Do Labour Market Changes Explain the Slowdown in European Productivity Growth?

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Is There an Employment-Productivity Tradeoff?

- Two marked events in Europe after 1995
  - Slowdown in productivity growth to well below the U. S. rate
  - Increase in growth of employment per capita at well above the U. S. rate
- Are these connected causally or just a coincidence?
  - Which way does the causation go?
- Co-authored with Ian Dew-Becker
  - Look him up on google, at age 23, he has 4000+ entries
Ian in SF, you can’t see “MV=PY”
The US Accelerates, Europe Decelerates

- From 1950 to 1995 EU productivity growth was faster than in the US.
- But in the past decade since 1995 we have witnessed
  - An explosion in US productivity growth
  - A slowdown in EU productivity growth roughly equal in size
  - An explosion in research on the US takeoff and but much less research on Europe’s slowdown
- The magnitude of the shift (average EKS&GK Groningen)
  - EU/US level of labor productivity (ALP)
    - 1979  1995  2004
    - 80%  97%  89%
This paper begins with two simple observations:

1. While European productivity (Y/H) has fallen back since 1995 relative to the US, output per capita (Y/N) has not fared nearly as badly
   - Y/H growth gap: 0.9%
   - Y/N growth gap: 0.2%

2. After 1995, we see divergence across the EU-15 in Y/H growth
   - St. Dev. 1970-1995: 0.62
   - St. Dev. 1995-2005: 1.01
The Key Identity Suggests the Tradeoff

- An identity links Y/N and Y/H to H/N:
  \[ Y/N = Y/H \times H/N \]
  Thus the paradox of high European Y/H and low Y/N must be resolved by lower H/N

- Also, Y/H and H/N are jointly determined

- The task of this paper is going to be figure out which direction the causation runs
  - We will argue that a good deal of the decline in ALP growth is due to exogenous employment shocks
  - Also we will highlight the reversal of almost everything at 1995, comparing 1970-95 vs. 1995-2005
Bringing Together the Disparate Literatures

- Literature #1, why did Europe’s hours per capita (hereafter H/N) decline before 1995? Prescott, Rogerson, Sargent-Lundqvist, Alesina, Blanchard
  - High taxes, regulations, unions, high minimum wages
  - Europe made labor expensive
  - Movement up Labor Demand curve => low employment + high ALP

- Literature #1 has missed the turnaround
  - Since 1995 there has been a decline in tax rates and employment protection measures; unionization earlier
  - Big increase in hours per capita, turnaround in both absolute terms and relative to the US Move back down L^D curve
Take any CRS production \( F(K,L) \)
- Intensive form, \( L \cdot F(K/L,1) = L \cdot f(K/L) \)
- \( Y/L = f(K/L) \)

As long as capital is fixed, an increase in employment lowers labor productivity.

We don’t know how fast capital adjusts though; the tradeoff may be quantitatively small.

A major goal of this paper is to quantify the tradeoff.
Downward shift in labor supply curve reduces real wage and productivity.
Pre-1995: Moving Northwest

- 1970-95 EU climbs to the northwest
  - Hours per capita decline, average labor productivity increases
  - In this sense much of Europe’s 1970-95 productivity catchup was “artificial,” propelled by policies making labor expensive
    - No busboys, grocery baggers, valet parkers
    - Product regulations kept stores shut tight many hours of the day/night
    - All this reduced Europe’s employment share in retail/services
Post-1995: Moving Southeast

- 1995-2004 EU slides southeast
  - Hours per capita start increasing while they decline in the US
  - Effects are magnified by slow reaction of capital, eventually capital should grow faster offsetting much or all of productivity slowdown

- Literature #1 misses the turnaround
  - Since 1995 decline in tax rates and employment protection measures
  - We are unaware of much macro-level research on the turnaround in hours
  - Allard and Lindert (2006) do not really mention it – data only goes to 2001
Literature #2: The EU-US ALP gap

- Central Focus of Lit #2 on post-1995 turnaround in US Productivity Growth

  - Jorgenson, Ho and Stiroh (2006): ’95-’00 due to ICT, ’00-’05 something else

  - Retail is often noted
    - Foster, Haltiwanger and Krizan (2002) on new establishments

  - Baily and Kirkegaard (2004) on regulations
    - Need to free land use restrictions
Fully 85% of EU productivity slowdown has its counterpart in a speed-up of EU H/N

- Europe paid for lower ALP mainly with higher hours rather than less consumption
- Saltari and Travaglini have made a similar point with respect to Italy

This runs counter to the Blanchard story about preferences for leisure

- Now we hear that they’re not lazy, just unproductive
- Huge literature on different structural reasons for EU sclerosis
There is a long line of research examining the relationship between hours and productivity. Even using an IV approach, increases in H/N drive down Y/H.

