

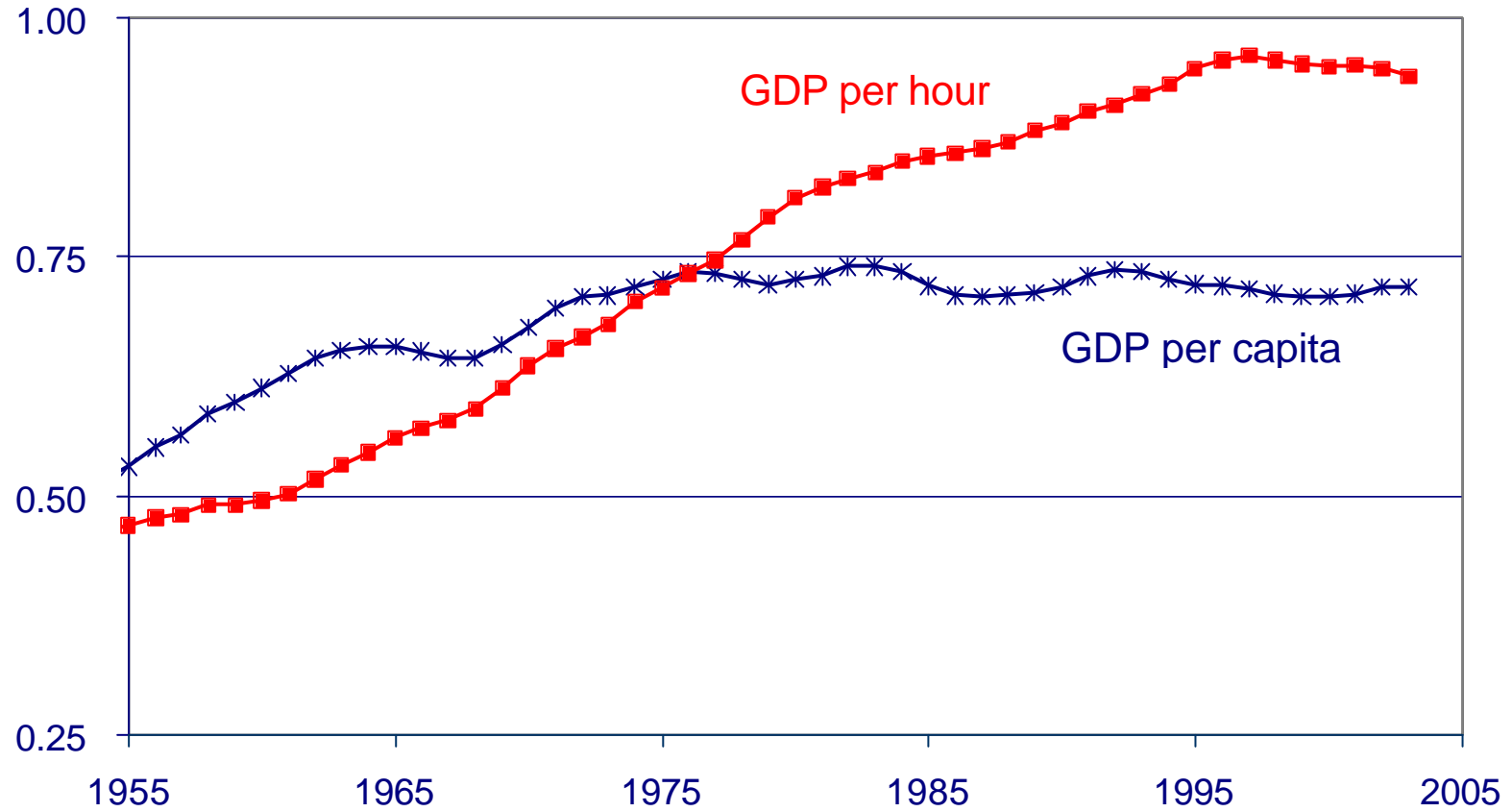
# ICT and Europe's Productivity Performance

