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Why Is Wage Inequality so High in the US? Pitching Cognitive Skills Against Institutions (Once Again)

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Inequality and growth

- Earlier arguments: inequality = necessary evil in the pursuit of economic growth (Kaldor, 1957, Kuznets, 1955, Mirrlees, 1971; Lazear and Rosen, 1981)
- More recently: inequality reduces growth:
 - Redistributive pressures (Persson and Tabellini, 1994; Alesina and Rodrik, 2014)
 - Generates social conflict (Benhabib and Rustichini, 1996; Perotti, 1996)
 - Prevents the talented poor from undertaking profitable investments in physical and human capital (Galor and Zeira, 1993; Banerjee and Newman, 1993)
 - Catalyses financial crises (Rajan, 2010)



Skills and wage inequality: within the US over time

- **Skills-biased technological change:** rising inequality linked to the fact that the supply of educated workers has not kept pace with the rise in demand for them (Juhn, Murphy and Pierce, 1993; Juhn, 1999; Goldin and Katz, 2008; Autor, 2014)
- More recent theories of **routine-biased technological change** maintain a central role for skills in explaining rising wage inequality in the United States (Autor, Levy, and Murnane, 2003; Autor, Katz, and Kearney, 2006, 2008; Autor and Dorn, 2013; Autor, 2015).
- Other explanations for changing demand for skills:
 - Offshoring (Blinder, 2009)
 - Population ageing (Dwyer, 2013)
 - Organisational changes (Acemoglu, 1999; Bresnahan et al., 2002; Caroli and van Reenen, 2001, Antràs et al., 2006)



Cross-country differences in wage inequality: mixed evidence from the literature

| Paper | Data | Method | Do skills matter? |
|----------------------------|-------------|------------------------------------|--------------------------|
| Devroye and Freeman (2001) | IALS | Variance decomposition | No |
| Blau and Kahn (2005) | IALS | JMP decomposition | No |
| Leuven et al. (2004) | IALS | Katz and Murphy D&S analysis | Yes |
| Jovecic (2015) | PIAAC | Variance decomposition | No |
| Pena (2015) | PIAAC | JMP decomposition | No |
| Paccagnella (2015) | PIAAC | Unconditional quantile regressions | No |



Survey of Adult Skills (PIAAC, 2012)

- 166 000 adults (aged 16-65) from 24 countries
- Tested in literacy, numeracy and problem solving in technology-rich environments
- Also: a range of demographic characteristics including education; labour market status; job characteristics including wages, tenure and experience; individuals' skills use in the workplace
- Samples range from around 4 500 in Sweden to nearly 27 300 in Canada (5 000 in the US)

