PRODUCTIVITY AND POTENTIAL GROWTH IN THE US AND EUROPE

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Outline

- US productivity and potential GDP growth
  - Potential GDP growth in the US
  - Hours and aggregate productivity
  - Okun's Law
  - Productivity lessons from the BEA industry data
  - Conclusions from the US experience
- European productivity and potential GDP growth?
  - Hours and aggregate productivity
  - Productivity lessons from the country data
  - Okun's Law
  - Lessons from the industry data—EU-US comparisons*
- Competitive Intensity and Productivity Growth
  - European success stories
  - Evidence from Sweden
  - Evidence from other countries
- Conclusions on Boosting European Growth
- Concluding Thoughts

Following the meeting in Frankfurt, the EU-US comparison data was revised to reflect the EU-KLEMS data set. The results are generally similar, but differ in detail from those presented January 17, 2008.

Potential Output Growth in the US

- Potential GDP growth is the sum of trend output per hour growth and trend hours growth in non-farm business, minus an adjustment to go from NFB to GDP. Most models use production function estimates and labor supply equations—Macro Advisers, CBO.

- One way to estimate potential growth is to apply a smoothing or filtering technique to actual productivity or actual GDP (Hodrick-Prescott or Kalman).

- Another way to estimate potential GDP growth is with Okun's Law, which says that the unemployment rate will fall when actual GDP growth is faster than potential GDP growth.

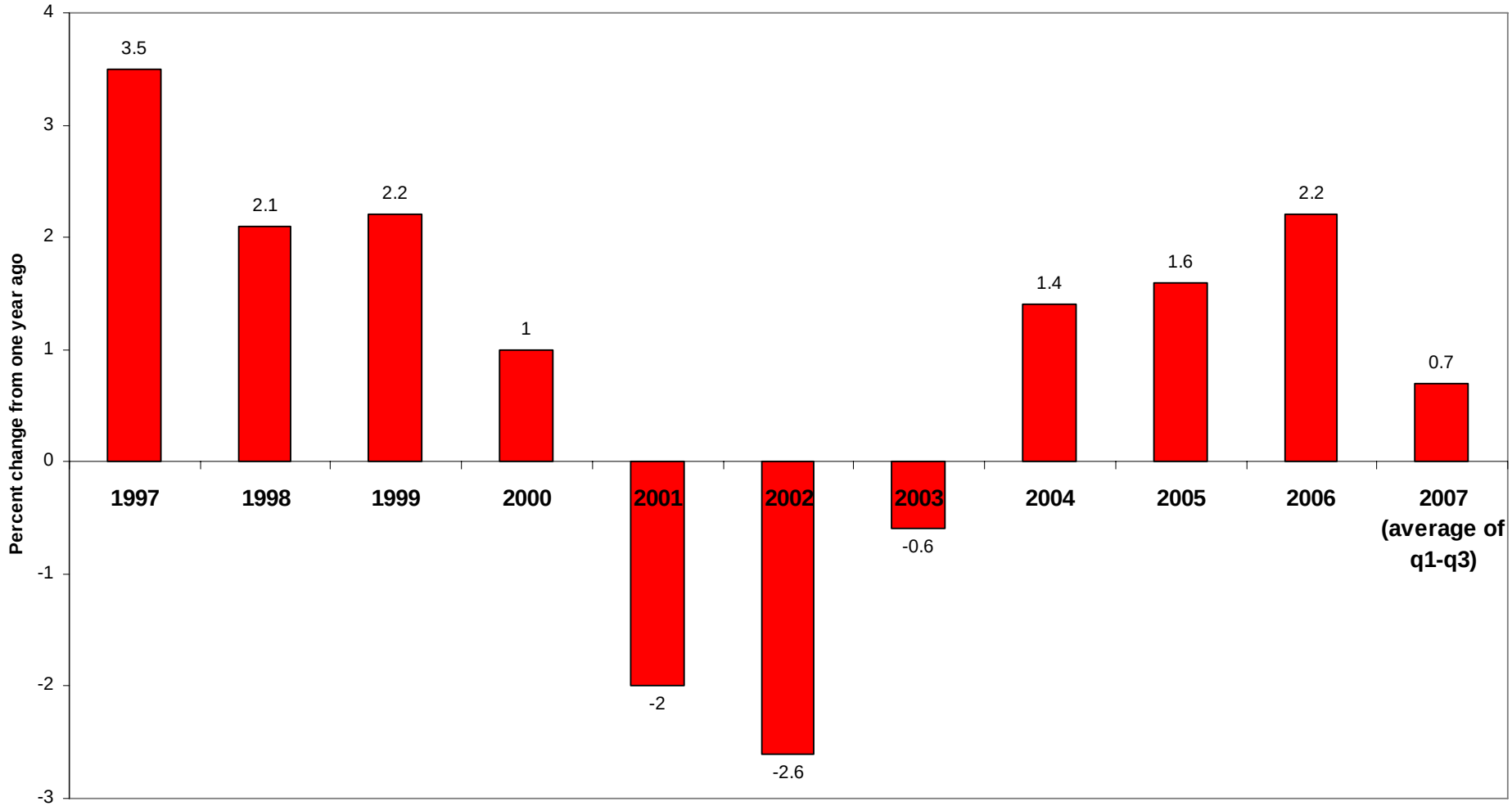
Change in unemployment = Okun coefficient x (potential GDP growth – actual GDP growth)

Currently 0.5 for the US according to Robert Gordon

Build in the effect of a time lag, one to three quarters

Hard to Estimate the Trend in NFB Hours Growth. Rapid growth in the 90s, Restructuring 2001-03. Current estimates are in the range 0.8 to 0.9