Industry-level Growth Account Comparisons  
with the United States

**Robert Inklaar, Mary O'Mahony  
and Marcel Timmer**

*Presentation for Conference on "Divergences in Productivity  
between Europe and the United States", Royaumont Abbey March  
22, 2004*

# EU-15 as ratio of U.S., 1955-2003



# End of Catch-up in 1990s: Why?

➤ ICT-revolution

➤ End of catch-up in “old” technologies

➤ Changes in labour markets

⇒ Need for industry perspective

# What do we know so far?

## Before and after 1995

	<i>United States</i>	<i>Europe</i>
<i>Labour productivity</i>	Acceleration	Slowdown
<i>ICT deepening</i>	Acceleration	
<i>TFP</i>	Acceleration	Slowdown
<i>Non-ICT deepening</i>		Slowdown
<i>Industries</i>	ICT-users	?

## Main findings of this study

- Industry pattern of **ICT investment** is same in Europe and U.S: trade, finance, business services.
- .....but level is much lower than U.S.
- No **TFP acceleration** outside ICT-production in Europe
- Slow down in **non-ICT capital deepening** is widespread
  - Linked to wage moderation
  - Potential in “old technologies” depleted

# Harmonised Data (1)

- France, Germany, Netherlands, UK, U.S.
  - Four EU countries aggregated to EU-4
  - +/- 70% of EU-15 GDP
- Period: 1979-2000
- 26 comparable industries:
  - 13 manufacturing
  - 13 non-manufacturing
- Aggregation across industries and countries:  
Tornqvist indices, sectoral PPPs

# Harmonised Data (2)

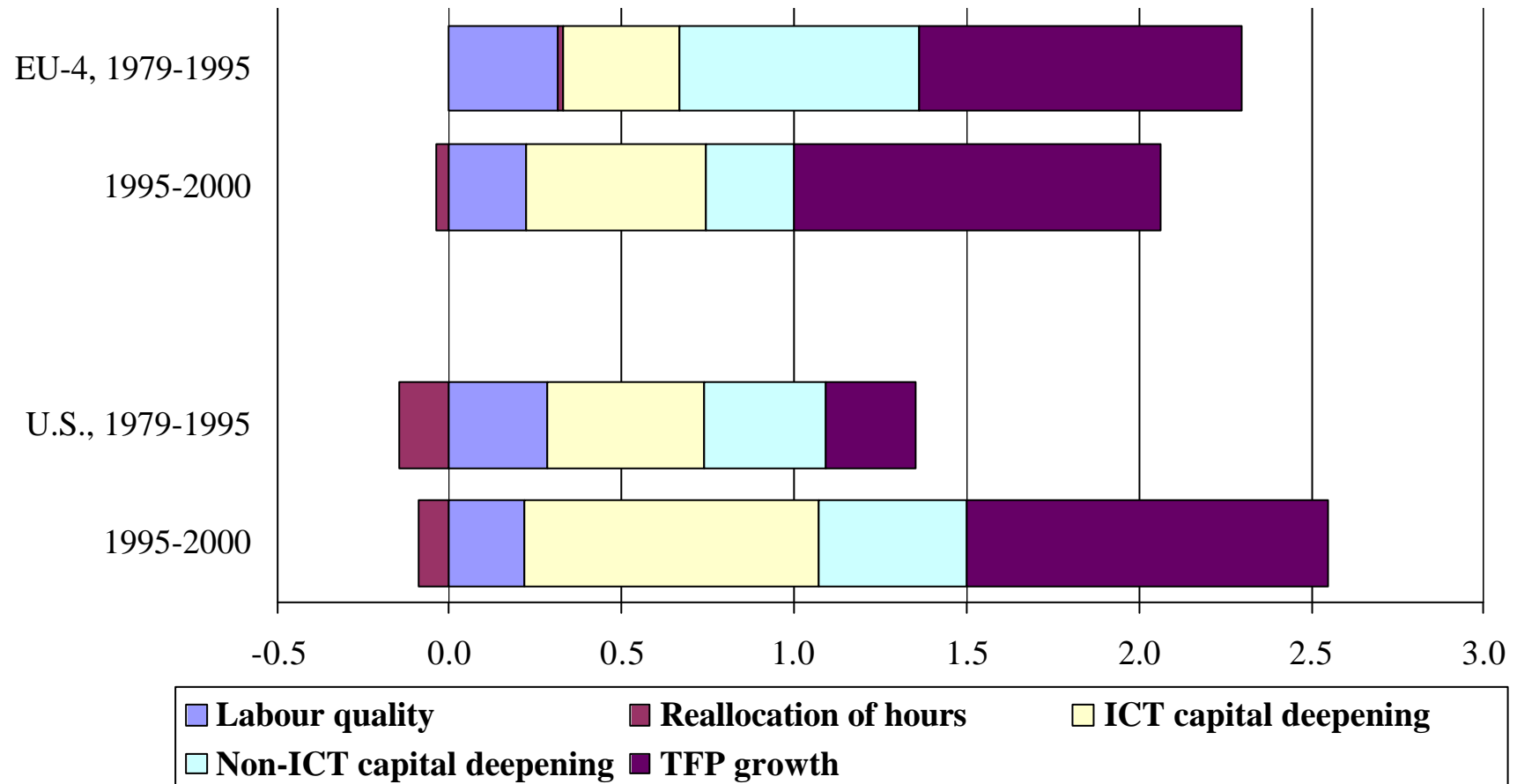
- Capital:
  - Investment in 6 capital assets for each industry
    - 3 ICT assets: hardware, communication and software
    - 3 Non-ICT: non-residential structures, machinery, transport
  - PIM with harmonised depreciation rates
  - Harmonised ICT investment deflator based on U.S.
- Labour:
  - 3 to 7 educational attainment categories
- Output:
  - Harmonised ICT output deflator based on U.S.