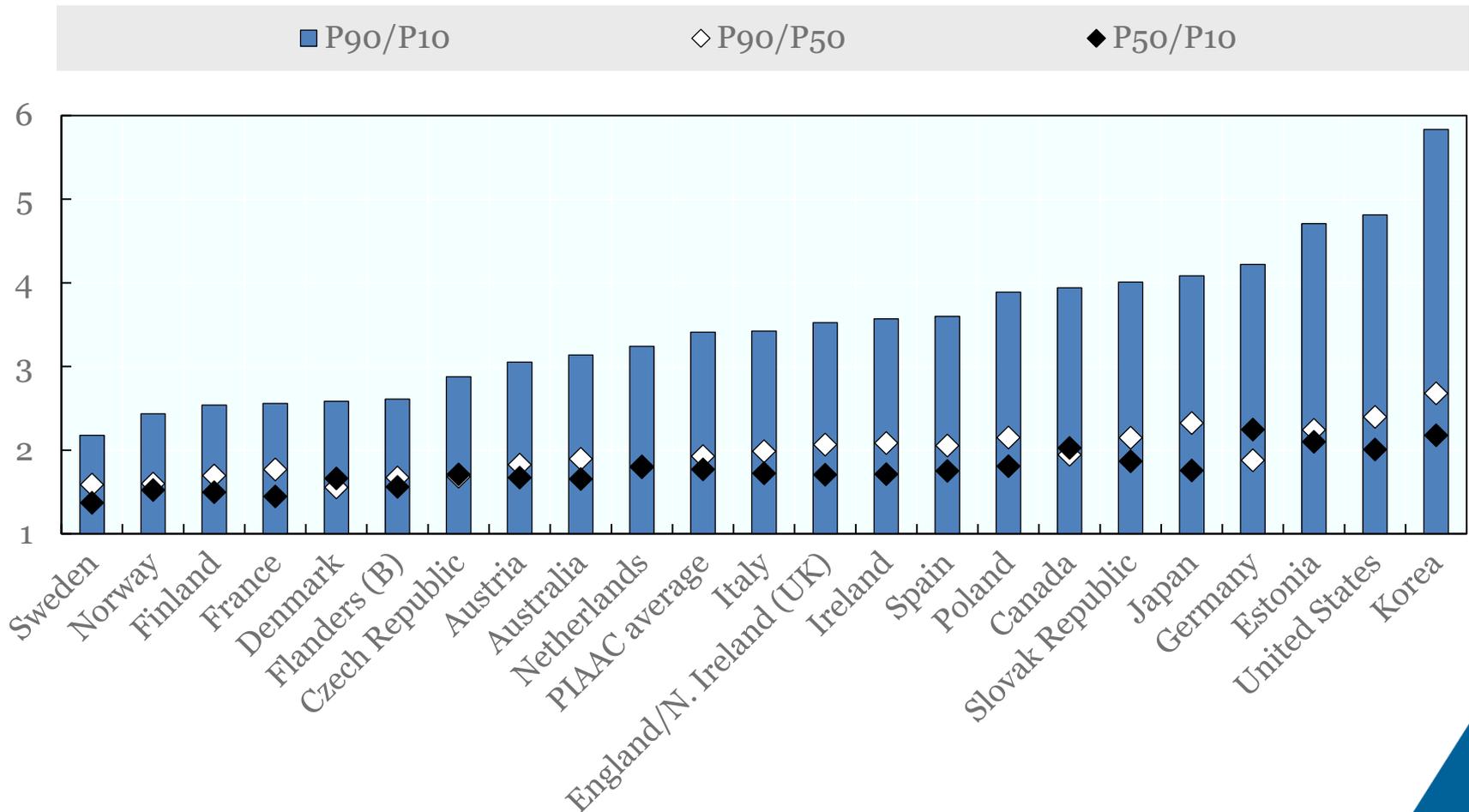


BACKGROUND



Wage inequality is much higher in some countries than in others

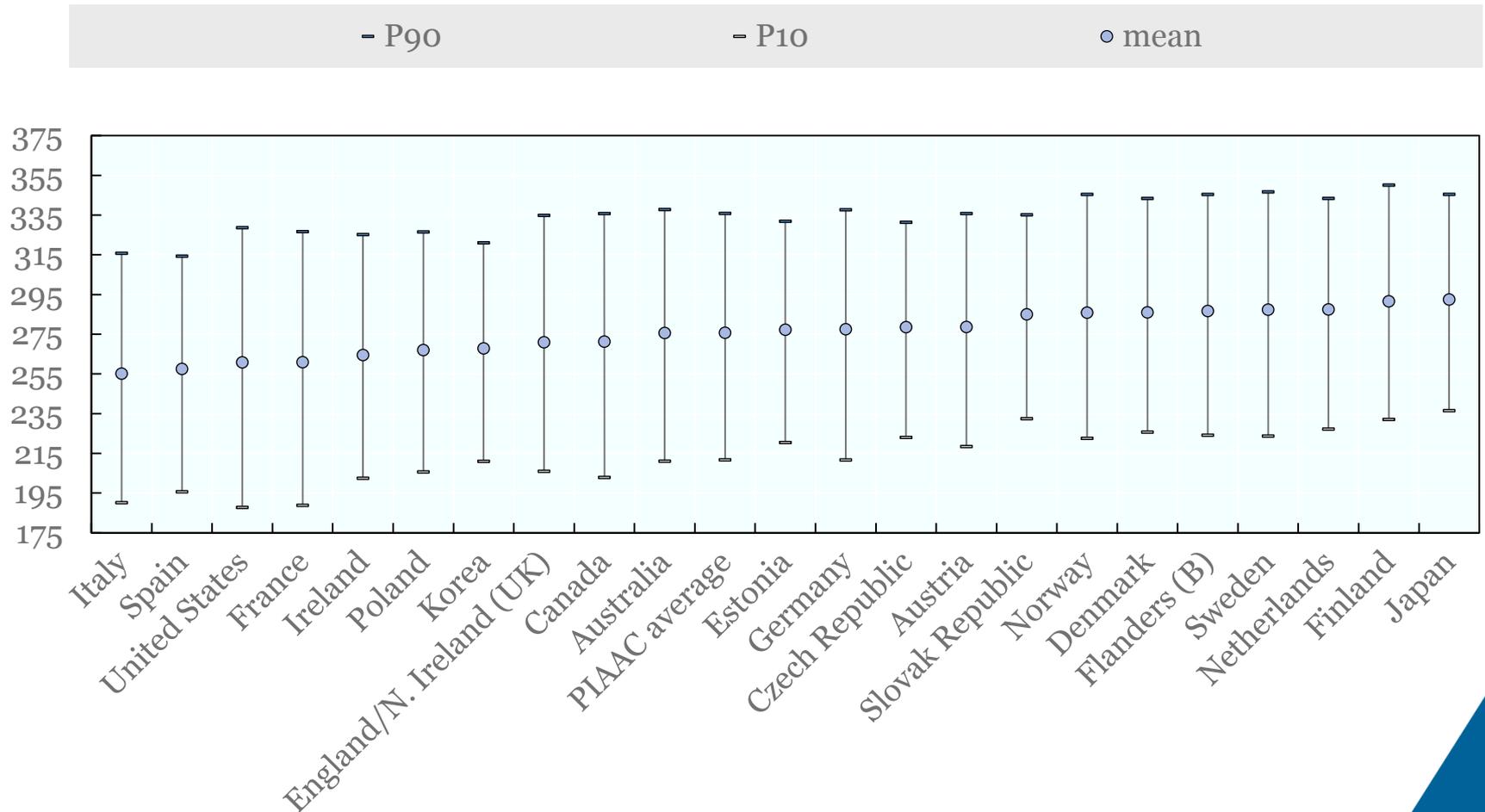
Wage inequality in the 22 PIAAC countries (inter-decile wage ratios)