- This makes sense in a single factor model or with any slow adjustment of capital.
- Measuring the speed of adjustment of investment is difficult – future research for us.

View today’s talk as a report on research in progress, not the final polished word.

Percent

EU-15 Y/H

US Y/H

Growth Trend Turnaround in H/E is less Dramatic, 1970-2006
Interpreting the Post-1995 Turnaround

- Simple HP trends
- Europe is continuing its long slow decline
- Turnaround is generally pegged at 1995
  - The EU-15 stops catching up, and the US takes off
- We are mainly going to examine the determinants of the turnaround – i.e. changes in Y/H growth post-1995
- Qualification: US trend peaks in 2002-03 and is now declining
U. S. Productivity Growth Trends
Based on Data to 2007:Q4

NFPB LP

TE LP

NFPB minus TE

Year:
We Need to Look at Everything Per Capita

- Population growth in EU 0.7 percent per year slower than US over the past decade
- Output per capita in the EU doesn’t look bad at all
- Post-1995 hours turnaround is a counterpart to the Y/H turnaround
- We will see that there is a similar pattern within the EU – strong negative correlation between the hours and ALP turnarounds
Turnarounds in Hours and Output

- Turnarounds are 1995-2006 minus 1980-1995 growth
- The relative turnarounds (EU minus US) cancel each other out
  \[ \frac{Y}{H} + \frac{H}{N} = \frac{Y}{N} \]
  \[-2.20 \quad 1.99 \quad -0.21\]
- 1980-2005 Y/N growth is identical
- But the EU is not catching up
The US has experienced an enormous decline in hours growth when capital growth fell.

Thus “capital-deepening” numbers for US are misleading as they reflect as much movements in the denominator as in the numerator.

Cumulative hours growth zero 2000-06, growth in hours per capita negative.

The EU had strong hours growth while the US went through its recession and recovery.
Defining the Four Country Groups, Pop Share and ALP Growth 1995-2006

- **Nordic**: Denmark, Finland, Sweden
  - Pop Share: 5
  - ALP: 2.09

- **Anglo-Saxon**: UK and Ireland
  - Pop Share: 17
  - ALP: 2.18

- **Continental**: Benelux, Austria, France, Germany, Portugal
  - Pop Share: 49
  - ALP: 1.75

- **Mediterranean**: Greece, Italy, Spain
  - Pop Share: 29
  - ALP: 0.24
A closer look at the Mediterranean Countries

- Mainly driven by Spain and Italy

Spain:
- -4.43 turnaround in Y/H
- +5.04 turnaround in H/N

Italy:
- -2.28 turnaround in Y/H
- +1.16 turnaround in H/N

- Had we ranked the countries according to output per capita, Spain would be a Tiger, behind only Greece and Ireland
Making Sense of Cross-EU Heterogeneity in Table 1

- Notice the homogeneity pre-1995 and heterogeneity post-'95. Stdev LP 0.63 to 1.0. Stdev H/N 0.46 to 1.02
- The only two countries with a noticeable acceleration in LP are Sweden, Greece and Ireland
- Declines < 1% for Finland, UK, Austria, Lux, NL
- Sharp declines for Belgium, Denmark, France, Germany, Portugal, and especially Italy and Spain
- We emphasize the experience of the Mediterranean countries and their contrast with Nordic & Anglo-Saxon
Research Strategy

- Divergence across the EU has increased
- The Y/H slowdown in the Med countries is balanced by healthy H/N growth, which mainly consists of E/N growth
- We will estimate regressions that allow us to determine how much of the turnaround in E/N growth can be attributed to policy/institutional variables
- Then how much of the productivity slowdown can be explained by the E/N growth and by policy variables, separately and together?
Employment Regressions

- Cover 1980-2003 EU-15, N=320, population weighted

- Explanatory Variables:
  - Output Gap
  - Average Replacement Rate (ARR)
  - Employment Protection Legislation (EPL)
  - Product Market Regulation (PMR)
  - Union Density
  - Tax wedge
  - Various dummies

