Development of a Quality Adjusted Labour Productivity Index in the European Union – Example of the Employment Embodied in European Exports

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Background

- Production fragmentation: division of labor at the level of production stages (Baldwin, 2006)
  - Countries do not perform all production stages needed to produce a final good
  - Only considering industry and number of jobs not very sensible
  - Type of job matters (activity and what does it pay)

- Empirical challenge: data not routinely collected & what should be measured?
  - Industries (Lall, 2008)
  - Occupations (Mann, 2005)
  - Business functions (Sturgeon and Gereffi, 2009)
  - Tasks (Autor et al., 2015)
  - Skills (Hijzen et al., 2005; Foster-McGregor et al., 2013)

What is this paper about?

- Collect and harmonize **data** on employment by **skill** level and **age** groups as a proxy for quality
- Combine with **Eurostat SUIOTs** to calculate employment embodied in exports
- Construct and apply **index of labor inputs** adjusted for skill and age groups (quality)

Data sources

- Benchmarked by national account data
  - Total hours worked by industry & total compensation
- Labour Force Surveys (LFS)
  - Age, skill and industry structure of hours worked
  - Annual data 2002-2014
- Structural Earnings Survey (SES)
  - Age, skill and industry structure of labor compensation
  - 2002, 2006, 2010
- Statistics on Income and Living Conditions (SILC)
  - Age and skill structure of labor compensation in agriculture

- Goal: 2002–2014, 3 age groups, 3 skill types, 28 member states with 10 industries (21 for subset of countries)

Data sources

- Eurostat SUIOTs
  - Consolidated tables of national agencies
  - In ESA2010 (SNA2008) for 2010-2013
  - Projected back to 2005 and forward to 2014

- Employment in exports
  - Use Leontief inverse to obtain employment embodied in exports

Methodology: Employment embodied in exports

- Stylized national input-output table (industry x industry)

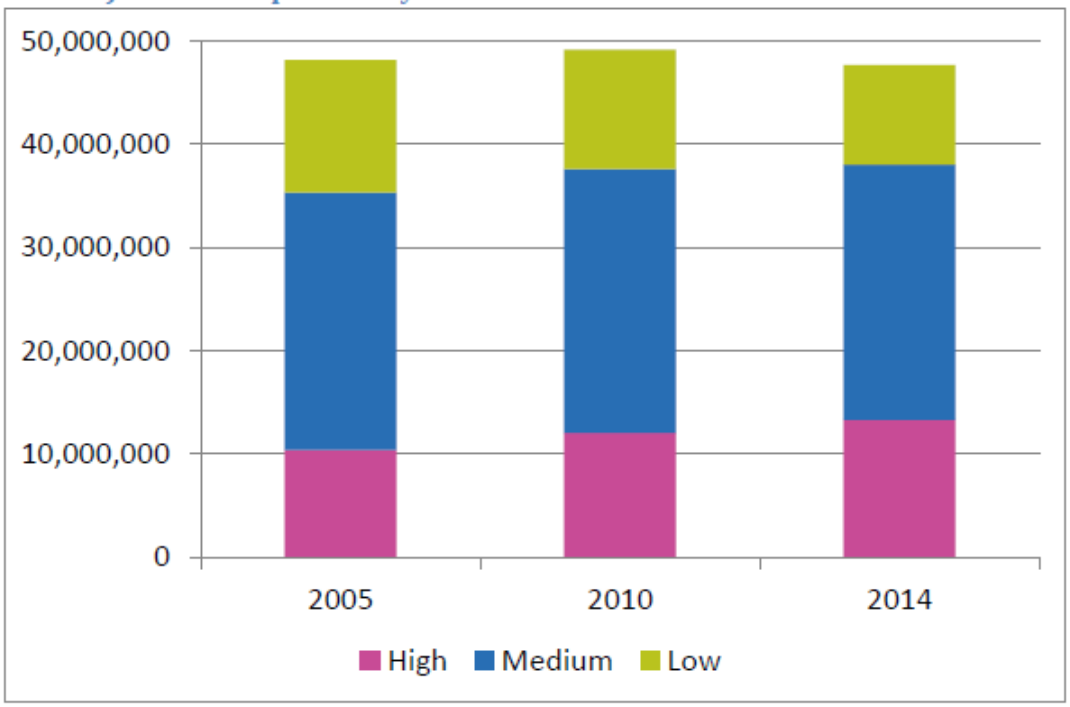
	D_{Agr}	D_{Mfg}	D_{Serv}	FD	EXP	GO
D_{Agr}	Z_{dom}			fd_{dom}	e	x
D_{Mfg}						
D_{Serv}						
M_{Agr}	Z_{imp}			fd_{imp}	e_{imp}	m
M_{Mfg}						
M_{Serv}						
VA	va					
GO	x'					

- $EmpEX = \mathbf{b}\left(\mathbf{I} - \mathbf{Z_{dom}}(\hat{\mathbf{x}})^{(-1)}\right)^{(-1)}\mathbf{e} = \mathbf{b} * \mathbf{L} * \mathbf{e}$
  - see: Leontief (1936), Chenerey et al. (1986), Hummels et al. (2001)…