Countries differ also in the level and dispersion of skills

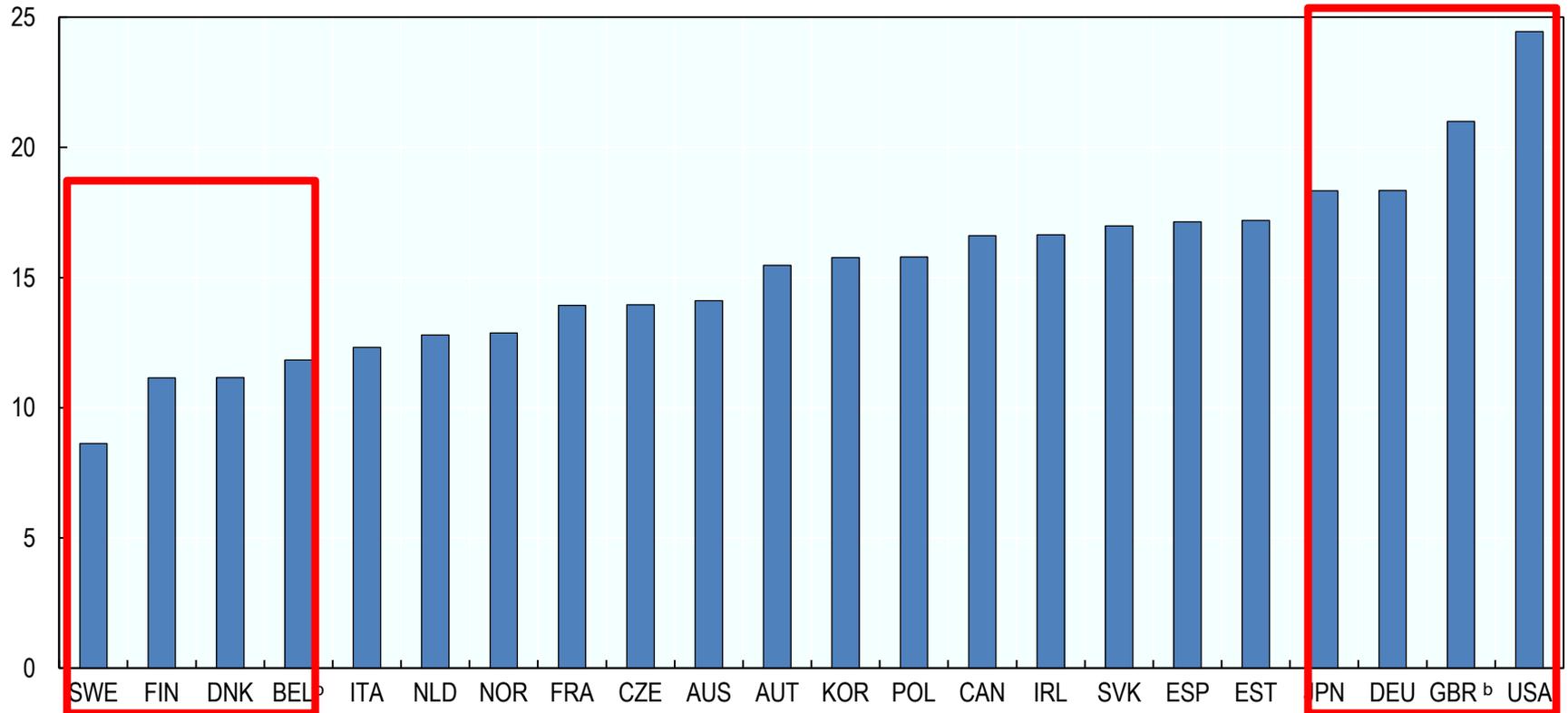
Mean numeracy, 10th and 90th percentile for the employed population





And in the returns to skills

Percent increase in hourly wages for a standard deviation increase in numeracy

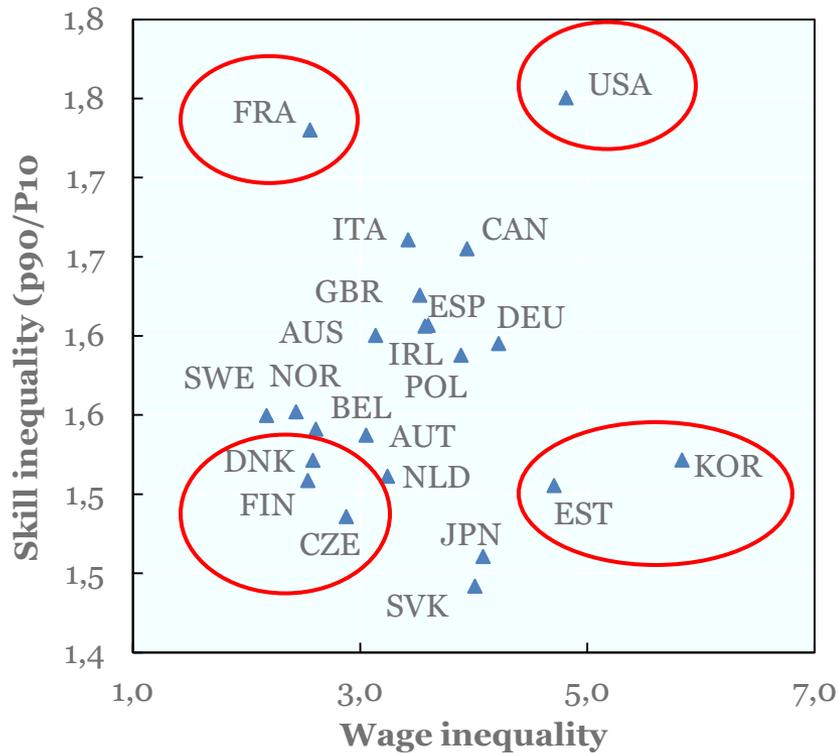


Coefficients on numeracy scores from country-specific OLS regressions of log hourly wages on proficiency scores standardised at the country level