- These are common across this literature
Employment Protection Legislation

Graph showing the trend of Employment Protection Legislation over time for different regions:

- Mediterranean
- Continental
- Nordic
- Anglo-Saxon

The x-axis represents the years from 1980 to 2000, and the y-axis represents the employment protection index from 0 to 4.
Employment Regression Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax Wedge</td>
<td>-0.28</td>
<td>0.07</td>
</tr>
<tr>
<td>Employment Protection Legislation</td>
<td>0.86</td>
<td>0.79</td>
</tr>
<tr>
<td>Product Market Regulation</td>
<td>-0.44</td>
<td>0.55</td>
</tr>
<tr>
<td>Unemployment Benefits (ARR)</td>
<td>-0.18</td>
<td>0.05</td>
</tr>
<tr>
<td>Union Density</td>
<td>-0.46</td>
<td>0.10</td>
</tr>
<tr>
<td>High Corporatism Dummy</td>
<td>-2.04</td>
<td>0.98</td>
</tr>
<tr>
<td>Output Gap</td>
<td>0.52</td>
<td>0.05</td>
</tr>
<tr>
<td>Post-1995 Dummy</td>
<td>0.94</td>
<td>0.15</td>
</tr>
<tr>
<td>R2</td>
<td>0.52</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>320</td>
<td></td>
</tr>
<tr>
<td>RMSE</td>
<td>1.18</td>
<td></td>
</tr>
</tbody>
</table>

- Our tax wedge coefficient is consistent with what others have found.
- EPL and PMR seem to have no effects.
- Everything else has the correct sign – regulations and taxes reduce employment.
- The post-1995 dummy is substantial.
- Growth in the employment rate rose by 1% after ‘95.
Employment Regression Results

Robustness

- Results are the same if population weights are dropped or year dummies are added.
- Dropping the Mediterranean countries or Spain does not affect the size of the post-1995 dummy.
Employment Regression Results

- With all of our dummies, we need to determine the effects of the policy/institutional variables holding constant the country and time dummies.

- We plot predicted values with policy fixed at its 1995 level

- The output gap and dummies are still allowed to vary
Female Employment

Effect of the Post-95 dummy (2.38%)
Male Employment

Effect of the post-95 dummy (6.32%)

Effect of the Policy variables (1.47%)

Predicted

Fixed Policy

No Post-1995 Dummy
Productivity Regressions

Suppose we are in a Cobb-Douglas world. What coefficient would we expect on employment?

\[ y = 0.33*k + 0.67*l \]

\[ (y-l) = 0.33*(k/l) \]

- If capital is fixed, the coefficient will be -0.33
- If capital adjusts it will be smaller
- If labor is not homogenous it could be larger
  - The last people to enter the labor force are likely the least skilled and experienced
Productivity Regressions

- We can’t simply regress productivity on employment

- A shock to productivity affects wages and hence employment
Productivity Regressions

Identification

- We want variables that affect employment but not productivity
- The tax wedge is our best candidate
- We also consider using the post-1995 dummy and union density
  - Pragmatism
    - This gives more power and passes identification tests, but raises the question as to what caused the post-1995 change as quantified by the dummy
<table>
<thead>
<tr>
<th>Productivity Regressions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tax wedge is the only instrument in this version</strong></td>
</tr>
<tr>
<td><strong>Coefficient on employment is twice what we would expect</strong></td>
</tr>
<tr>
<td><strong>EPL and ARR have independent positive effects on productivity</strong></td>
</tr>
<tr>
<td><strong>We can drive the SE on employment down to 0.10, but the result remains the same</strong></td>
</tr>
<tr>
<td><strong>Not dependent on Med.</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment Rate</td>
<td>-0.64 ***</td>
<td>(0.20)</td>
</tr>
<tr>
<td>Employment</td>
<td>1.66 ***</td>
<td>(0.65)</td>
</tr>
<tr>
<td>Protection Legislation</td>
<td>0.56</td>
<td>(0.45)</td>
</tr>
<tr>
<td>Product Market Regulation</td>
<td>0.56</td>
<td>(0.45)</td>
</tr>
<tr>
<td>Unemployment Benefits (ARR)</td>
<td>0.14 ***</td>
<td>(0.05)</td>
</tr>
<tr>
<td>Union Density</td>
<td>0.03</td>
<td>(0.12)</td>
</tr>
<tr>
<td>High Corporatism Dummy</td>
<td>-0.49</td>
<td>(0.94)</td>
</tr>
<tr>
<td>Output Gap</td>
<td>0.68 ***</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Post-1995 Dummy</td>
<td>-0.14</td>
<td>(0.24)</td>
</tr>
<tr>
<td>R2</td>
<td>0.63</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>320</td>
<td></td>
</tr>
<tr>
<td>RMSE</td>
<td>0.95</td>
<td></td>
</tr>
</tbody>
</table>
Level of Labor Productivity