Growth of total hours worked, non-farm business

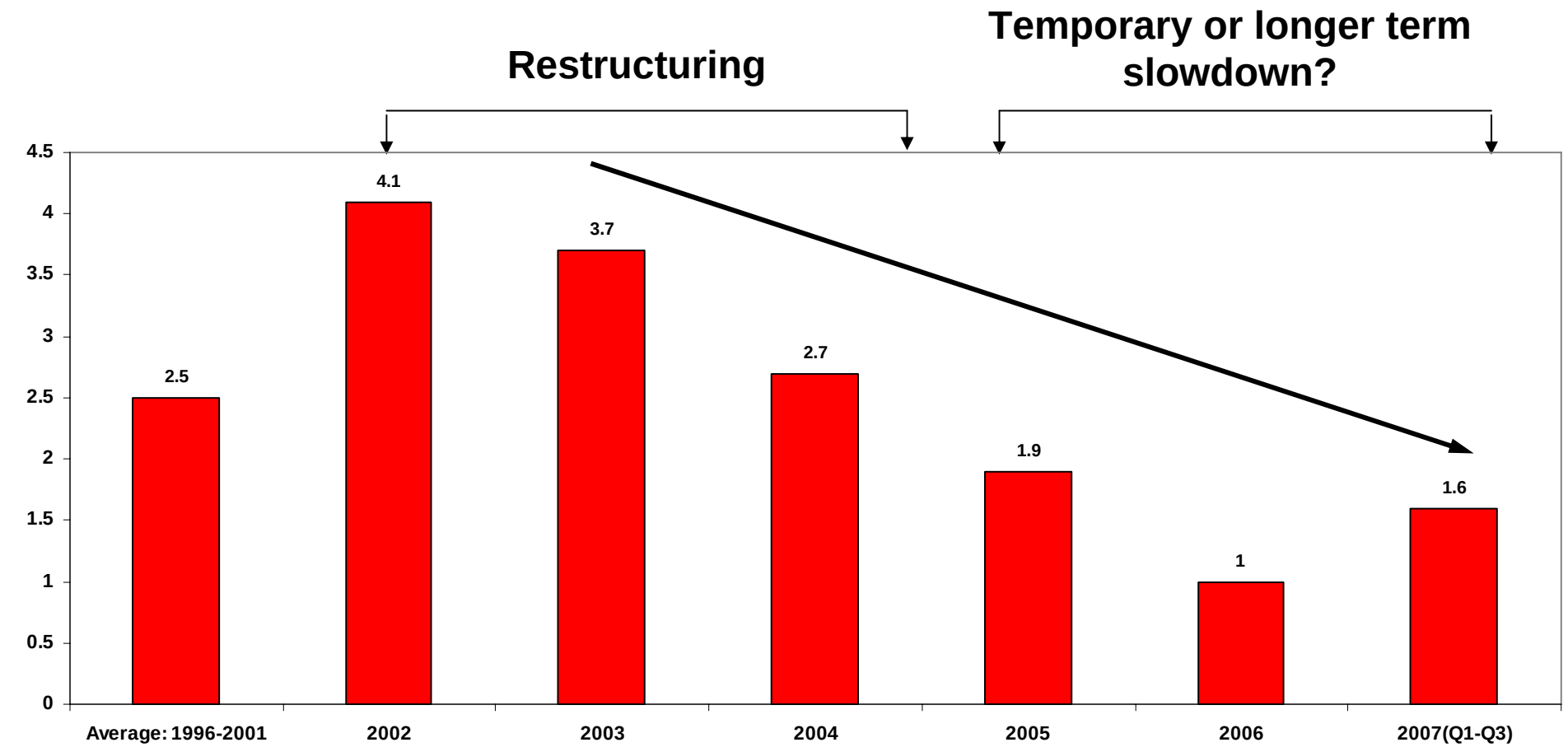


Source: Bureau of Labor Statistics

Has the US Productivity Boom Ended?

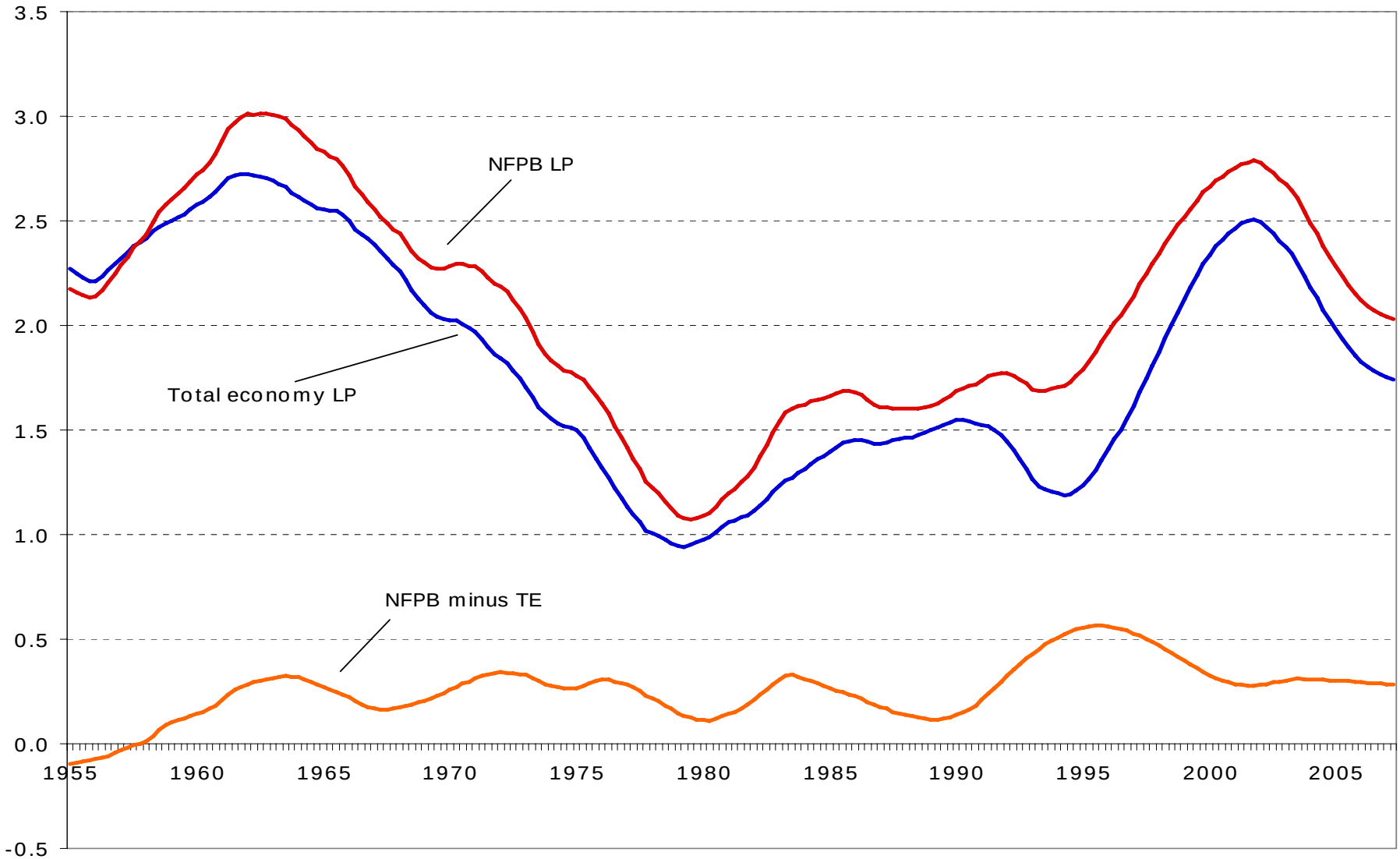
Restructuring Boosted Productivity Above Trend, Followed by Below Trend Growth