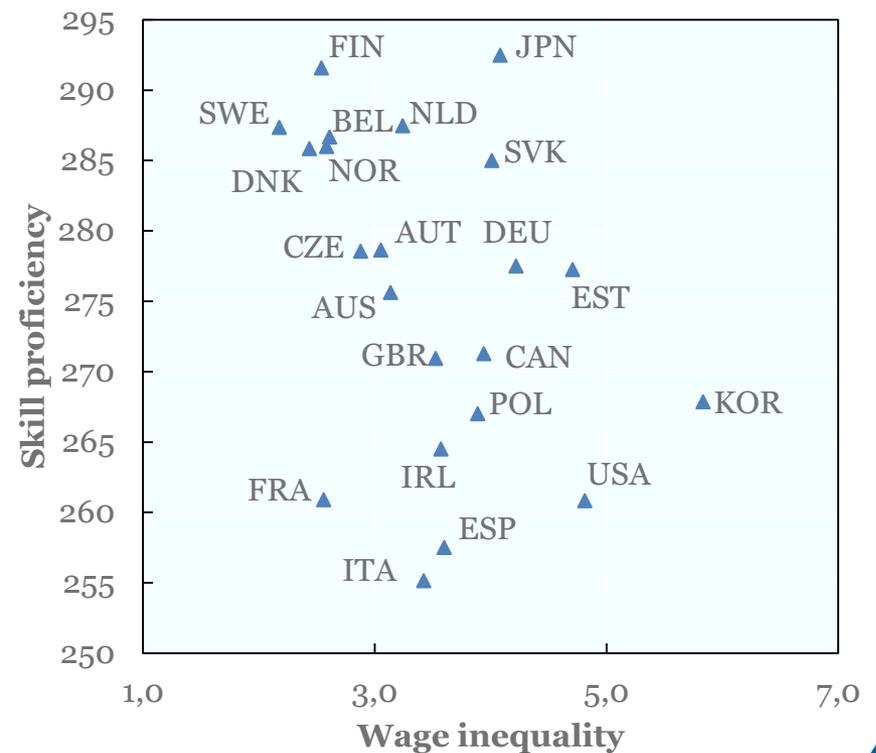


The (aggregate) relationship between skills and wage inequality is not clear

Wage inequality & skill inequality



Wage inequality & skill proficiency





Objectives and value-added of the study

1. Quantify the extent to which skills contribute to explain differences in wage inequality between the United States and other countries:
 - The level of skills
 - The dispersion of skills
 - How skills are rewarded

2. Check that the results are robust once the role of labour market institutions and demand and supply conditions are accounted for

3. Unified analytical framework for assessing the importance of skills and labour market institutions in international differences in wage inequality :
 - Improved data on wages and skills and broader country coverage
 - New method for analysing the role of skills inequality in explaining wage inequality
 - Adapt simulation techniques to take account of demand and supply conditions and institutional settings when building counterfactual wage distributions – thus bridging two literatures



THE ROLE OF SKILLS: SEPARATING LEVEL FROM INEQUALITY



Methodology

Standard approach:

- Decompose differences in wage inequality into endowment (skill) effect, a price effect and a residual
- Methods vary – Murphy and Pierce decomposition (1993) or Firpo, Fortin and Lemieux (2009) unconditional quantile regressions

Different approach here:

- Simulate alternative wage distributions using reweighting techniques
- Inspired by DiNardo, Fortin and Lemieux (1996) and Lemieux (2002, 2010) but we separate out the dispersion and level aspects of a country's skill distribution
- Simpler approach
- More flexible: allows to analyse the impact of the (full) skills distribution on wage inequality rather than at just a few moments of the distribution
- Allows assessing the role played by demand and supply conditions and the impact of labour market institutions

Main shortcoming:

- Static approach: prices (returns) and quantities (skills) do not move together
- Common to other decomposition methods



DiNardo, Fortin and Lemieux (1996) and Lemieux (2002, 2010)

- What would happen to wage inequality in the United States if it had the same skills endowment/prices as country x ?
- The effect of skill endowments:
 - The data for country x and the US are then divided into cells/intervals, S , of five numeracy points each.
 - Replace original sample weights $\omega_{i,US}$ for individual i in the US with counterfactual weights $\omega'_{i,US} = \omega_{i,US} \Psi_i$ where Ψ_i represents the reweighting factor and

$$\Psi_i = \frac{\theta_{s,x}}{\theta_{s,US}}$$

where θ_s is the share of the total workforce employed in each s

- The effect of skills prices:
 - Replace each individual i 's (log) wage $y_{i,US}$ with a new (log) wage $y'_{i,US}$ where:

