Employment Protection, Investment in Job-Specific Skills, and Inequality Trends in the United States and Europe

Matthias Doepke and Ruben Gaetani
Explaining Trends in College Wage Premium

The question:

- Large rise in college wage premium since 1980s in the United States, but not in continental Europe.
- What explains the difference?
Explaining Trends in College Wage Premium

- The question:
  - Large rise in college wage premium since 1980s in the United States, but not in continental Europe.
  - What explains the difference?

- Our conjecture:
  - Differences in labor market regulation are (in part) responsible.
  - Firing restrictions affect incentive to invest in relationship-specific capital.
  - Restrictions for firing older workers particularly relevant, which is where U.S.-Europe differences are the largest.
Employment Protection and Change in College Wage Premium

OECD index of employment protection versus change in college premium, 1980–2006:
Overview of Mechanism

- Focus on workers’ decisions on investment in skills and firms’ decisions to create jobs that allow for accumulation of skills.

- Model features:
  - Jobs that may or may not allow for skill accumulation.
  - Workers decide on investment in skills.
  - Worker-firm matches subject to productivity shocks.
  - Skills of college-educated workers are transferable.
  - Skills of less-educated workers are job specific.
Overview of Mechanism

- Labor market regulation interacts with changes in "turbulence."
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- Low turbulence:
  - Low probability of separation even without firing restrictions.
  - Many skilled jobs, most workers invest in skills regardless of regulation.

- High turbulence:
  - No firing restrictions (U.S.): Few skilled vacancies for less-educated workers; only educated workers invest in skills; high wage premium.
  - Firing restrictions (Europe): More skilled vacancies; most workers continue to invest; low wage premia.
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United States
Germany
Germany
1. Vast literature on changes in inequality, skill-biased technical change, capital-skill complementarity . . . .

2. Some closely related work:
   ▶ Acquisition of skills on the job and changes in inequality: Guvenen, Kuruscu, and Ozcan (2014).
   ▶ Labor protection and investment in skills: Delacroix and Wasmer (2007).
Outline

1. Facts on employment protection, college premium, and worker tenure, US versus Germany.

2. Model of investment in job-specific skills.

3. Effect of rise in turbulence.
Facts
Labor Market Regulation

- European labor markets more regulated.
- In many cases, explicit or implicit age discrimination:
  - Distinction between regular and temporary contracts.
  - Features like “Sozialauswahl” in Germany for layoffs.
- Protection for older/experienced workers particularly relevant for mechanism.
College Premium, U.S. versus Germany
Share of College Graduates (25–64), U.S. versus Germany
Worker Tenure, U.S. versus Germany

Fraction of college-educated workers 45–55 with 20+ years of tenure (PSID/SOEP)
Worker Tenure, U.S. versus Germany

Fraction of less-educated workers 45–60 with 15+ years of tenure (PSID/SOEP)
## Education and Transferability of Skills

<table>
<thead>
<tr>
<th></th>
<th>Log of hourly wage, age 45-54</th>
<th>USA (PSID)</th>
<th>1981-1995</th>
<th>1996-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenure &gt;= 20, High-school</td>
<td>.235***</td>
<td>.236***</td>
<td>(.045)</td>
<td>(.033)</td>
</tr>
<tr>
<td>Tenure &gt;= 20, College</td>
<td></td>
<td>.129***</td>
<td>(.061)</td>
<td>.156***</td>
</tr>
<tr>
<td>Exper. 3rd degree pol.</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td># Obs.</td>
<td>1,875</td>
<td>1,278</td>
<td>2,561</td>
<td>1,961</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.10</td>
<td>0.04</td>
<td>0.06</td>
<td>0.05</td>
</tr>
</tbody>
</table>
# Education and Transferability of Skills

<table>
<thead>
<tr>
<th></th>
<th>Log of hourly wage, age 45-54</th>
<th>Germany (SOEP)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1984-1995</td>
<td>1996-2013</td>
</tr>
<tr>
<td>Tenure $\geq 20$, High-school</td>
<td>.098*** (.021)</td>
<td>.143*** (.022)</td>
</tr>
<tr>
<td>Tenure $\geq 20$, College</td>
<td>-.035 (.051)</td>
<td>-.075* (.041)</td>
</tr>
<tr>
<td>Exper. 3rd degree pol.</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td># Obs.</td>
<td>4,008</td>
<td>1,066</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.11</td>
<td>0.13</td>
</tr>
</tbody>
</table>