- **b**: labor requirements per unit of output by industry
  - Needed data: hours worked by skill level/age group by industry

Employment embodied in exports

Figure 8: Embodied employment in exports for the EU28 (in thousands of hours worked) and its composition by skill level workers

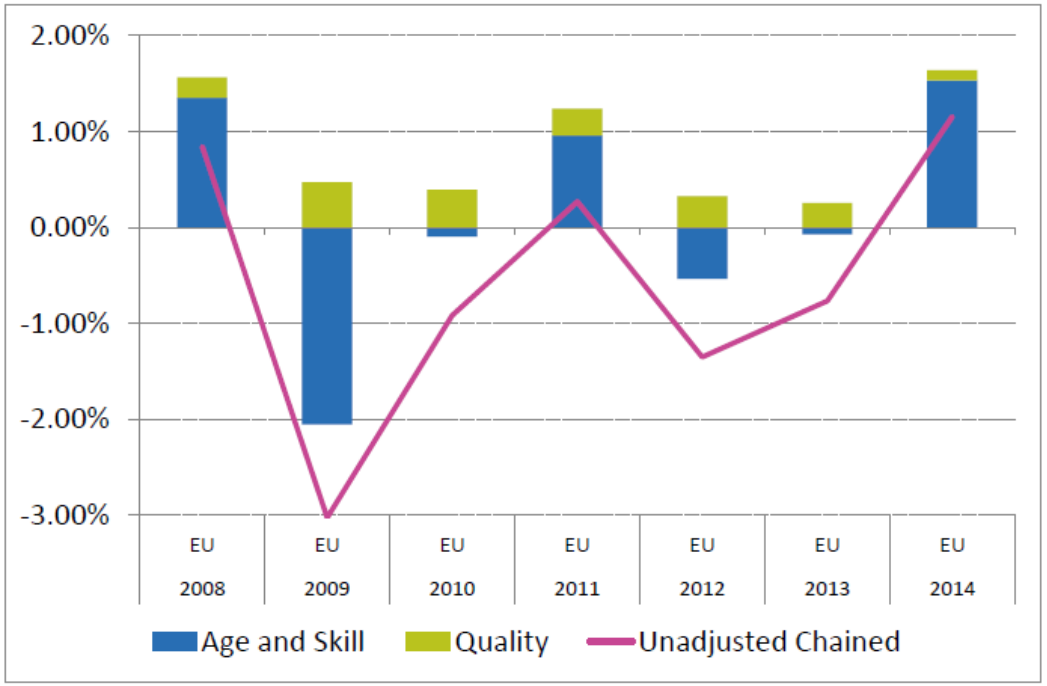


- Stylized findings:
  - 50% medium-skilled workers, high-skilled share increased
  - Differences across industries
  - Age is not yet incorporated

Methodology: Quality Adjusted Labour Index (QALI)

- Goal: coherent set of competitiveness indicators
  - Labor input index (Labor services index)
    - Based on Jorgenson et al. (1987); EUKLEMS (O'Mahony and Timmer, 2009)
    - Different groups of labor differently productive
    - Adjust labor inputs for groups
  - $QALI_{i\ T}^{t} = \sum_i \left[\left(\frac{w_{i,t} + w_{i,t-1}}{2} \right) \ln \left(\frac{h_{i,t}}{h_{i,t-1}} \right) \right] * 100$
    - h: hours worked, w: labor income shares, i: groups
    - Skill and age proxy for quality
    - Aggregation takes into account the composition of the labor force
  - Growth of adjusted index > growth of unadjusted hours worked -> labor shifted to higher remunerated groups
  - Time series: 2002-2014
- Running project: capital productivity indicators

QALI of European Union



- Summing up:
  - Data collection on labor
  - Combination with Eurostat IO tables
  - Quality Adjusted Labor Index

Discussion

- How does the new data compare to existing sources? What can be learned from these?

- World Input-Output Database and Socio-Economic Accounts (WIOD; Timmer et al., 2015)
  - 1995-2011, 27 EU member states
  - Same data sources for European countries (LFS, SES, SILC)
  - Same skill classification (ISCED97, 3 categories)
  - Strong point: age and recent years
  - Weak point: national IO tables vs. world tables in WIOD

Discussion

- EUKLEMS (O'Mahony and Timmer, 2009)
  - Relatively detailed account of data on employment
  - Includes a similar labor services index
    - Additionally covers gender

- How does it compare to/improve upon this labor services index?
  - Are there methods that can be applied to increase coverage?
  - Are there additional data sources that can be exploited?
- What are the priorities in data construction?
  - E.g.: "non-publishable information due to representativeness of the different categories" of gender and status

Discussion

- How can the data be extended to link closer to the type of job?
- Extent data construction beyond existing metrics (age, skill, gender)
  - E.g., occupational data available in LFS and SES
  - Other Eurostat resources to extend on the type of job?

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Thank you for your attention