$$y'_{i,US} = y_{i,US} + (y_{s,x} - y_{s,US})$$

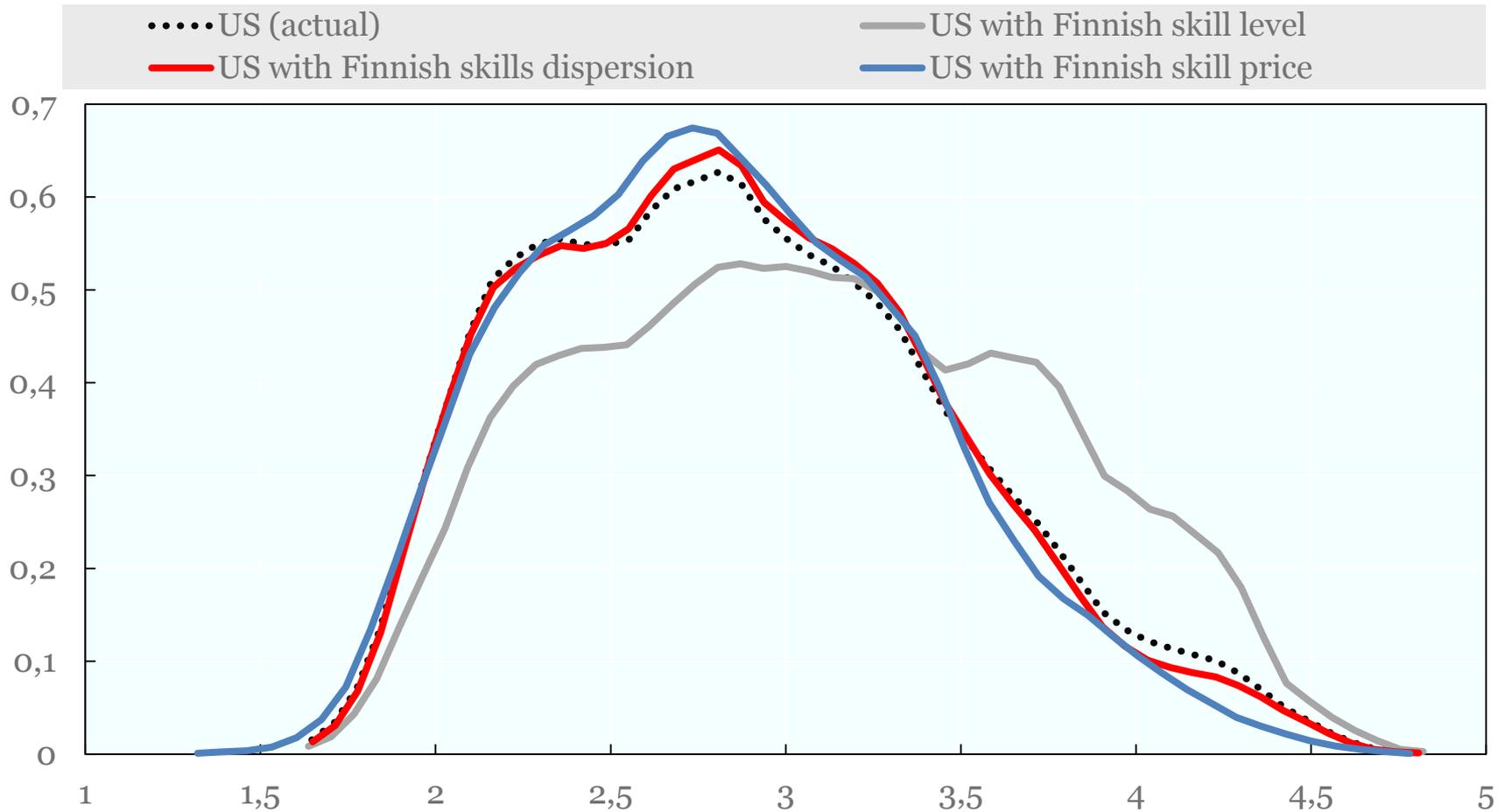


Our methodology: separating skill level and dispersion

- Skill level and distribution are separated - counterfactual wage distributions are simulated by re-weighting the data for the US so that **its deviations from the skill mean, its skill level** or its skill prices resemble those observed in country x
- The reweighting factor changes – e.g. to simulate alternative skill dispersions:
 - De-meanded numeracy scores $\tilde{s}_{i,x}$ and $\tilde{s}_{i,US}$ are obtained for each individual in country x and the US, respectively, by subtracting the country average score \bar{s} from each individual's numeracy score s_i ($\tilde{s}_{i,x} = s_{i,x} - \bar{s}_x$ and $\tilde{s}_{i,US} = s_{i,US} - \bar{s}_{US}$).
 - The shares $\theta_{\tilde{s},x}$ and $\theta_{\tilde{s},US}$ of total employment in each of these de-meanded skills cells/intervals are calculated.
 - The reweighting factor is calculated as the ratio of these two shares: $\Psi_{S,i} = \frac{\theta_{\tilde{s},x}}{\theta_{\tilde{s},US}}$.



Simulation of alternative wage distributions by reweighting individual data

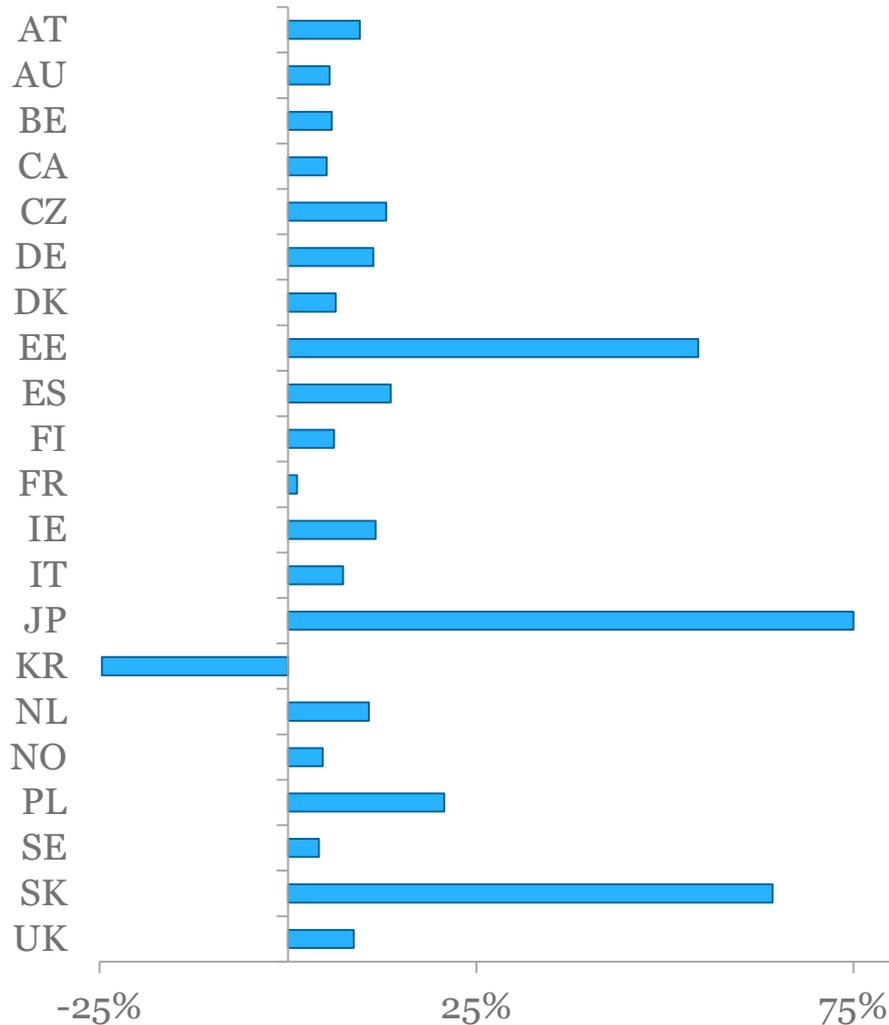






The separate contribution of skills inequality

Proportion of the difference in wage inequality (Gini) with the US explained by skills inequality



- Skill inequality can on average explain 15% of cross-country differences in wage inequality
- Skill inequality more important for wage inequality at the top than at the bottom (not shown here)