**Policy Effect**
- Lowered growth by 0.25% per year
- Cumulates to 2.5% decline in the level
- 1/3 of the total shortfall
Effects of the Policy and Institutional Variables

- Assuming hours per employee is stable, $E/N + \frac{Y}{H} = \frac{Y}{N}$

- Policy has effects on both employment and productivity

- We just add these effects up
### Effects of Policy & Institutions

<table>
<thead>
<tr>
<th>Policy &amp; Institutions</th>
<th>Shock Size</th>
<th>Employment</th>
<th>Productivity</th>
<th>Output Per Capita</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tax Wedge</strong></td>
<td>9.21</td>
<td>-2.67 ***</td>
<td>1.71 ***</td>
<td>-0.96 **</td>
</tr>
<tr>
<td></td>
<td>(0.64)</td>
<td>(0.53)</td>
<td></td>
<td>(0.4)</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td>0.87</td>
<td>0.74 **</td>
<td>0.23</td>
<td>0.97 ***</td>
</tr>
<tr>
<td></td>
<td>(0.36)</td>
<td>(0.37)</td>
<td></td>
<td>(0.31)</td>
</tr>
<tr>
<td><strong>Protection Legislation</strong></td>
<td>0.9</td>
<td>-0.14</td>
<td>0.35</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>(0.24)</td>
<td>(0.25)</td>
<td></td>
<td>(0.22)</td>
</tr>
<tr>
<td><strong>Product Market Regulation</strong></td>
<td>0.9</td>
<td>-0.14</td>
<td>0.35</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>(0.24)</td>
<td>(0.25)</td>
<td></td>
<td>(0.22)</td>
</tr>
<tr>
<td><strong>Unemployment</strong></td>
<td>11.31</td>
<td>-0.90 ***</td>
<td>1.37 ***</td>
<td>0.47 *</td>
</tr>
<tr>
<td></td>
<td>(0.34)</td>
<td>(0.31)</td>
<td></td>
<td>(0.25)</td>
</tr>
<tr>
<td><strong>Benefits (ARR)</strong></td>
<td>11.31</td>
<td>-0.90 ***</td>
<td>1.37 ***</td>
<td>0.47 *</td>
</tr>
<tr>
<td></td>
<td>(0.34)</td>
<td>(0.31)</td>
<td></td>
<td>(0.25)</td>
</tr>
<tr>
<td><strong>Union Density</strong></td>
<td>23.32</td>
<td>-7.93 ***</td>
<td>5.07 ***</td>
<td>-2.85 ***</td>
</tr>
<tr>
<td></td>
<td>(1.17)</td>
<td>(1.23)</td>
<td></td>
<td>(1.07)</td>
</tr>
<tr>
<td><strong>High Corpratism Dummy</strong></td>
<td>1</td>
<td>-1.02 **</td>
<td>0.65 **</td>
<td>-0.37 *</td>
</tr>
<tr>
<td></td>
<td>(0.48)</td>
<td>(0.33)</td>
<td></td>
<td>(0.21)</td>
</tr>
</tbody>
</table>

- Tax wedge and union density lower Y/N
- ARR and EPL have positive effects
  - Driven by their direct effects on productivity
Effects of Government Policy

- Why would ARR and EPL *raise* productivity and output?
  - Acemoglu and Shimer on reservation wages and matching
  - Match quality may improve
  - More incentive to create job-specific human capital
The New Results in this Paper at the Industry Level

- We aggregate productivity growth by industry in a way that allows us to determine the relative role of productivity and shares.
- The “productivity” effect is just the difference in productivity growth in a given industry.
- The “share” effect is the addition or subtraction from growth as shares shift within industries.
  - Example: Ireland shifts to high-tech manufacturing, this comes out as a “share” effect within manufacturing.
Contributions, Productivity vs. Share Effects, in EU-US, 1995-2003

Manufacturing is nearly as important as retail.