# Growth accounting framework

- Follow standard growth accounting framework of Jorgenson & Griliches (1967).

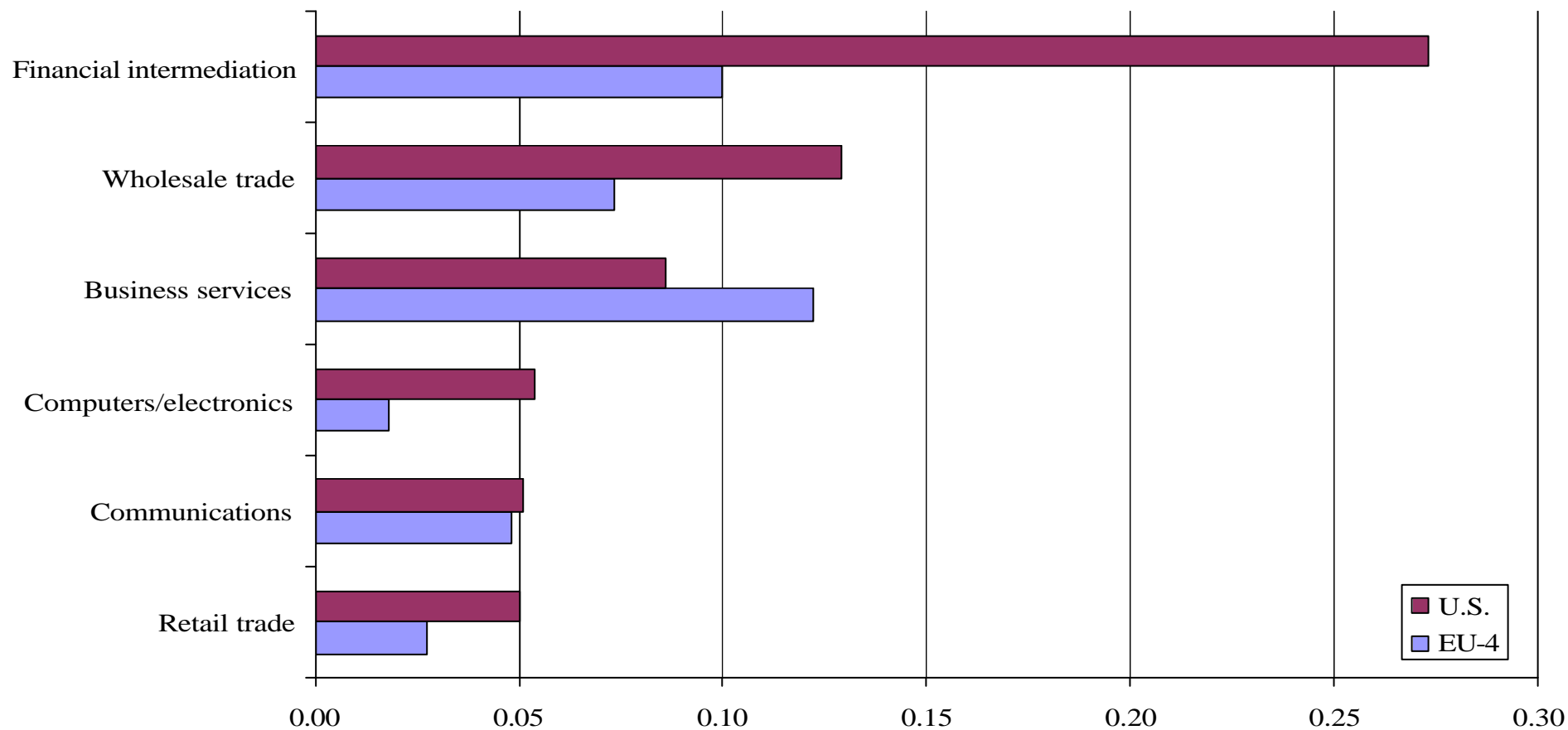
$$\begin{array}{cccccc} \dot{y} & = & v_L \dot{q} & + & v_{ICT} \dot{k}_{ICT} & + & v_N \dot{k}_N & + & \dot{tfp} \\ \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow \\ \text{Labour} & & \text{Labour quality} & & \text{ICT capital} & & \text{Non-ICT} & & \text{TFP growth} \\ \text{productivity} & & \text{contribution} & & \text{deepening} & & \text{capital} & & \\ \text{growth} & & & & \text{contribution} & & \text{deepening} & & \\ & & & & & & \text{contribution} & & \end{array}$$