INCORPORATING SUPPLY AND DEMAND OF SKILLS



Accounting for demand and supply of skills

Price effect = market conditions + institutions

Demand for and supply of skills

- Calculate counterfactual wage for the US if it had demand and supply for skill group S of country x :
- Step 1: Create demand and supply indices (US relative to country x)

- Demand index $\Delta D_{S,x}^{US} = \ln \left[1 + \sum_o \frac{\theta_{S,o,x}}{\varepsilon_{S,x}} (\theta_{o,US} - \theta_{o,x}) \right]$

- Supply index $\Delta S_{S,x}^{US} = \ln \left(\frac{\varepsilon_{S,US}}{\varepsilon_{S,x}} \right)$

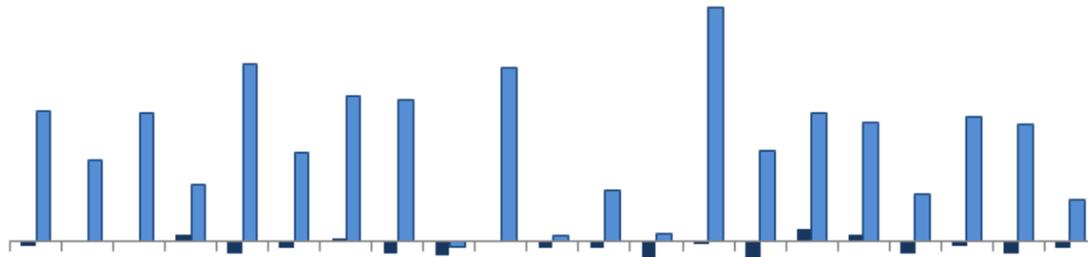
- Step 2: Regress wage differentials on demand and supply indices
- $\Delta y_{Sx}^{US} = \alpha + \beta_S \Delta S_{Sx}^{US} + \beta_D \Delta D_{Sx}^{US} + \rho_x + \varepsilon_{Sx}^{US}$
- Step 3: Make counterfactual wage for US

- $y'_{i,US} = y_{i,US} - \beta_S \Delta S_{Sx}^{US} - \beta_D \Delta D_{Sx}^{US}$

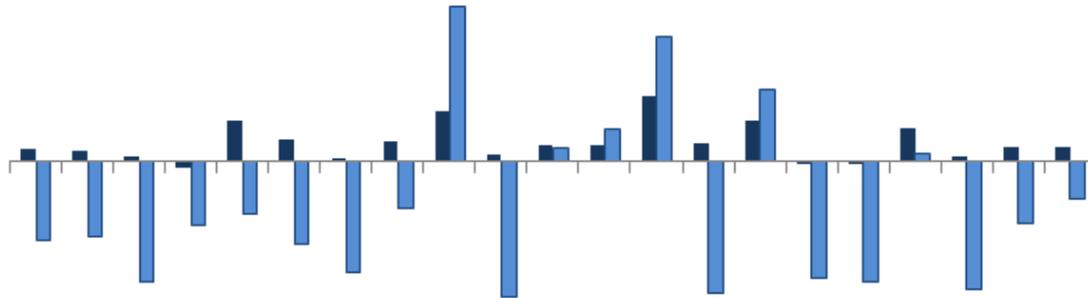


Demand and supply indices: US versus country x

Low-skilled



High-skilled



AT AU BE CE CZ DE DK EE ES FI FR IE IT JP KO NL NO PL SE SK UK

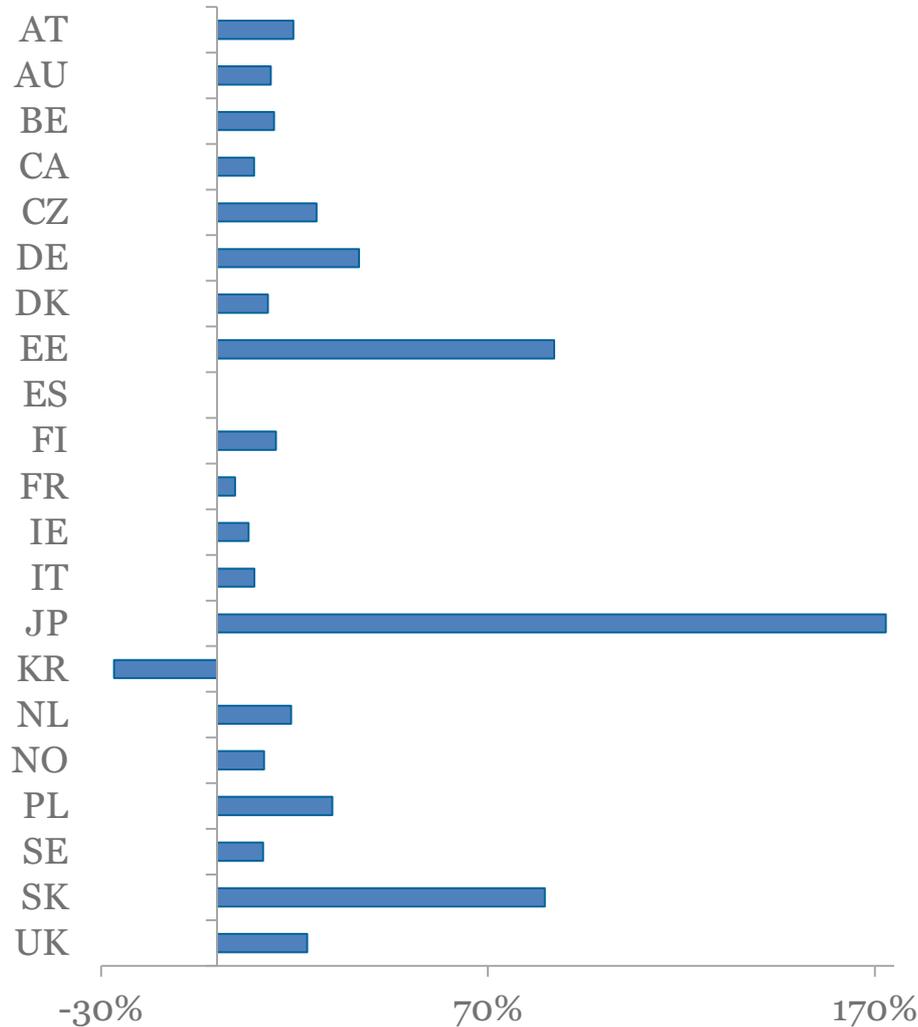
■ Demand ■ Supply

Notes: Low (high)-level skills are defined as the bottom (top) ten skills intervals (out of a total of 25).