Note: *** p $< 0.001$, * p $< 0.10$
Model
A Model of the Impact of Labor Market Turbulence on Skill Acquisition

- Life cycle model, ages 20 to 64.
- Two education types $s \in \{H, L\}$:
  - $H$ acquire (mostly) general skills.
  - $L$ acquire (mostly) job-specific skills.
- Two types of jobs:
  - All jobs for educated workers allow accumulation of skill.
  - For less-educated workers, only fraction $v_A$ of jobs does.
Employment Dynamics and Investment in Relationship-Specific Capital

- Fixed job finding rate $\lambda_s$.
- Workers draw productivity level $h \in \{h_1, \ldots, h_n\}$.
- If job allows for skill accumulation, can exert costly effort $e$ at cost to upgrade skill with probability $p(e)$.
- Firms face heterogeneous cost of posting vacancies that allow for skill accumulation; fraction $v_A$ given by:

$$v_A^L = \min \left\{ \max \left\{ \frac{E \left[ J_A^L \right] - E \left[ J_N^L \right]}{(c_1 - c_0)E \left[ J_N^L \right]} - \frac{c_0}{c_1 - c_0}, 0 \right\}, 1 \right\}.$$  

- Wages determined via Nash bargaining with downward wage rigidity.
Turbulence and Skill Loss

- Match output in regular times:
  \[ y^s(h, x) = a^s(x) \ h. \]

- With probability \( \gamma^s \), turbulence shock reduces productivity by factor \( \epsilon \sim \text{Uniform}(0, \bar{\epsilon}) \).

- Productivity returns to normal with probability \( \epsilon \).

- Separation if continuation value of firm is lower than firing cost \( f \).

- Skill loss upon separation: For \( j \leq i \), transition probability \( Q^s(i, j) \) defined by:
  \[ Q^s(i, j) = \sigma^s Q^s(i, j + 1), \quad \sum_{j=1}^{i} Q^s(i, j) = 1. \]

- Set \( \sigma^H < \sigma^L \): skill loss more severe for less-educated workers.
 Calibration Exercise for United States

- Parameterize model to match college premium, tenure premium, and share of high-tenure workers in 1980.
- Choose change in overall skill bias and turbulence shock to match college premium, tenure premium, and share of high-tenure workers in 2010.
- Examine role of investment in relationship-specific capital for the impact of these change on college wage premium in 2010.
### Preset Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discount rate</td>
<td>$\beta$</td>
<td>0.95</td>
</tr>
<tr>
<td>Job finding rate</td>
<td>$\lambda$</td>
<td>0.8</td>
</tr>
<tr>
<td>Bargaining weight</td>
<td>$\alpha$</td>
<td>0.5</td>
</tr>
<tr>
<td>Non-market prod.</td>
<td>$b$</td>
<td>0.2</td>
</tr>
<tr>
<td>Wage rigidity</td>
<td>$\delta$</td>
<td>0.8</td>
</tr>
</tbody>
</table>

#### Target
- Yearly $r = 5.25\%$
- Average unemployment spell 3 months
- Gertler and Trigari (2009)
- $0.5 \times 40\%$ replacement rate
- 20% wage cut
### 1980 US Calibration

<table>
<thead>
<tr>
<th>Param.</th>
<th>Value</th>
<th>Moment</th>
<th>Data</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>$L$ skill specificity</td>
<td>$\sigma^L$</td>
<td>0.44</td>
<td>$L$ Tenure premium</td>
<td>0.27</td>
</tr>
<tr>
<td>$H$ skill specificity</td>
<td>$\sigma^H$</td>
<td>0.15</td>
<td>$H$ Tenure premium</td>
<td>0.11</td>
</tr>
<tr>
<td>Prob. skill upgrade</td>
<td>$\bar{e}$</td>
<td>0.34</td>
<td>$H$ Exp. premium</td>
<td>0.36</td>
</tr>
<tr>
<td>Skill-biased tech.</td>
<td>$A_{80}^H$</td>
<td>1.12</td>
<td>1980 College premium</td>
<td>0.28</td>
</tr>
<tr>
<td>$L$ turbulence</td>
<td>$\gamma^L_{80}$</td>
<td>0.095</td>
<td>$L$ long tenure</td>
<td>0.36</td>
</tr>
<tr>
<td>$H$ turbulence</td>
<td>$\gamma^H_{80}$</td>
<td>0.079</td>
<td>$H$ long tenure</td>
<td>0.40</td>
</tr>
<tr>
<td>Pareto initial skills</td>
<td>$\eta$</td>
<td>1.67</td>
<td>SD log-wage age 25</td>
<td>0.30</td>
</tr>
<tr>
<td>Productivity loss</td>
<td>$\bar{\epsilon}$</td>
<td>0.6</td>
<td>Var. of match prod.</td>
<td>0.05</td>
</tr>
</tbody>
</table>
## 2010 US Calibration

