ICT and Europe’s Productivity Performance
Industry-level Growth Accounts Comparisons with the United States

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EU-U.S. growth divergence

United States
- Labour productivity acceleration after 1995
- Faster ICT investment
- Accelerating Total Factor Productivity (TFP) growth
- ICT users grow faster

Europe
- Labour productivity slowdown after 1995
- Lagging ICT investment
- Constant TFP growth
- Slower non-ICT investment
Main Findings

- U.S. TFP acceleration is not limited to ICT producers => ICT users important too
- Same industries in Europe and U.S. make large ICT investment: trade, finance, business services
- Slowdown in non-ICT investment widespread and important
- Wage moderation main suspect
Follow standard growth accounting framework of Jorgenson & Griliches (1967).

\[ \dot{y} = v_L q + v_{ICT} \dot{k}_{ICT} + v_N \dot{k}_N + \text{tfp} \]

- \( \dot{y} \): TFP growth
- \( v_L q \): Labour productivity growth
- \( v_{ICT} \dot{k}_{ICT} \): ICT capital deepening contribution
- \( v_N \dot{k}_N \): Non-ICT capital deepening contribution
- \( \text{tfp} \): TFP growth
Data (1)

➢ 26 comparable industries:
  ▶ 13 manufacturing
  ▶ 13 non-manufacturing
➢ 1979-2000/2001
➢ France, Germany, Netherlands, UK, U.S.
  ▶ Four EU countries aggregated to EU-4
  ▶ +/- 70% of EU-15 GDP
Data (2)

- Investment in 6 capital assets for each industry
  - 3 ICT assets: hardware, communication and software
  - 3 Non-ICT: buildings, machinery, transport
- Different labour categories by industry
  - 3-7 educational attainment categories
- Use U.S. deflators for ICT
  - Apply at detailed industry and asset level
  - Improvement over non-quality adjusted deflators
Aggregation using Törnquist indices
Aggregation across countries using industry-specific output PPPs
No input/output tables yet => planned for FP6
No adjustments for imperfect competition, input utilization
Sources of labour productivity growth

EU-4, 1979-1995

1995-2000

U.S., 1979-1995

1995-2000

Labour quality
Reallocation of hours
ICT capital deepening
Non-ICT capital deepening
TFP growth
Industry Perspective (1): ICT contribution

- Financial intermediation
- Wholesale trade
- Business services
- Computers/electronics
- Communications
- Retail trade

U.S. EU-4
Industry Perspective (2): TFP growth

- Computers/electronics
- Retail trade
- Wholesale trade
- Agriculture
- Financial intermediation
- Communications
- Transport services

Graph showing TFP growth for various industries with comparison to U.S. and EU-4.
## Non-ICT investment and wage moderation (1)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Non-ICT capital deepening</strong></td>
<td></td>
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<tr>
<td>EU-4</td>
<td>2.59</td>
<td>0.88</td>
<td>-1.71</td>
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<tr>
<td>U.S.</td>
<td>1.46</td>
<td>1.79</td>
<td>0.33</td>
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<tr>
<td><strong>Wage/non-ICT rental rate</strong></td>
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<tr>
<td>EU-4</td>
<td>1.88</td>
<td>0.53</td>
<td>-1.35</td>
</tr>
<tr>
<td>U.S.</td>
<td>1.27</td>
<td>1.46</td>
<td>0.19</td>
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Non-ICT investment and wage moderation (2)

\[ \dot{k}_{i,t}^N = \beta_1 \dot{w}_{i,t} + \beta_2 \dot{r}_{i,t}^N + \nu_i + \epsilon_{i,t} \]

<table>
<thead>
<tr>
<th></th>
<th>France</th>
<th>Germany</th>
<th>Netherlands</th>
<th>UK</th>
<th>US</th>
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</thead>
<tbody>
<tr>
<td>Wage growth</td>
<td>(\beta_1)</td>
<td>0.302**</td>
<td>0.460**</td>
<td>0.550**</td>
<td>0.425**</td>
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<td>(9.961)</td>
<td>(5.032)</td>
<td>(6.068)</td>
<td>(9.411)</td>
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<tr>
<td>Non-ICT rental rate growth</td>
<td>(\beta_2)</td>
<td>0.011</td>
<td>-0.081**</td>
<td>0.021</td>
<td>-0.008</td>
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<td>(0.685)</td>
<td>(-3.450)</td>
<td>(0.648)</td>
<td>(-0.854)</td>
</tr>
</tbody>
</table>

** indicates significance at the 5% level.
Conclusions

- Divergence in productivity growth after 1995 between EU and U.S.
- U.S. acceleration related to ICT => few industries very important
- EU slowdown related to slower non-ICT investment => very widespread
- Better data => FP6
- More analysis: factor demand, imperfect competition