Output per hour, non-farm business, percent change from a year ago



Source: Bureau of Labor Statistics

Robert Gordon Averages H-P and Kalman. Trend of 2 percent—non farm business productivity (August 2007 estimate)



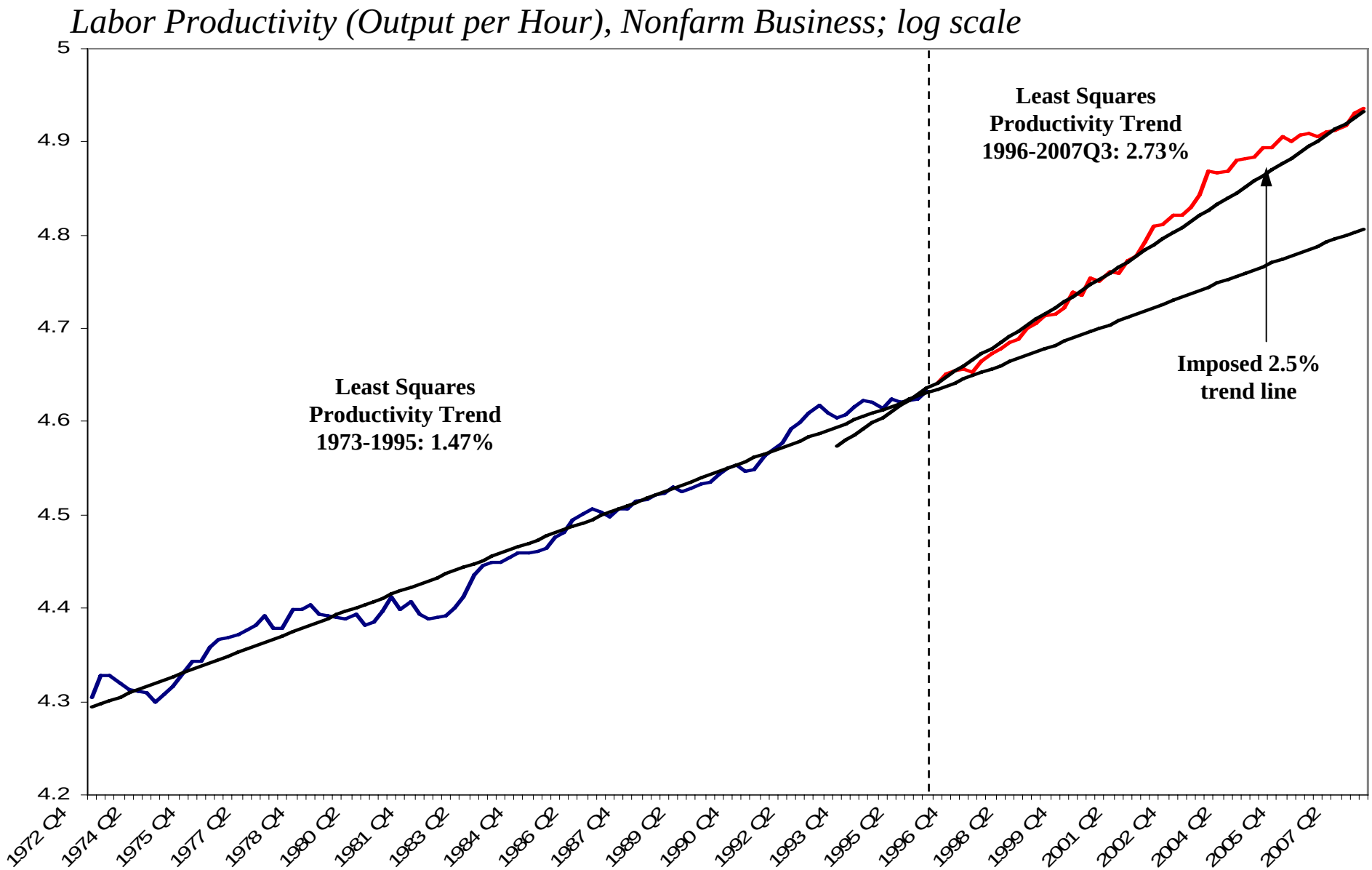
Macro Advisers and the Congressional Budget Office Now See Labor Productivity Growth Close to 2 percent.

Estimates of US Potential GDP Growth based on Productivity and Labor Force

Administration through 2013		Fall 2007 Forecast update				
Hours Worked NF Bus.		Labor Productivity NF Bus.		NF Bus. To GDP		Potential GDP
0.8	+	2.5	-	0.4	=	2.9
Macro Advisers through 2012		December 2007				
Hours Worked NF Bus.		Labor Productivity NF Bus.		NF Bus. To GDP		Potential GDP
0.9	+	2.1	-	0.4	=	2.6
CBO 2007-2012		December 2007				
Hours Worked NF Bus.		Labor Productivity NF Bus.		NF Bus. To GDP		Potential GDP
0.8	+	2.2	-	0.3	=	2.7