But ICT is tiny. Only ~2% hours share.
US acceleration is widespread, not just in retail and manufacturing.

EU weakness is also widespread.
Cross-Industry Correlation of Y/H and E/N Turnarounds

- ▲ = ICT or Communications
- ■ = Med. (non-ICT or Comm)
Table 12: Regressions of LP Turnaround* on E/N Turnaround*

<table>
<thead>
<tr>
<th>Countries</th>
<th>Exclude ICT and Comm.</th>
<th>Coefficient</th>
<th>T-Statistic</th>
<th>N</th>
<th>R2</th>
<th>RMSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>No</td>
<td>-0.45</td>
<td>-4.35</td>
<td>179</td>
<td>0.10</td>
<td>3.000</td>
</tr>
<tr>
<td>All</td>
<td>Yes</td>
<td>-0.54</td>
<td>-5.94</td>
<td>149</td>
<td>0.19</td>
<td>2.495</td>
</tr>
<tr>
<td>Mediterranean Only</td>
<td>No</td>
<td>-0.82</td>
<td>-4.19</td>
<td>36</td>
<td>0.34</td>
<td>2.920</td>
</tr>
<tr>
<td>Mediterranean Only</td>
<td>Yes</td>
<td>-0.83</td>
<td>-5.60</td>
<td>30</td>
<td>0.53</td>
<td>2.140</td>
</tr>
</tbody>
</table>

Comparing Nordic with EU-15
Comparing Anglo-Saxon with EU-15

- Business Services
- Non-ICT Durable Mfg.
- Retail/Wholesale
- Non-durable Mfg.
- Trans
- Real Estate
- GHI
- Construction/Utilities
- ICT Mfg.
- Communication
- Finance
- Ag./Mining
Comparing Continental with EU-15
Comparing Med with EU-15

Mediterranean

- Business Services
- GHI
- Finance
- Communication
- ICT Mfg.
- Retail/Wholesale Trans.
- Construction/Utilities
- Real Estate
- Non-ICT Durable Mfg.
- Nondurable Mfg.
- Ag./Mining

Comparing Med with EU-15

- GHI
- 0.15
- 0.05
- -0.10
- -0.15
- -0.25
- 0.05
- 0.10
Comparing US with EU-15

<table>
<thead>
<tr>
<th>Sector</th>
<th>US TFP</th>
<th>EU TFP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Services</td>
<td>0.25</td>
<td>0.35</td>
</tr>
<tr>
<td>Retail/Wholesale</td>
<td>-0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>ICT Mfg.</td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td>Non-ICT Durable Mfg.</td>
<td>-0.05</td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td>0.10</td>
</tr>
<tr>
<td>Construction/Utilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nondurable Mfg.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trans.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GHI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real Estate</td>
<td>0.35</td>
<td></td>
</tr>
<tr>
<td>Ag./Mining</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

45° line
Conclusions from Employment and Productivity Growth Regressions

- There is a strong negative correlation between growth in Y/H and E/N evident in the data, emerging from our regressions, and also in the cross-industry data displayed at the end.
- At least in short run, lower taxes and looser regulations raise employment growth and reduce productivity growth.
- The novelty in our framework is to show that policy changes widely endorsed in Europe as desirable (Lisbon agenda) may boost E/N at the cost of reducing Y/H, thus leaving ambiguous effects on growth in output per capita (Y/N).
- A 1% increase in employment only raises output by 0.36% in the short-run.
- Summary of effects:
  - Unions reduce output per capita.
  - EPL and unemployment benefits raise output per capita.
  - PMR and the tax wedge have roughly no effects.
Further Conclusions from Cross-Industry Results

- Differences across Europe are in part reflected in industries that are “national champions”. Compared to EU average, LP turnaround reveals
  - Nordic strong in ICT manufacturing
  - Anglo-Saxon strong in finance and business services
  - Continental average as would be expected
  - Mediterranean weak across the board, consistent with a broad-based macro explanation rather than an industry-specific explanation
Final Qualification

- The E/N and Y/H regression analysis is static and does not trace further dynamic adjustment
  - Negative effect of policy reforms on K/H should in many models be followed by faster growth in K
  - This has not happened (yet) in much of Europe
- There are fundamental differences in industry performance between the US and EU that have widely accepted structural explanations
  - Wholesale and retail trade, big boxes vs. inner-city pedestrian walking districts (role of land-use planning as another policy reform)