<table>
<thead>
<tr>
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<th>Value</th>
<th>Moment</th>
<th>Data</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>$L$ turbulence</td>
<td>$\gamma_{10}^L$</td>
<td>0.128 $L$ long tenure, 2010</td>
<td>0.23</td>
<td>0.23</td>
</tr>
<tr>
<td>$H$ turbulence</td>
<td>$\gamma_{10}^H$</td>
<td>0.115 $H$ long tenure, 2010</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>Fraction of $A$ jobs</td>
<td>$\nu_{A,10}^L$</td>
<td>0.63 $L$ Exp. premium</td>
<td>-0.02</td>
<td>-0.02</td>
</tr>
<tr>
<td>SBTC</td>
<td>$A_{10}^H$</td>
<td>1.24 2010 College premium</td>
<td>0.48</td>
<td>0.48</td>
</tr>
<tr>
<td>Return to exp.</td>
<td>$g_{10}$</td>
<td>0.005 $H$ Exp. premium</td>
<td>0.08</td>
<td>0.08</td>
</tr>
</tbody>
</table>
Investment in Skill Upgrading

![Graph showing the probability of skill upgrading over experience for non-college and college workers in 1980 and 2010.](Image)

- **Non-college, 1980**: Blue line
- **College, 1980**: Red line
- **Non-college, 2010**: Dashed blue line
- **College, 2010**: Dashed red line
Investment in Skill Upgrading: Impact of Turbulence
Skill Distribution

![Skill Distribution Graph]

- **Non-college, 1980**
- **Non-college, 2010**
- **College, 1980**
- **College, 2010**
Skill Distribution: Impact of Turbulence
Impact of Turbulence on College Premium

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<th>College Premium</th>
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<tr>
<td>1980 data/model</td>
<td>0.287</td>
</tr>
<tr>
<td>2010 data/model with turbulence, SBTC</td>
<td>0.485</td>
</tr>
<tr>
<td>2010 model with turbulence</td>
<td>0.378</td>
</tr>
<tr>
<td>2010 model with turbulence (fixed job composition)</td>
<td>0.293</td>
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Turbulence accounts for 46 percent of rise in college premium. Primarily because fewer jobs allow for skill accumulation.
## Impact of Turbulence on College Premium

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→ Turbulence accounts for 46 percent of rise in college premium.
→ Primarily because fewer jobs allow for skill accumulation.
Role of Employment Protection

- Introduce a firing cost.
- Calibrated to match long term tenure in Germany with same turbulence shock as in the US.
- Result: Increase in college premium 40% smaller.
Relative Return to Accumulation Vacancy

![Graph showing the relative return to accumulation vacancies over experience from 1980 and 2010. The line for 1980 is solid blue, and the line for 2010 is dashed blue.](image-url)
Relative Return to Accumulation Vacancy with Firing Cost

![Graph showing relative return to N vacancies over experience for different years and with firing cost.](image-url)
Investment in Skill Upgrading with Firing Cost
Cohort Effects in the Model

1980

25-39 40-54
0.5 1 1.5
College premium relative to 1980

1990

25-39 40-54
0 0.5 1

2000

25-39 40-54
0.5 1 1.5

2010

25-39 40-54
0.5 1 1.5
Cohort Effects in the Data

1980

<table>
<thead>
<tr>
<th>Year</th>
<th>25-39</th>
<th>40-54</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>1990</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>2000</td>
<td>1.5</td>
<td>2</td>
</tr>
<tr>
<td>2010</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

College premium relative to 1980
Welfare as a Function of Firing Cost

![Graph showing the relationship between welfare and firing cost. The graph displays two scenarios: Full effect and Constant job composition. The welfare decreases as the firing cost increases, and the share of T vacancies increases as well, with the Full effect curve showing a more pronounced increase compared to the Constant job composition.]
Conclusion

- Large differences in employment protection across countries.
- In Europe, insider-outsider labor markets and protection of senior workers increasingly common.
- Has important implications for investment in relationship-specific capital.
- Contributes to understanding of cross-country differences inequality trends.