workers in high-skilled occupations.
- ✓ Computer use is related to less routine tasks. Robots & ICT are insignificant if we control for computer use.
- ✓ Globalisation (off-shoring) is related to less routine tasks in richer countries (and high-skilled workers) and more routine tasks in poorer countries (and low-skilled workers).

Decomposition of differences in routine task intensity with respect to the US, by country groups



- ✓ Technology has the largest contribution to the cross-country differences in routine task intensity.
- ✓ The contribution of skills in low- and middle-income countries is substantial.
- ✓ Among the most developed countries, globalisation explains most of differences in RTI.

CONCLUSIONS

- ✓ Large differences in task content within occupations across countries.
- ✓ High-skilled occupations are less routine in richer countries; it's not the case among workers in middle-skilled and low-skilled occupations.
- ✓ Technology (especially computer use) contributes most to the cross-country differences in tasks.
- ✓ Globalisation matters more for the task content of jobs in low-skilled occupations than for the content of jobs in middle- and high-skilled occupations.