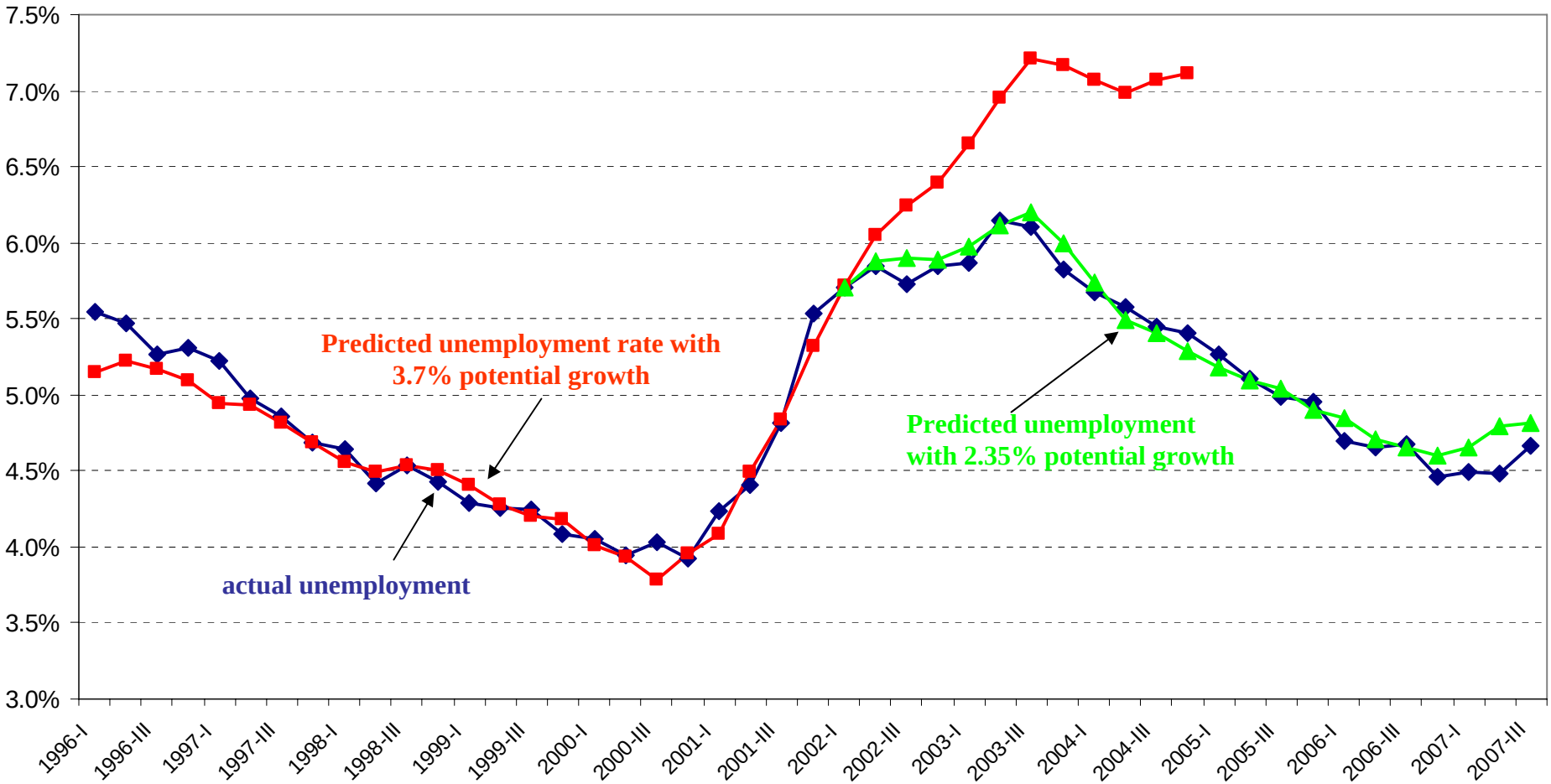
Note: Potential growth is expected to decline over time as labor force growth declines.

Slow Growth Starting in 2004Q3. A Return to a Slower Trend or Payback for the Above-Trend Growth 2001Q4-2004Q2? Trend since 95 is 2.5 to 2.75



Source: BLS Major Sectors Productivity and Costs Index

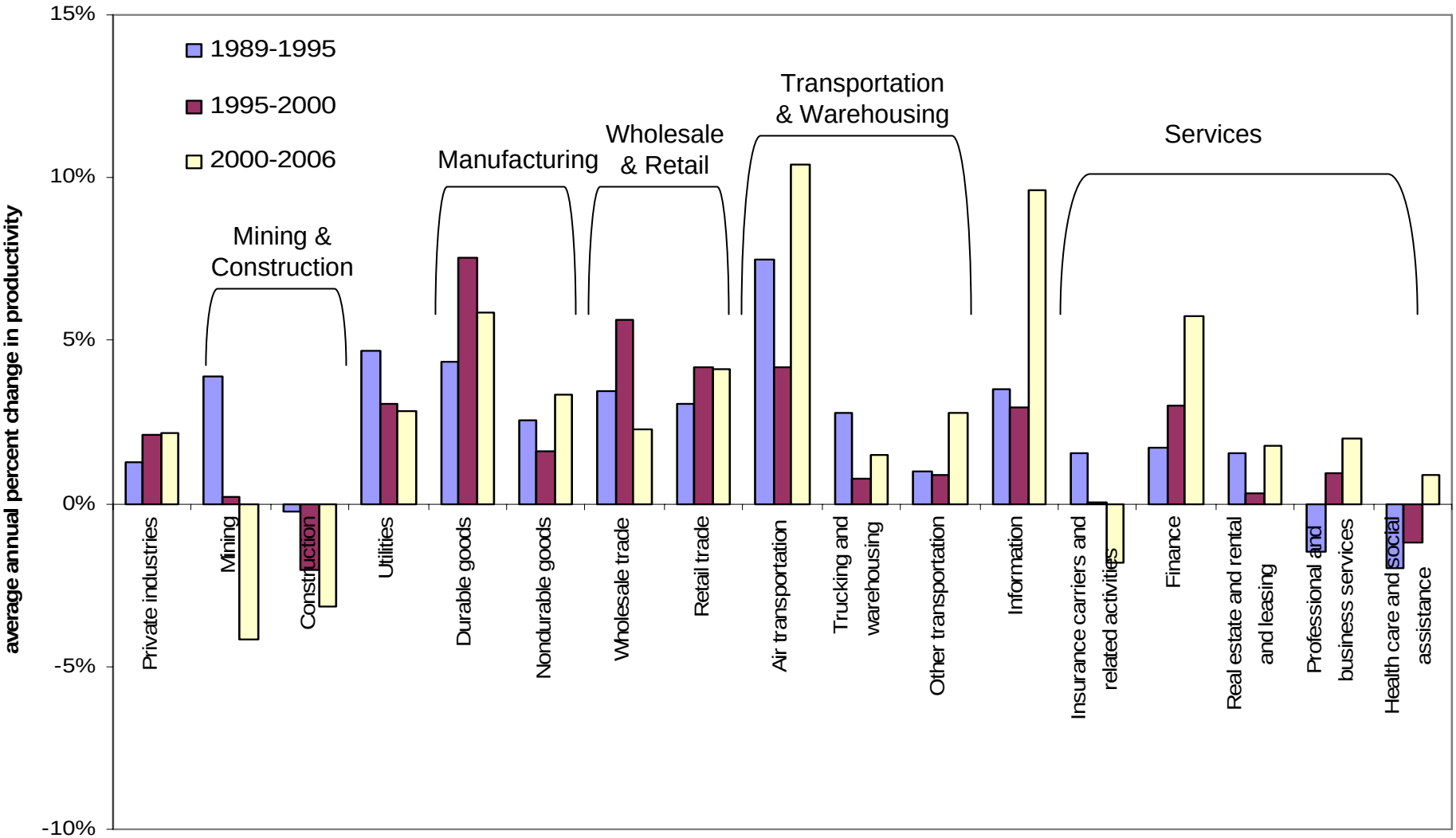
In the US, Okun's Law Suggests a Sharp Slowdown in Potential GDP Growth—A decline in hours growth, maybe productivity also. NAIRU fell in the 90s, inducing a temporary surge in potential growth that has now ended.