The contribution of supply and demand conditions

Proportion of the difference in wage Inequality (Gini) with the US explained by demand & supply conditions



- Demand & supply can on average explain 28% of cross-country differences in wage inequality
- Mainly driven by supply differences (not shown here)
- More important at the top of the wage distribution (not shown here)



ACCOUNTING FOR INSTITUTIONS



Accounting for institutions

Price effect = market conditions + institutions

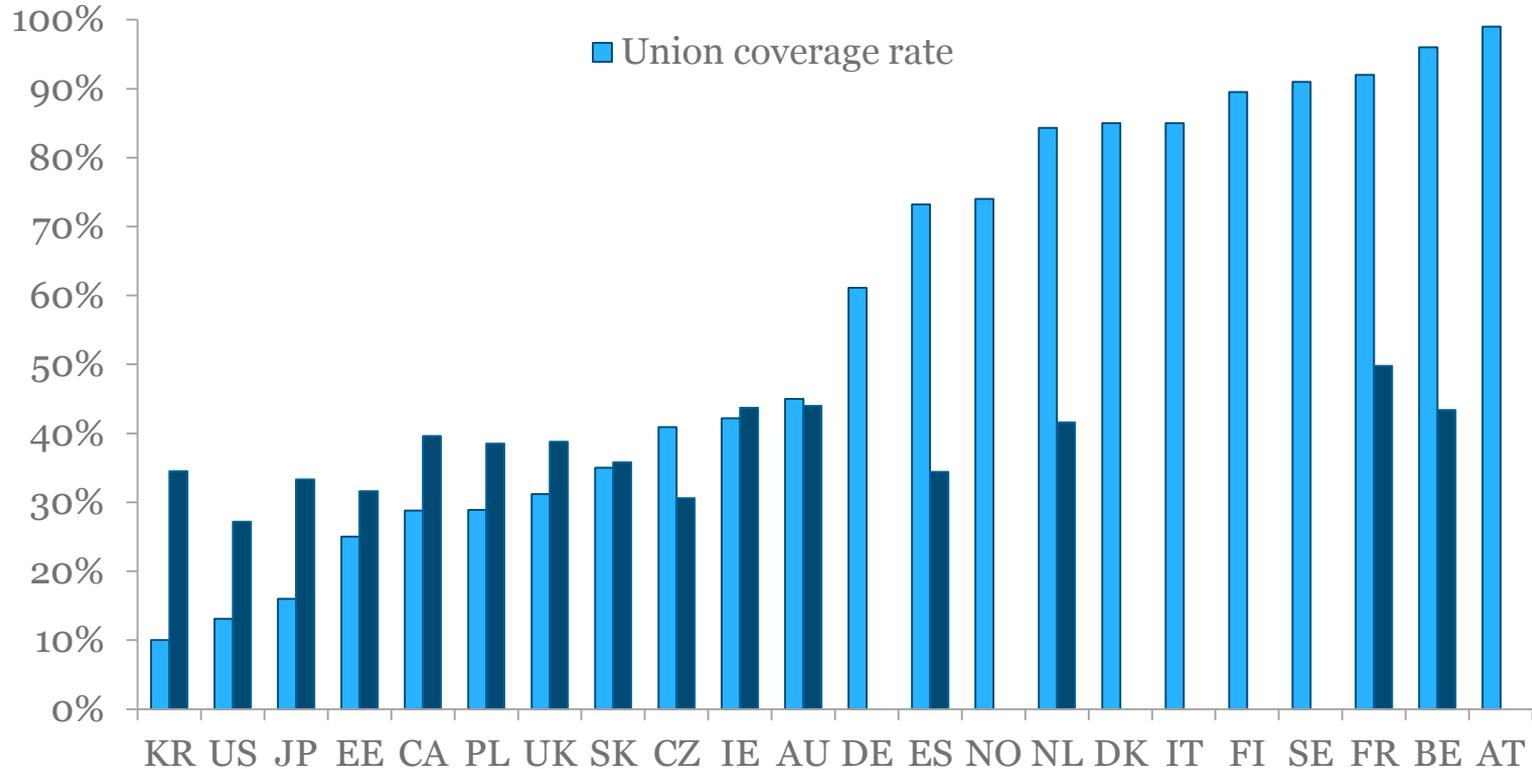
Institutions: Minimum wage & union coverage

Simulation:

- (i) Impose minimum wage of country x on US wage distribution by replacing wages below counterfactual minimum wage by minimum wage.
- (ii) Impose union coverage rate of country x on US by multiplying the survey weights of workers covered by unions by $\frac{UC_x}{UC_{US}}$, and the weights of workers that are not covered by $\frac{1-UC_x}{1-UC_{US}}$.