# Sources of Labour Productivity Growth



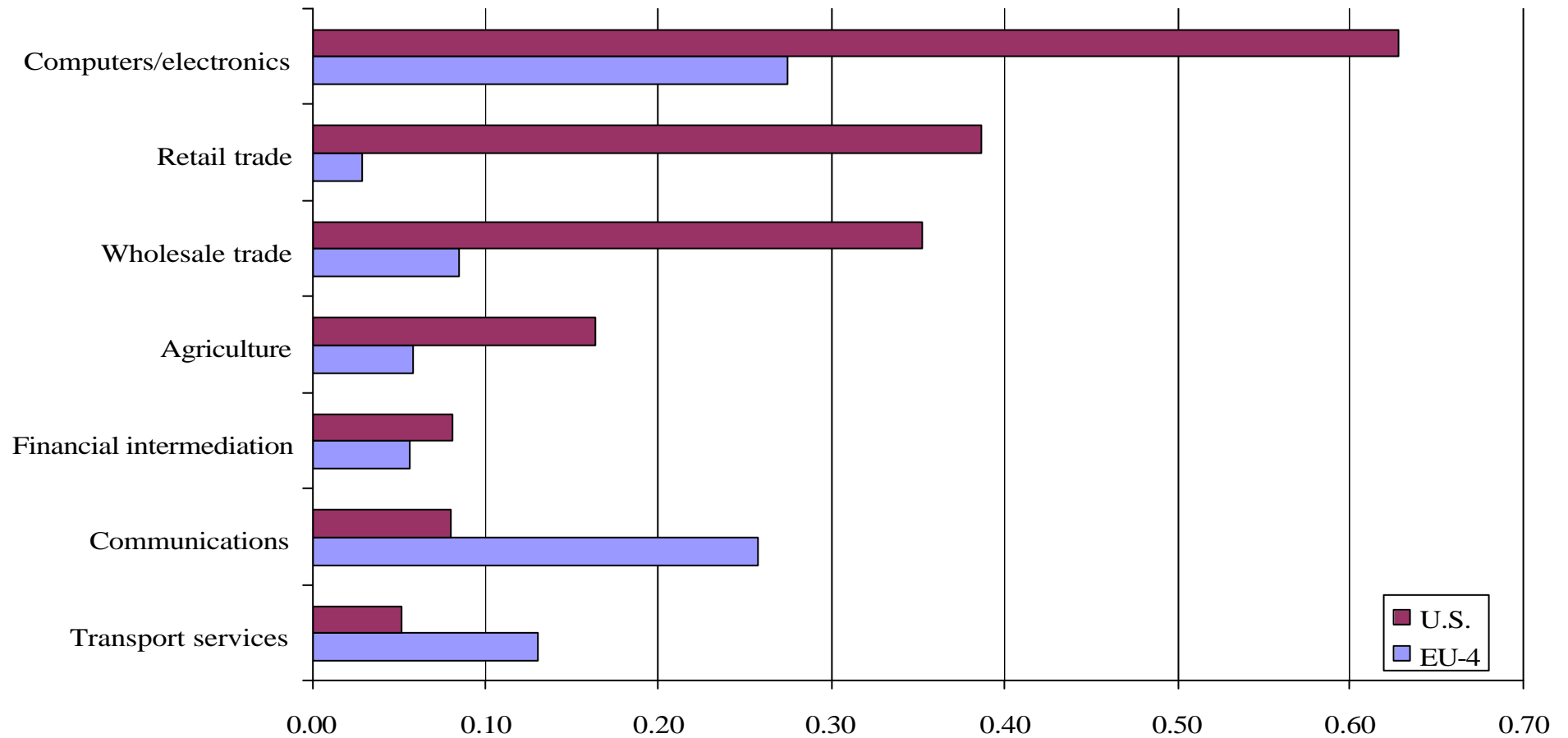
# ICT capital deepening, 1995-2000, EU-US

