Employment and productivity:
Disentangling employment structure and qualification effects

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INTRODUCTION

Changes in the employment rate impacts:

• GDP per capita
• Productivity

Trade-off between productivity and employment rate

The impact on productivity comes partly from:

• An effect of the education composition of the employment
• At a given education structure, the fact that the less productive are the later employed
Aim of the paper:

- To distinguish, from an empirical approach, the specific roles of:
  - Employment education structure change
  - Pure employment rate change

- To give policy implications on what impact countries could expect from a catch up with the best practice:
  - In education structure
  - In employment rates levels
Employment and productivity: Disentangling employment structure and qualification effects

Outline

1) Previous literature
2) The data
3) Estimation
4) Disentangling employment structure and qualification effects
5) Policy implications

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1 – PREVIOUS LITERATURE

Two main empirical approaches, concerning the specific roles of:

- Employment education structure change
- Pure employment rate change

Without decomposition of the employment

Usually based on econometric estimations on country level panel data

Estimates of the semi-elasticity of hourly productivity with regard to the employment rate

Implicit assumption: same impact of employment rate change in every country at every moment
Among others:

- Gust and Marquez (2004) OLS and GLS
- Belorgey et al. (2006) GMM
- Bourlès and Cette (2005, 2007) IV
- MacGuckin and Van Ark (2005) OLS
- Aghion et al. (2009) IV
- Dew-Becker and Gordon (2008) IV

Range of the estimated semi-elasticity: -0.6 to -0.3
With decomposition of the employment

Usually based on country level panel data

Two approaches:

**Econometric approach**

Based on estimates of the impact of employment rate changes from several labour force groups

Implicit assumption: same impact in every country of a one point global employment rate change, from each group and at every moment

Bourlès and Cette (2005) IV
Distinguish 6 groups: 3 ages and 2 genders

Main results: No significant gender difference; the semi-elasticity is lower (in AV) for the 25-54 years old group than for the 15-25 and 55-64 years old groups
**Calibrated approach**

Based on the explicit assumption that the relative productivity of a group to another one is equal to the relative compensation costs

Implicit assumptions: (i) perfect labour market; (ii) compensation data are reliable

Boulhol (2009); Boulhol and Turner (2009)

Distinguish 30 groups: 5 ages, 2 genders, 3 education levels

- **Our approach**

Same as the one from Bourlès and Cette (2005)

Econometric approach, by the IV method

On a country panel dataset

Distinguish 3 education level groups

Same implicit assumption as Bourlès and Cette (2005)

Policy implications closely linked with the Lisbon Strategy:

*Improve Europe’s knowledge-based economy and employment rates*
2 – THE DATA

- Main data sources: OECD
- Annual panel data
- 21 OECD countries:
  - Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Iceland, Italy, Japan, Korea, the Netherlands, Norway, Portugal, Spain, Sweden, the United Kingdom and the United States
- 1980-2007
3 education levels are distinguished in the working-age population (15-64 years old):

- Below secondary education
- Secondary education (completed or not)
- Higher education (completed or not)

Number of observations:
- 400 without education level decomposition
- 163 with education level decomposition
The qualification structure differs strongly among countries. Canada is the best practice.

**Chart 1 – Education structure of the working age population**

In 2005, in %

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The employment rates differ strongly among countries. Iceland is the best practice. But very small country. Denmark will be considered as the best practice.

**Chart 2 – Employment and contribution of each education group**
*In 2005, in %*
3 – ESTIMATION

Estimated relation

Close to the one estimated by Cette and Bourlès (2005, 2007)

\[ \Delta \log p = \sum \beta_i \Delta ER_i + \gamma \Delta h + \varphi \Delta CUR + \eta ITPR + cte + u \]

lp: log of the hourly labour productivity
h: log of the average annual working time
CUR: capacity utilisation rate
ITPR: share of ICT production in total value added

\[ ER_i = \frac{E_i}{P} \] with
Ei: Employment with education level i
i: 1 to 3
P: working-age population
\[ \varphi(ER_i) = ER \] the total employment rate
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Part 3 – Estimation

Estimated results

IV estimations:
  • Sargan test
  • Durbin-Wu-Hausman test

Estimation without decomposition

\[ \Delta lp = -0.509.\Delta ER - 0.503.\Delta h + 0.002.\Delta CUR + 1.492.\text{ITPR} - 0.064 \]
\[
\text{SE: (0.238)***(0.177)***(0.001)***(0.448)***(0.025)**}

Estimation with decomposition

\[ \Delta lp = -0.594.\Delta ER_1 - 0.108.\Delta ER_3 - 0.555.\Delta h + 0.002.\Delta CUR + 0.773.\text{ITPR} - 0.031 \]
\[
\text{SE: (0.163)***(0.285) (0.158)***(0.001)***(0.206)***(0.013)**}

***: significant at 1%; **: significant at 5%

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4 – DISENTANGLING EMPLOYMENT STRUCTURE AND QUALIFICATION EFFECTS

**Methodology**

Mechanical impact on GDP of country \( j \) as a result of adopting

- The education level of a reference country \( r \)

\[
MIES = \sum_i \beta_i \frac{E_{ij}}{P_{ij}} \left( \frac{P_{ir}}{P_r} - \frac{P_{ij}}{P_j} \right)
\]

- The employment rate structure of a reference country \( r \)

\[
MIER = \sum_i (1 + \beta_i) \frac{P_{ij}}{P_j} \left( \frac{E_{ir}}{P_{ir}} - \frac{E_{ij}}{P_{ij}} \right)
\]
Results – 1

Chart 3 – Mechanical effect on GDP level by adopting the education structure of the working age population of...

In 2005 %

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Results – 2

Chart 4 – Mechanical effect on GDP level by adopting the employment rate structure of...

In 2005, %

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5 – POLICY IMPLICATIONS

The best practices are:

- Canada for education
- Denmark for employment rate

Mechanical effect on GDP level by adopting the best-practice education level structure or employment structure, in 2005

<table>
<thead>
<tr>
<th>Employment rate structure</th>
<th>Education level structure</th>
</tr>
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<tbody>
<tr>
<td>Impact &lt; 2,5%</td>
<td>USA</td>
</tr>
<tr>
<td>2,5% ≤ Impact &lt; 5%</td>
<td>AUS DNK ISL NLD NOR SWE GRB</td>
</tr>
<tr>
<td>5% ≤ Impact</td>
<td>AUT PRT</td>
</tr>
<tr>
<td></td>
<td>USA</td>
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<td></td>
<td>AUS DNK ISL NLD NOR SWE GRB</td>
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