Sources: Bureau of Labor Statistics and Bureau of Economic Analysis, authors' analysis

Widespread Productivity Acceleration after 1995. Big Contributions from High-Tech Manufacturing, Wholesale and Retail Trade, Finance and Business Services

Productivity CAGRs by industry



Source: Bureau of Economic Analysis Data, GDP by Industry, FTPT Employment By Industry tables

Is the US Productivity Slowdown 2004-06 Caused by the Declines in Construction and Mining? About a Third of it.

Construction and Mining Make Little Difference 1989-95. They Dampen the Acceleration 1995-2004. For 2004-06 there is a 78 basis point decline with these industries and 55 basis points without them.

Productivity CAGRs:

Sector		1989-1995	1995-2004	2004-2006
Total nonfarm private		1.32	2.34	1.56
Nonfarm Private less construction and mining		1.38	2.66	2.11
Nonfarm Private minus construction		1.39	2. 57	2.04
Nonfarm Private minus mining		1.31	2.42	1.62

Source: BEA, author's calculations

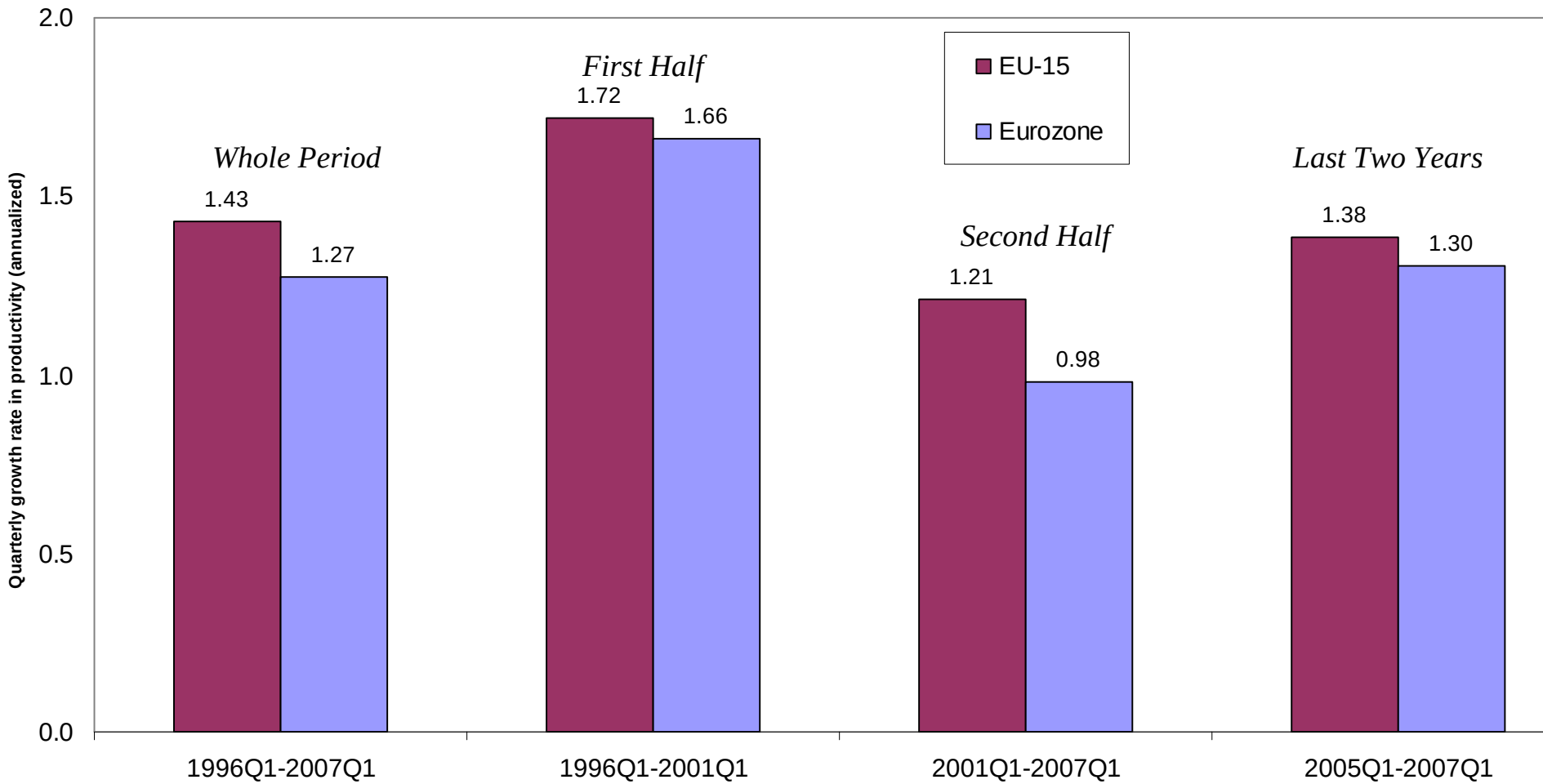
Note: Construction output fell 1.9 percent at an annual rate from 2006Q4-2007Q3. Hours worked in Construction fell 1.5 percent, so the productivity weakness has not been great. Non-residential construction output has grown strongly, offsetting residential.

Conclusions on the US

- Evidence from a variety of industry and aggregate studies shows that the combination of a strong competitive environment and business and technological opportunities generate rapid productivity growth. Those conditions prevailed in the US in the 1990s and the early years of this century.
- The competitive environment is still strong today, but it is not clear yet if the productivity opportunities remain as available. The trend of labor productivity in non-farm business is likely 2 to 2½ percent.
- Rapid labor force growth and a one-time fall in the NAIRU added to the growth potential of the US economy in the 1990s. That has changed with an aging population and slowing labor force growth. Potential GDP growth of 2½ to 2¾ percent.
- The pattern of industry productivity growth is consistent with the first point above. Industries with strong competition and opportunities for improvement.
- The US has regulatory challenges in several industries including mortgage banking, telecom and utilities.

