PIAAC(-L) in Applied Economic Research – A Literature Overview

• Goals of this tutorial:
  • Provide a (non-exhaustive) summary of existing economic research that uses PIAAC(-L) data (as of December 2022)
  • Highlight the potential of PIAAC(-L) data in applied research
  • Showcase the resources and best practices readily available in previous papers

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  • Research associate at the Chair of Public and Behavioral Economics at JGU Mainz
  • PIAAC enthusiast
Agenda

I. PIAAC(-L) in education economics
II. Interesting subsamples in PIAAC(-L)
III. PIAAC(-L) and causality
• Programme for the International Assessment of Adult Competencies
• Administered by the OECD (https://www.oecd.org/skills/piaac/about/)
• Large scale assessment of adult skills
  • Numeracy
  • Literacy
  • Problem-solving in technology-rich environments (ICT)
• First cycle: (mostly) 2011/12
• Second cycle: since 2018
• >40 participating countries
  • 5000 participants per country, aged 16-65

• Germany: PIAAC-L
• Administered by GESIS (https://www.gesis.org/en/piaac/rdc/data/piaac-longitudinal)
• Longitudinal version of PIAAC with three extra waves (2014, 2015, and 2016)
Part I – PIAAC(-L) in Education Economics
returns to cognitive skills


• Focus on the role of cognitive skills in the labor market

• Mincer regression with cognitive skills for 23 countries

• Methodological contributions:
  • Use of PIAAC’s cognitive skill measures in applied economic research (PVs, standardization, weights)
  • Focus on numeracy skills
  • PIAAC wage information
Returns to Skills Around the World: Evidence from PIAAC

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Notes: Least squares regressions weighted by sampling weights. Dependent variable: log gross hourly wage. Sample: full-time employees aged 35–54 (Canada includes part-time employees). Numeracy score standardized to std. dev. 1 within each country. Experience² divided by 1000. Pooled specification includes country fixed effects and gives same weight to each country; R² refers to within-country R². Robust standard errors in parentheses.
Vocational Training


• Focus on the labor market success of people with vocational versus general training in 16 countries

• Trade-off: early advantage and late disadvantage for people with vocational education – particularly strong in countries with apprenticeship systems

• Methodological contributions:
  • Makes use of PIAAC’s extensive education and labor-market information, and the age structure
  • Cognitive skills used to account for (differential changes in) selection into education type over time

Focus on the incentive structure associated with central exams: Accountability versus teaching-to-the-test?

Variation in exam type over time and between school systems for 30 countries

Positive skill implications of central exams – but: results suggest fading-out effect

Methodological contributions:
- Makes use of PIAAC’s age structure
- Cognitive skills used as the main outcome of the education production function
- PIAAC merged with extensive data on (changes in) examination procedure in each country
• Are employees well prepared for the jobs they do?
• Methodological contributions:
  • Cognitive skills in combination with detailed information on occupation (ISCO-08)
  • Key challenge: What are the required skills for a given occupation in a given country?

  • *Self-reported mismatch, skill proficiency, & skill use at work*
  • *Job analysis method*
Part II – Interesting Subsamples
Early-Career Workers


• Focus on the career prospects of young workers in 31 countries

• Positive selection into large firms based on education and skills
  • Interesting differences in the relative role of formal education and skills between Europe and other continents

• Methodological contributions:
  • Makes use of PIAAC’s job and age information
  • Cognitive skills used as a main observable characteristic that selection into large firms is based on

• Focus: Relating teacher skills in a country to student performance in 31 countries

• Variation in teacher skills within-country and between-subject

• Teachers’ cognitive skills strongly related to student performance

• Methodological contributions:
  • Cognitive skills (numeracy and literacy) of teachers as the key explanatory variable
  • PIAAC-based teacher skills measure combined with PISA student outcomes
  • Canada as a benchmark due to sample size

• Hartinger, K. (In progress). Individualism, creativity, and innovation.

• Focus on the role of culture in human capital investments and innovation-conducive behavior in 22 countries

• Epidemiological approach: Comparison of migrants from different cultural origins within the same destination country

• Strong positive effect of individualism on skill investments and innovation

• Methodological contributions:
  • Make use of PIAAC’s country of birth & language information
  • Numeracy skills used as the main outcome or an important mechanism
  • Region-level analysis
  • PIAAC-L value added approach
Migrants and Natives in a Specific Destination Country

- Focus on the migrant-native wage gap in the United States
- Differences in *marketable skills* explain a large share of the income differences between migrants and natives of similar age and formal education

- Methodological contributions:
  - Zooming in on one specific country
  - Cognitive skills used as the mechanism of interest behind the migrant-native wage gap

• Selection into job-related training based on literacy skills – but no increase in skills after training


• Discrepancies between self-reported and administrative wages
Part III – PIAAC(-L) and Causality
Labor Market Conditions


- Focus: Effect of career-entry labor-market conditions on long-term skill development *in 19 countries*

- Workers who *enter* the labor market in times of higher unemployment, have lower skills later in their career

- Exogenous variation in timing of recessions

- Methodological contributions:
  - Makes use of PIAAC’s age structure and education information
  - Cognitive skills used as the main outcome
  - International evidence combined with PIAAC-L-based findings
Returns to ICT Skills


• Focus on the role of ICT skills in the labor market in 19 countries

• Substantial wage returns to ICT skills internationally and in Germany

• Two instrumental-variable approaches to isolate exogenous variation in ICT skills through internet availability.

• Methodological contributions:
  • Cognitive skill dimension: problem solving in technology-rich environments
  • IV strategies in PIAAC
PIAAC(-L) is used in many different economic contexts
  - Returns to skills (numeracy & ICT skills; teacher skills)
  - Evaluation of education systems (vocational training, entrance exams)
  - Labor market (skill mismatch, recessions, on-the-job training)
  - Migration and culture
  - Survey methodology (self-reported wage information)

Existing literature provides important guidance for PIAAC data analysis
  - Dealing with skill measures (PVs, weights, standardization)
  - Handling key variables (wage and education information, migration status)
  - Subsample analysis
  - Combining PIAAC with other data sources
  - Incorporating PIAAC-L
Thank you for participating in this online tutorial!

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