## Contribution to Aggregate Lab Prod Growth

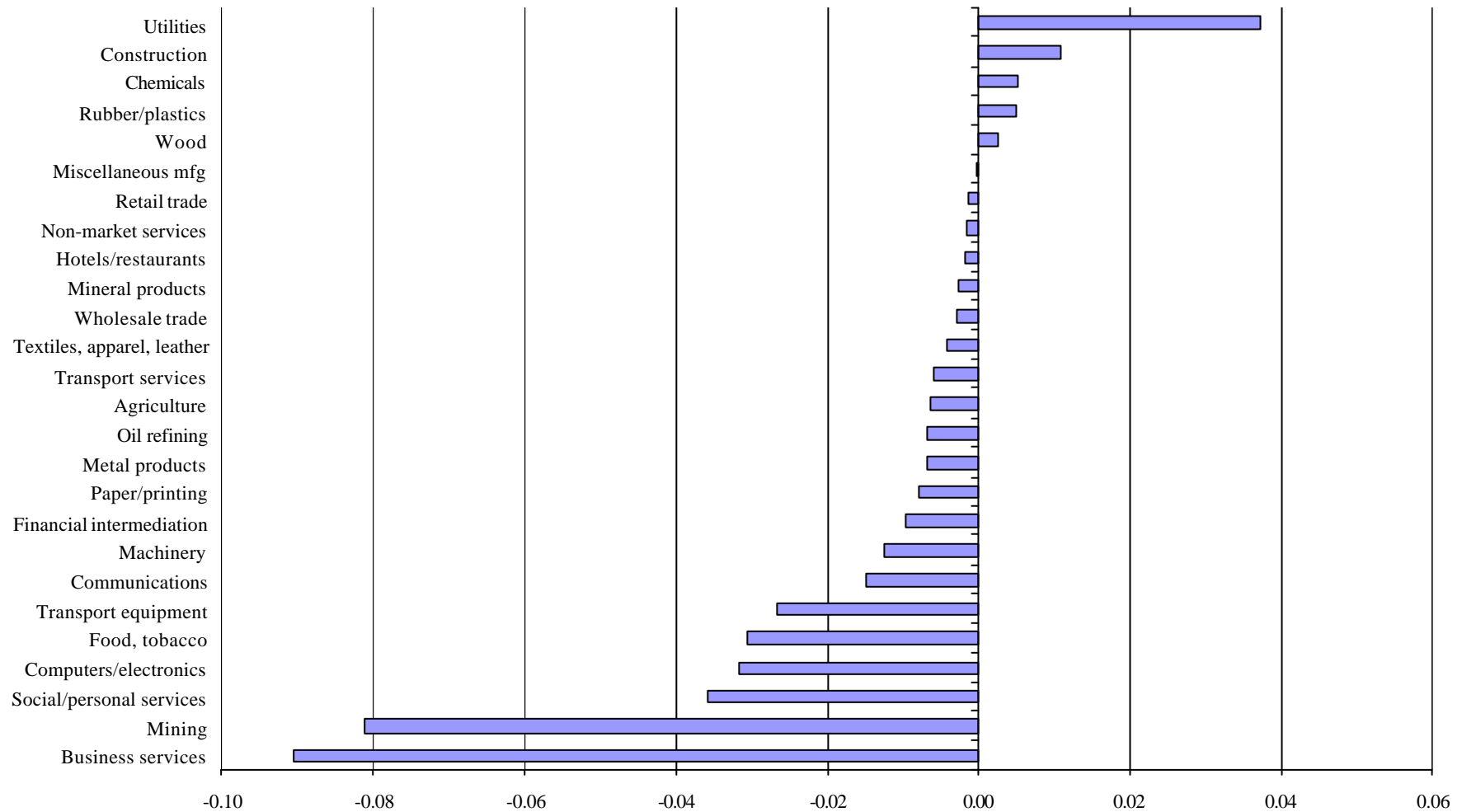


# TFP growth, 1995-2000, EU-US

## Contribution to Aggregate Lab Prod Growth



# Non-ICT Capital Deepening, EU, (95-00) minus (79-95) Contribution to Aggregate Lab Prod Growth



# Why decline in contribution of Non-ICT in E.U.?

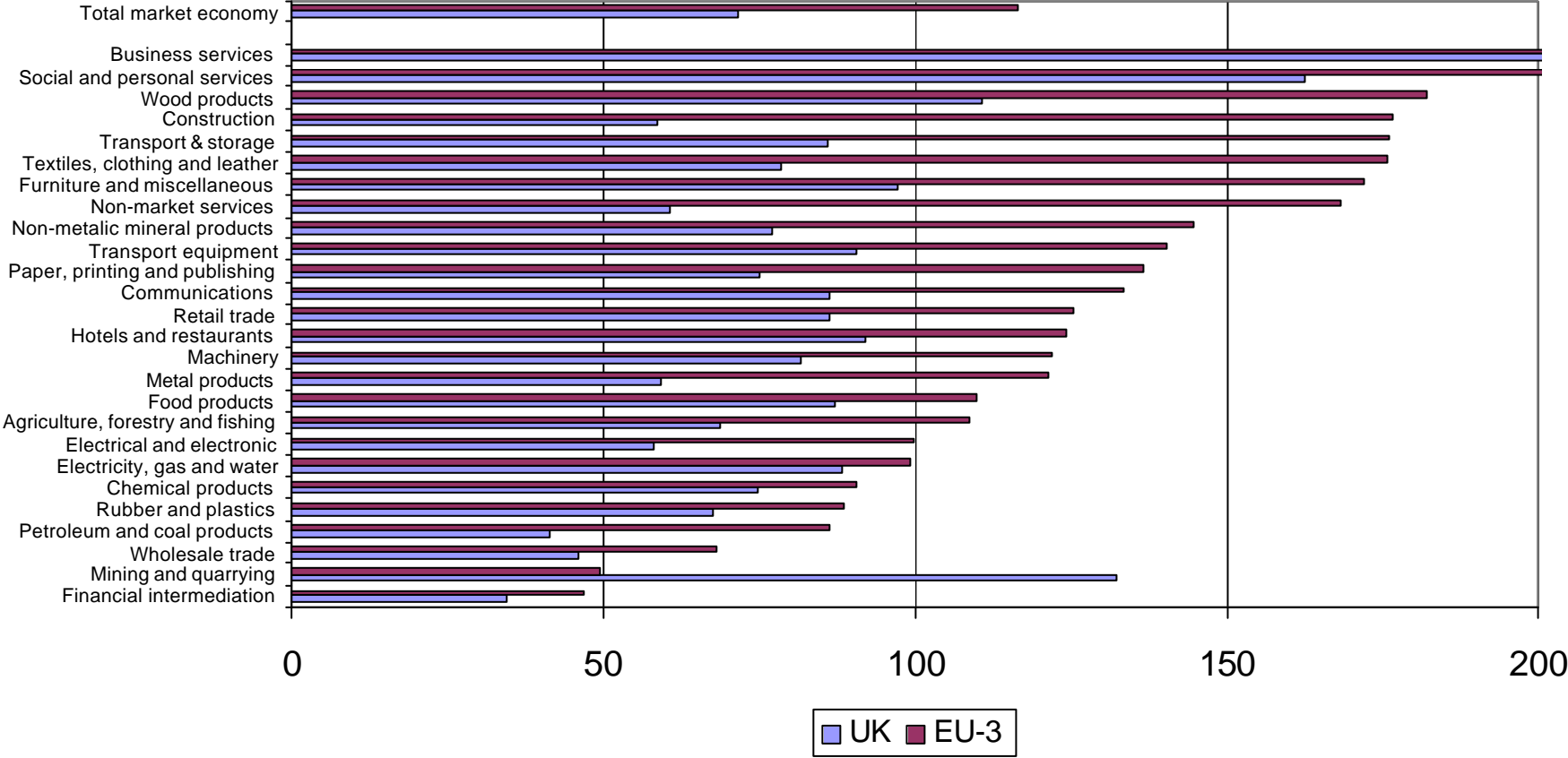
## Suspect 1: wage moderation

	1979-1995	1995-2000	Difference
<i>Non-ICT capital deepening</i>			
EU-4	2.59	0.88	-1.71
U.S.	1.46	1.79	0.33
<i>Wage/non-ICT rental rate</i>			
EU-4	1.88	0.53	-1.35
U.S.	1.27	1.46	0.19

# Why decline in contribution of Non-ICT in E.U.?

## Suspect 2: Depleted Potential

Non-ICT capital services per hour worked (US = 100), 2001



# Conclusions

- Divergence in productivity growth after 1995 between EU and U.S.
- Result of three developments: ICT-revolution, end of catch-up, wage moderation
- Contribution of ICT-using service industries much higher in U.S. than in EU, both through ICT capital deepening and TFP
- EU slowdown related to wide-spread slowdown in non-ICT capital intensity

# Further Research

- Better data
  - KLEMS: input-output tables
  - Sectoral output PPPs
  - Hours worked, worker characteristics
  - Capital accounts
  - International comparability
- Beyond growth accounting
  - Substitution & complementarity issues
  - Allow for economies of scale, imperfect competition, factor utilization etc.