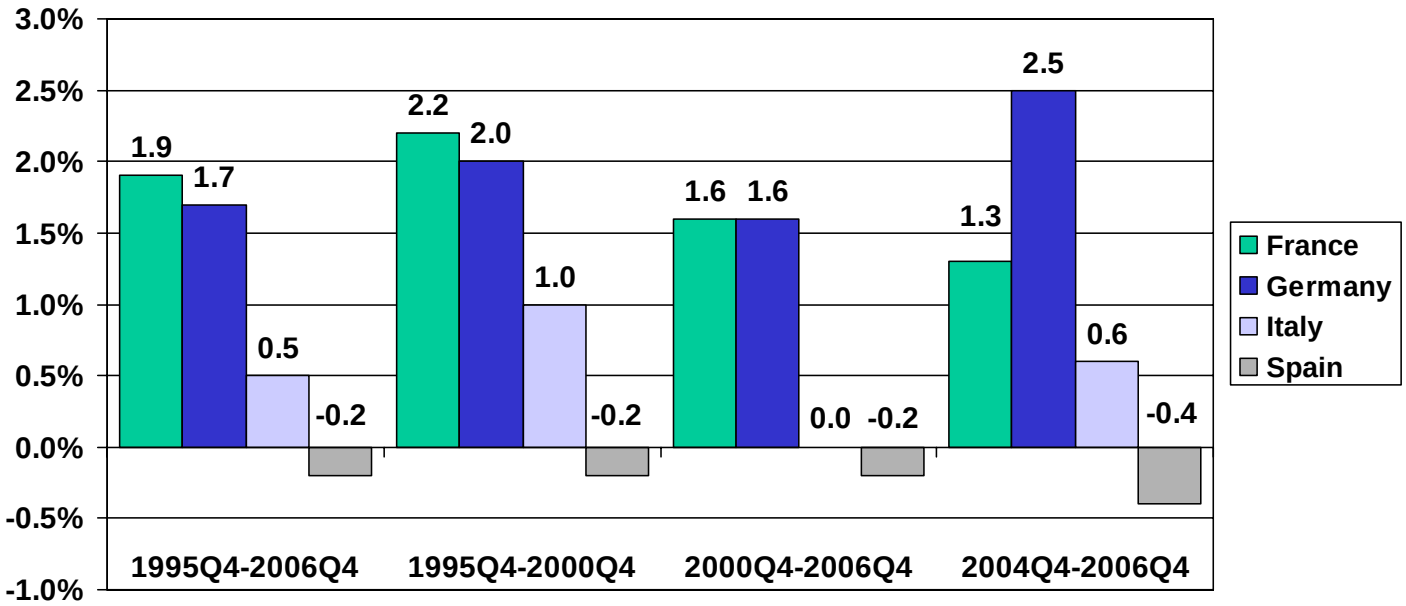
Europe: Aggregate Productivity Growth Has Slowed. The First Half of the Period Saw Faster Growth than the Second.

Productivity Growth in the EU-15 and Eurozone (GDP per hour)



Source: European Central Bank, Groningen database, authors' calculations

There Are Substantial Differences in Productivity Growth Among the Big Four Eurozone Economies

