Earnings Mobility and Inequality in Europe

Ronald Bachmann  Peggy David  Sandra Schaffner

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Increase in earnings inequality in many European countries, although at a different level

Cross-sectional measures of inequality are only a simple snapshot and do not capture movements within the earnings distribution

Earnings mobility plays a crucial role as it can reduce inequality in terms of lifetime earnings

Thus, the analysis of earnings inequality and mobility patterns appears to be of great political relevance
Figure 1: Earnings inequality and mobility

Source: EU-SILC, own calculations.
Note: Mobility is measured by the share of individuals leaving the initial earnings decile.
Research questions

- How are earnings inequality and earnings mobility related? Can mobility contribute to an equalization of earnings? Are there country-specific differences?

- To what extent can earnings inequality and mobility be explained by observable characteristics? Are there country-specific differences?

- Which individual and household characteristics determine pay transitions?
Previous Research

- Studies analyzing earnings inequality and earnings mobility
  - Aaberge et. al. (1996) for Scandinavian countries, Hofer and Weber (2002) for Austria and seven other OECD countries

- Studies decomposing earnings inequality and earnings mobility
  - Buchinsky and Hunt (1999) for the US

- Studies analyzing earnings mobility in terms of transition matrices
  - Dickens (2000) for the UK; Cardoso (2004) for Portugal and the UK; Raferzeder and Winter-Ebmer (2004) for Austria

- Contribution of this paper: Analysis of inequality and mobility for a large set of European countries
Data: EU-SILC

- European Union Statistics on Income and Living Conditions
- Covers all EU27 countries as well as Norway
- Years 2004-2008 (observation period is smaller for some countries)
- Rotational panel with 4 rotational groups, i.e. individuals can be followed for a maximum of 4 years
- Provides information on all household members aged 16 and above
Construction of sample

- Yearly data

- Monthly data (available for previous year) are used to add information on individual’s *gross labour earnings* and *employment history*
  - Compare labour market status at the time of the interview with calendar information
  - Data only provide year and quarter of the interview
  - Therefore: compare labour market status with status in the third (second, first) month of the quarter and add information

- Analysis is restricted to full-time employed individuals who are observed in at least two consecutive years
Measures of earnings inequality and mobility

- Inequality in a single year:

\[ I_{\text{mld}}(w) = \frac{1}{N} \sum_{i=1}^{N} \log \left( \frac{w_i}{w_t} \right) \]  

(1)

\[ I_{\text{theil1}}(w) = \frac{1}{N} \sum_{i=1}^{N} \frac{w_i}{w} \log \left( \frac{w_i}{w} \right) \]  

(2)

\[ I_{\text{theil2}}(w) = \frac{1}{2N} \sum_{i=1}^{N} \left[ \left( \frac{w_i}{w} \right)^2 - 1 \right] \]  

(3)

- Inequality based on earnings averaged over 3 years in relation to single-year inequality ⇒ Mobility index:

\[ M = 1 - \frac{I(\frac{1}{T} \sum_{t=1}^{T} w_t)}{(\sum_{t=1}^{T} \eta_t I(w_t))} \]  

(4)

⇒ measures the percentage reduction in single-year inequality when earnings are averaged over 3 years
Figure 2: Earnings inequality by country

Source: EU-SILC, own calculations.
Note: Outliers of Theil 2 index are not displayed: SK 1.73, PT 0.63, NO 0.57.
**Figure 3:** Mobility index by country

Source: EU-SILC, own calculations.

Note: Mobility is measured as change in single year inequality when earnings are averaged over three years.
Figure 4: Correlation between inequality and mobility

Source: EU-SILC, own calculations.
Note: The correlation between inequality and mobility is statistically insignificant: 15.002 (t-value: 0.54).
Decomposition of earnings inequality and mobility

- Decomposition of the Theil1 inequality index into within and between inequality:

\[
I = \sum_k v_k \left( \frac{\bar{w}_k}{\bar{w}} \right) I^W_k + \frac{1}{k} \sum_{k=1}^{k} \left( \frac{\bar{w}_k}{\bar{w}} \right) \log \left( \frac{\bar{w}_k}{\bar{w}} \right),
\]

where between group inequality is based on predicted earnings:

\[
I^B = \frac{1}{N} \sum_{i=1}^{N} \frac{\hat{w}_i}{\bar{w}} \log \left( \frac{\hat{w}_i}{\bar{w}} \right)
\]

- Similarly, the mobility index can be decomposed:

\[
M = \left[ 1 - \frac{I^B}{\sum_{t=1}^{T} \eta_t l^B(w_t)} \right] \frac{\sum_{t=1}^{T} \eta_t l^B(w_t)}{\sum_{t=1}^{T} \eta_t l(w_t)} + \left[ 1 - \frac{I^W}{\sum_{t=1}^{T} \eta_t l^W(w_t)} \right] \frac{\sum_{t=1}^{T} \eta_t l^W(w_t)}{\sum_{t=1}^{T} \eta_t l(w_t)}
\]

\[
M = MB^S + MW^S
\]
### Table 1: Decomposition of earnings inequality and mobility (Theil 1)