Minimum wage and union coverage: overview

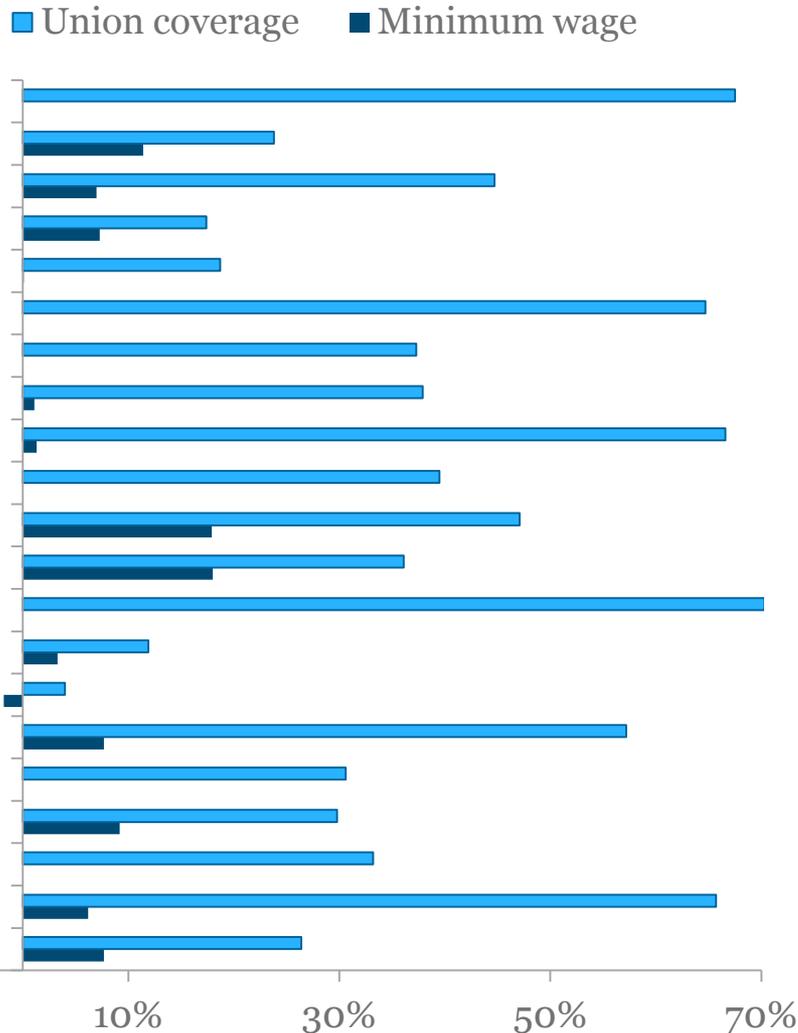


Notes: Low (high)-level skills are defined as the bottom (top) ten skills intervals (out of a total of 25).



The contribution of unions and minimum wages

Proportion of the difference in wage inequality (Gini) with the US explained by the minimum wage and union coverage



- Differences in minimum wages can on average explain 7% of the difference in wage inequality between the US and the other countries
- The overall contribution of differences in union coverage to differences in wage inequality is 39.5%. (mainly at the top, not shown here)



CONCLUSIONS



Conclusions

- Earlier (cross-country) literature had been inconclusive
- More recent literature tends to ignore an important side of the argument
- Yet it seems the relative demand and supply of skills does play some role
- Which would be consistent with the argument that skills/routine-biased technological change has played a crucial role in labor market polarization and rising inequality
- This is not to say that institutions are not important
- What has been missing, is a unified framework for analyzing the relative importance of skills v. labor market institutions in determining wage inequality



Conclusions

Our results suggest that:

- Higher **skills inequality** in the United States accounts for 15% of the difference in wage inequality with other countries;
- Differences in the **demand for and supply of** skills can explain just over a quarter;
- Higher **minimum wages** in other countries explain only 7% of the difference in wage inequality with the United States;
- Higher **union coverage** can explain 40%.



The bigger picture: OECD work on skills

- **PIAAC:**
 - **Wave 2 development work:** personality traits; education and training pathways; skills use and mismatch; problem solving domain; employer survey; work organisation
 - **Thematic reports:** skills use at work (definition, consequences on wages, job satisfaction and labour productivity; link with position in GVC, management practices, policies and institutions) – other available reports: skills and labour market outcomes in lifecycle perspective (EMO 2014 Chapter 5); VET and labour market outcomes (SEM WP 168); field-of-study mismatch (SEM WP 167) working and learning (SEM WP 169)
 - **Round II reporting:** second international report due early July 2016 (focused on Chile, Greece, Indonesia, Israel*, Lithuania, New Zealand, Singapore, Slovenia, Turkey)
- **Assessing and Responding to Changing Skill Needs:** background report published; first country review on Sweden under way
- **The future of work:** how technology and changes in work organisation are likely to impact skill needs
- **Also involved in:**
 - Helping countries develop National Skills Strategies
 - Skills Outlook publication: youth (2015), GVC forthcoming

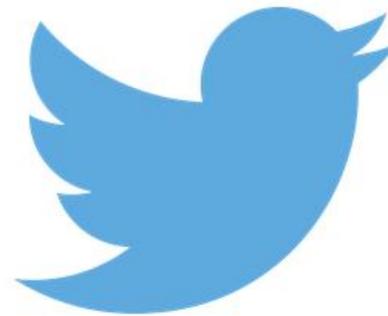
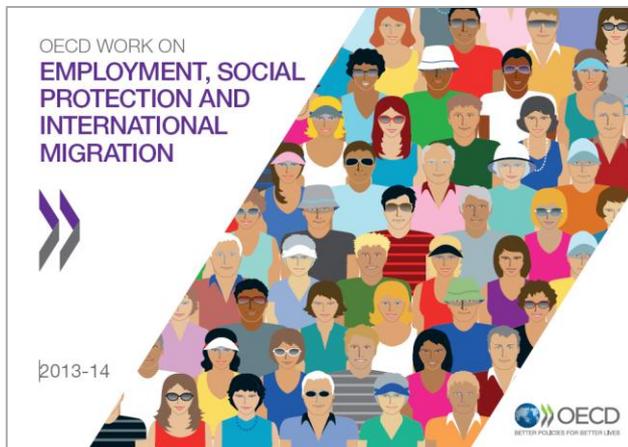


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