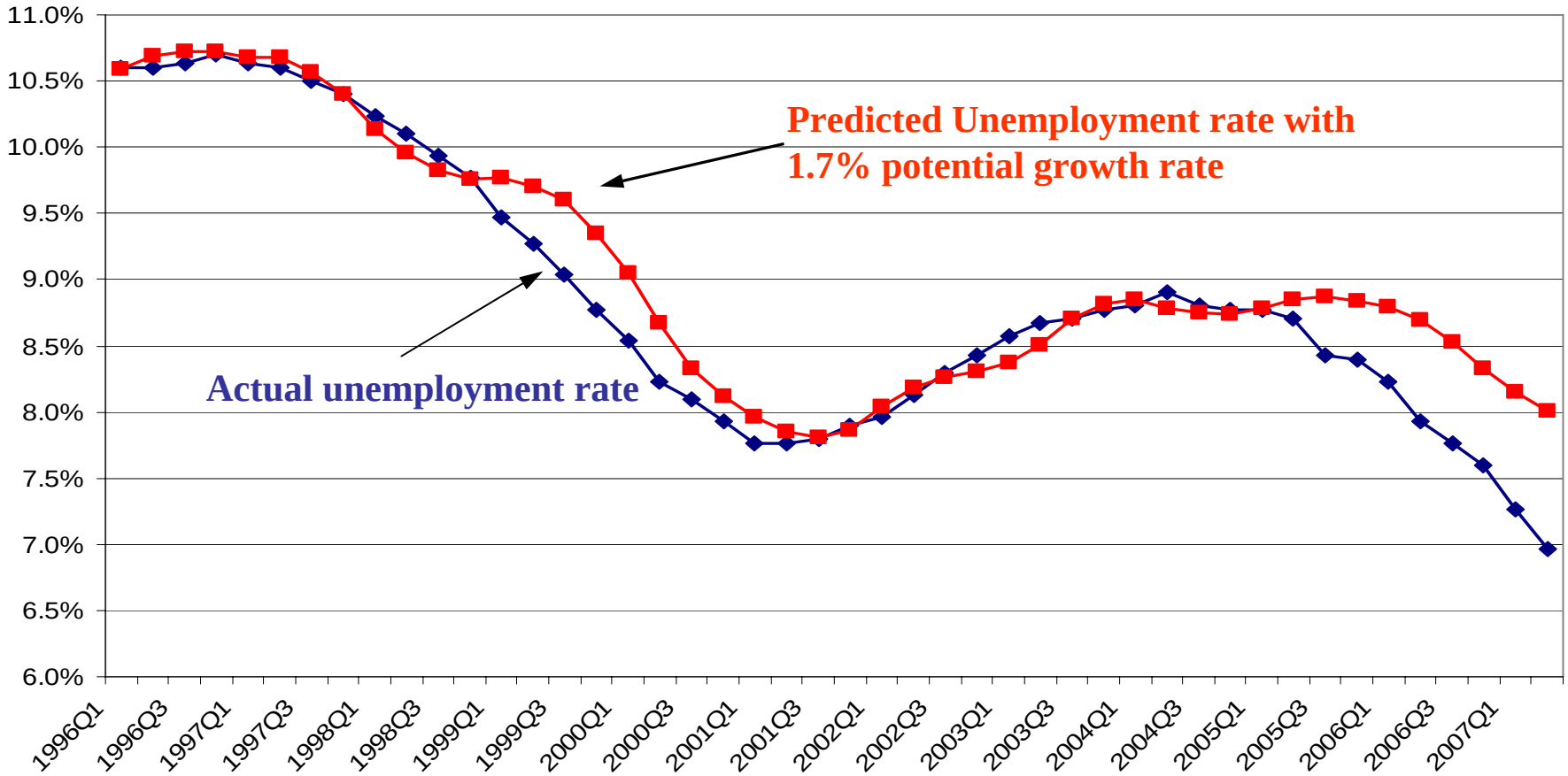


Source: European Central Bank

- Productivity performance much better in France and Germany. Higher level, faster growth. Substantial restructuring in German manufacturing in the past few years;
- France, Germany and Italy all see slower growth after 2000, especially Italy. All three go off track on Okun's Law;
- Spain: lowest level and slow decline the entire period. Rapid employment growth of lower-skilled workers.

The Good News is that European Unemployment is Falling Rapidly—Fewer out of work. The Bad News is that European Unemployment is falling rapidly—suggests slow potential GDP growth. Okun's law indicates Eurozone potential GDP growth of 1.7 percent, with a possible decline since 2005

The best fit for the full period is with an Okun coefficient of 0.5 (same as US) and potential growth of 1.7 percent



Source: Eurostat, Author's Calculations

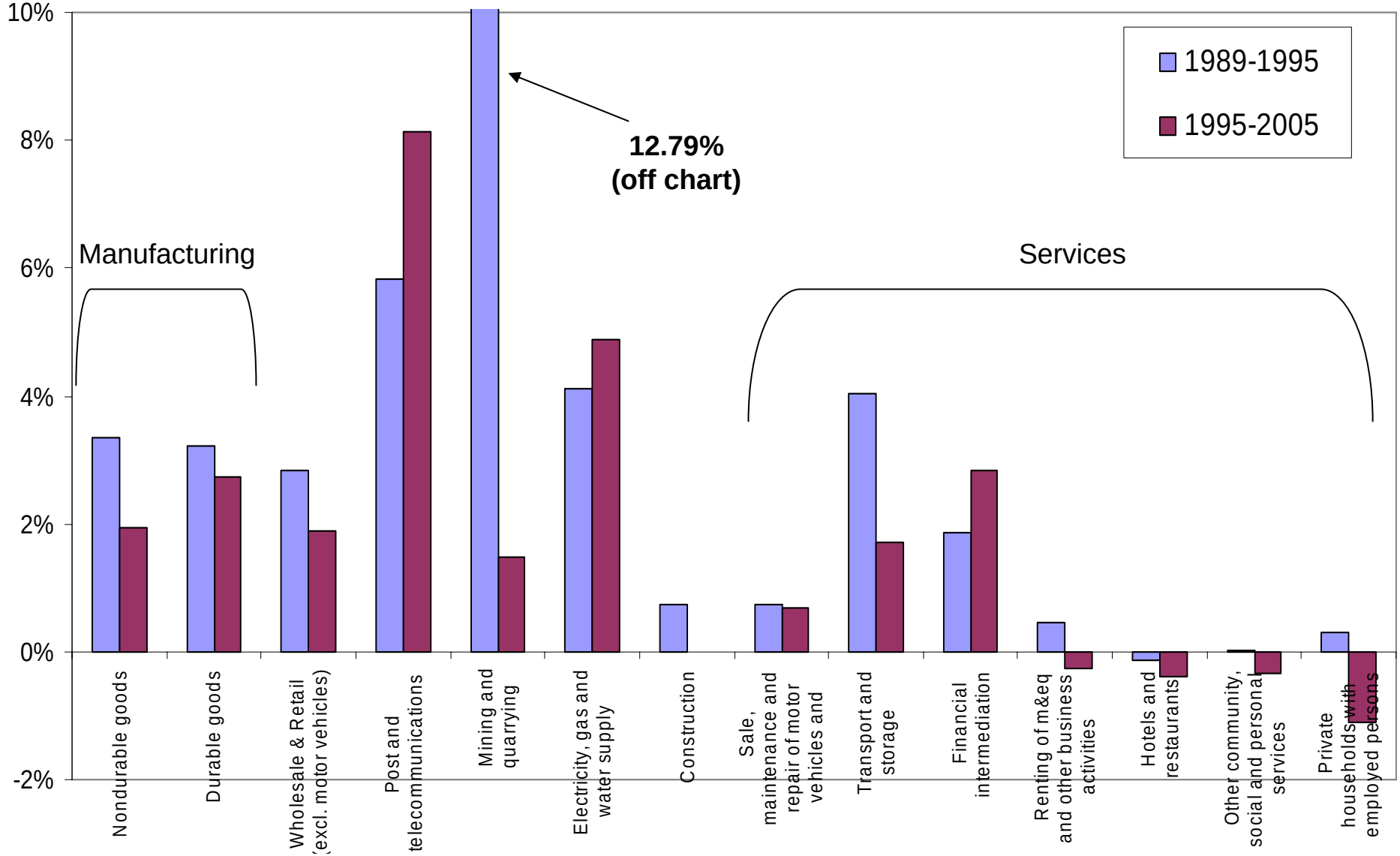
Industry Data from KLEMS Database Allow Comparisons of Private Sector Growth and Industry Growth Rates and Contributions

	Aggregate Non-Farm Private Productivity Growth: 1995-2005
USA	2.342%
EU-15	1.204%
France	1.568%
Germany	1.062%
Italy	0.001%
Spain	0.065%
UK	1.980%

Source: EU KLEMS data

EU-15 Productivity Growth by Industry. Strength in utilities and telecom. Weakness in services

Productivity CAGRs by Industry: EU-15



Source: EU KLEMS data

Industry Productivity Growth Rates In the EU-15 and the US (Slide 20)

Key Message: **The Majority of Industries Grew Faster in the US**

- **For high-tech production, growth rates in EU and US are very fast, driven by declining prices. We have excluded this industry from chart because it changes the scale and makes it hard to see what is happening in the other industries.***
- **Excluding high-tech, the correlation in industry growth rates across the two regions is quite weak. Growth in each industry depends on whether it is catching-up and on whether opportunities are taken, not on intrinsic industry characteristics (except for high-tech).**
- **For the majority of industries US productivity growth rates were faster than in the EU (below the 45 degree line**). The gaps were more pronounced in services. Major exceptions are telecom and utilities, where EU growth has been rapid.**
- **Construction productivity in the US dragged down its total growth. The industry uses more manufactured products, leaving lower value added activities classified as construction. There has been a shift towards lower-wage, lower-skill labor. Spain and the US both had residential construction booms and productivity declines.**

* This is a sector where the definition changed between the Groningen dataset and the KLEMS. The narrower industry segment in the Groningen data had much faster growth at rates that were similar in the two regions. In the KLEMS data the growth rate is 17.6% in the US and 5.6% in the EU, but this comes from the higher US share of computer/semicon.