<table>
<thead>
<tr>
<th></th>
<th>Inequality</th>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Between</td>
</tr>
<tr>
<td>EU-SILC</td>
<td>0.150</td>
<td>0.030</td>
</tr>
<tr>
<td>Austria</td>
<td>0.121</td>
<td>0.023</td>
</tr>
<tr>
<td>Cyprus</td>
<td>0.172</td>
<td>0.037</td>
</tr>
<tr>
<td>Denmark</td>
<td>0.066</td>
<td>0.011</td>
</tr>
<tr>
<td>Estonia</td>
<td>0.213</td>
<td>0.036</td>
</tr>
</tbody>
</table>

*Source: EU-SILC, own calculations.*

- A large part of inequality occurs within groups and therefore remains unexplained.
- Between groups mobility yields more unequal earnings → inequality between groups increases.
- Within groups mobility leads to a convergence of earnings → inequality within groups decreases.
Figure 5: Between earnings inequality - individual characteristics

Source: EU-SILC, own calculations.
Note: This figure displays the percentage shares in total inequality explained by individual characteristics.
Regarding earnings inequality there exist substantial differences between countries (e.g. low inequality in Denmark and Belgium, high inequality in Portugal and Estonia)

In most countries earnings mobility reduces inequality

Decomposition shows that a large part of earnings inequality is due to within-group inequality and thus remains unexplained

Moreover, the equalizing effect of mobility occurs within groups

Analysis of earnings transitions reveals that men and high-skilled workers are most likely to improve their position in the earnings distribution
Thank you for your attention!
Data: Calculation of gross monthly earnings

- Based on "Employee cash or near cash income (gross)" and calendar information on main activity
- Reference period is the calendar year prior to the interview (exceptions: Ireland and UK)
- Yearly gross income is divided up and assigned to the 12 calendar months
**Data: Calculation of gross monthly earnings**

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
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<tr>
<td>2005</td>
<td></td>
<td></td>
<td>2000</td>
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<tr>
<td></td>
<td></td>
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<td></td>
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<td></td>
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<td></td>
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<tr>
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<td>21.000</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>(23000-9000)/5</td>
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1. Only one FT/PT employment spell ⇒ income is divided by the number of months of this spell
2. Derived monthly income is extrapolated to the following (previous) months of the next (preceding) year if FT/PT status has not changed
3. Employment spell remains with no monthly income derived in step 2 ⇒ yearly income is reduced by the income assigned to the other employment spells in the respective year and divided by the number of months of this spell
### Table 2: Decomposition of earnings inequality and mobility (Theil 1)

<table>
<thead>
<tr>
<th>Country</th>
<th>Inequality Total</th>
<th>Inequality Between</th>
<th>Inequality Within</th>
<th>Mobility Total</th>
<th>Mobility Between</th>
<th>Mobility Within</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU-SILC</td>
<td>0.150</td>
<td>0.030</td>
<td>0.120</td>
<td>8.23</td>
<td>-37.31</td>
<td>21.35</td>
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<td>Austria</td>
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<td>0.023</td>
<td>0.105</td>
<td>10.99</td>
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<td>Belgium</td>
<td>0.084</td>
<td>0.013</td>
<td>0.073</td>
<td>6.83</td>
<td>-48.36</td>
<td>19.59</td>
</tr>
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<td>Bulgaria</td>
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<td>0.015</td>
<td>0.105</td>
<td>25.36</td>
<td>-20.65</td>
<td>32.04</td>
</tr>
<tr>
<td>Cyprus</td>
<td>0.172</td>
<td>0.037</td>
<td>0.156</td>
<td>-11.83</td>
<td>-20.65</td>
<td>32.04</td>
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<tr>
<td>Czech Republic</td>
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<td>0.027</td>
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<td>9.33</td>
<td>-27.90</td>
<td>21.15</td>
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<td>Denmark</td>
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<td>0.011</td>
<td>0.055</td>
<td>7.00</td>
<td>-41.42</td>
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<tr>
<td>Estonia</td>
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<td>15.64</td>
<td>-27.70</td>
<td>20.85</td>
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<tr>
<td>Finland</td>
<td>0.106</td>
<td>0.024</td>
<td>0.084</td>
<td>4.16</td>
<td>-28.23</td>
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<tr>
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<td>0.143</td>
<td>15.07</td>
<td>-49.69</td>
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</tr>
<tr>
<td>Ireland</td>
<td>0.142</td>
<td>0.042</td>
<td>0.100</td>
<td>4.99</td>
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<tr>
<td>Italy</td>
<td>0.103</td>
<td>0.018</td>
<td>0.085</td>
<td>4.55</td>
<td>-61.94</td>
<td>18.25</td>
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<tr>
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<td>Netherlands</td>
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<td>Norway</td>
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<td>17.66</td>
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<td>Poland</td>
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<td>0.157</td>
<td>6.23</td>
<td>-45.51</td>
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<td>26.76</td>
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<td>0.081</td>
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<tr>
<td>United Kingdom</td>
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<td>0.027</td>
<td>0.133</td>
<td>10.22</td>
<td>-23.21</td>
<td>17.24</td>
</tr>
</tbody>
</table>

*Source: EU-SILC, own calculations.*
Figure 6: Correlation between earnings inequality and trade union density

Source: EU-SILC, own calculations.
Note: The correlation between trade union density and inequality is statistically significant: -188.43 (t-value: -2.24). *
Figure 7: Correlation between earnings mobility and trade union density

Source: EU-SILC, own calculations.
Note: The correlation between trade union density and mobility is statistically insignificant: -1.449 (t-value: -1.58). *