**The vertical and horizontal axes are scaled differently in the charts, so the lines are not literally 45 degrees.

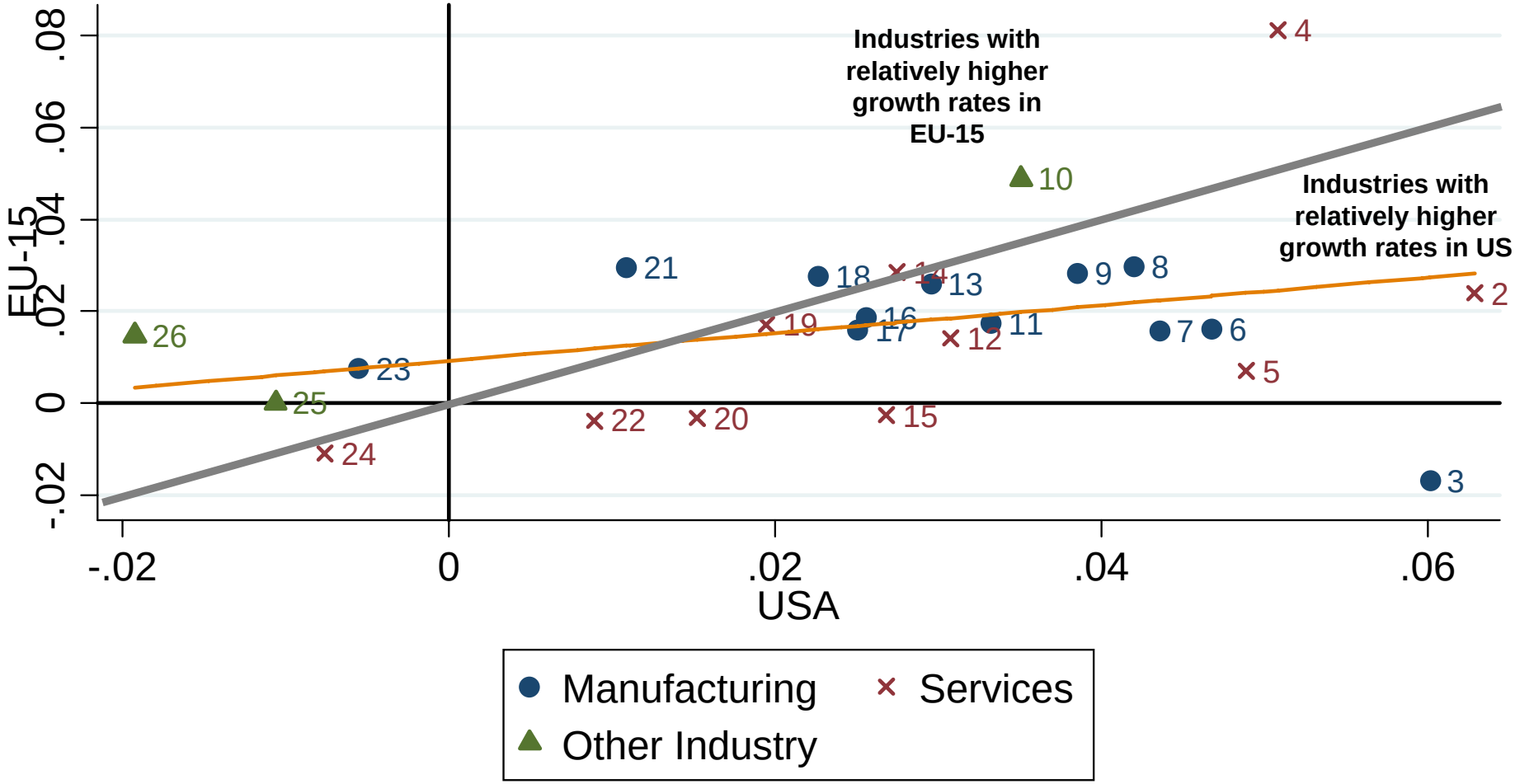
Legend

1. Electrical and optical equipment
2. Wholesale trade and commission trade, except of motor vehicles and motorcycles
3. Coke, refined petroleum products and nuclear fuel
4. Post and telecommunications
5. Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel
6. Textiles, textile products, leather and footwear
7. Manufacturing nec; recycling
8. Rubber and plastics products
9. Chemicals and chemical products
10. Electricity, gas and water supply
11. Machinery, nec
12. Retail trade, except of motor vehicles and motorcycles; repair of household goods
13. Transport equipment
14. Financial intermediation
15. Renting of m&eq and other business activities
16. Pulp, paper, paper products, printing and publishing
17. Basic metals and fabricated metal products
18. Other non-metallic mineral products
19. Transport and storage
20. Other community, social and personal services
21. Wood and products of wood and cork
22. Hotels and restaurants
23. Food products, beverages and tobacco
24. Private households with employed persons
25. Construction
26. Mining and quarrying

EU-15 and US: Industry productivity growth rates (percentages)

without Electrical and Optical Equipment

correlation coefficient = 0.32



*points labeled as 'rank of industry productivity growth in US from 1995-2003'

Source: EU KLEMS data

Productivity Contributions (Slides 22 and 23). Key Message: Big Contributions in the US from Large Service Industries

- For many smaller industries the contributions to growth differed little between the two regions.
- The contribution of high-tech manufacturing is higher in the US because the share of the computer and semiconductor segments are much larger.
- Large service industries such as wholesale trade, retail trade, finance and insurance, and business services grew faster and have bigger shares in the US, so they make larger growth contributions.
- Construction made a negative contribution to US productivity growth but was neutral in the EU.
- Post and telecommunications contributed more to growth in the EU as the segment was privatized and faced higher competition.

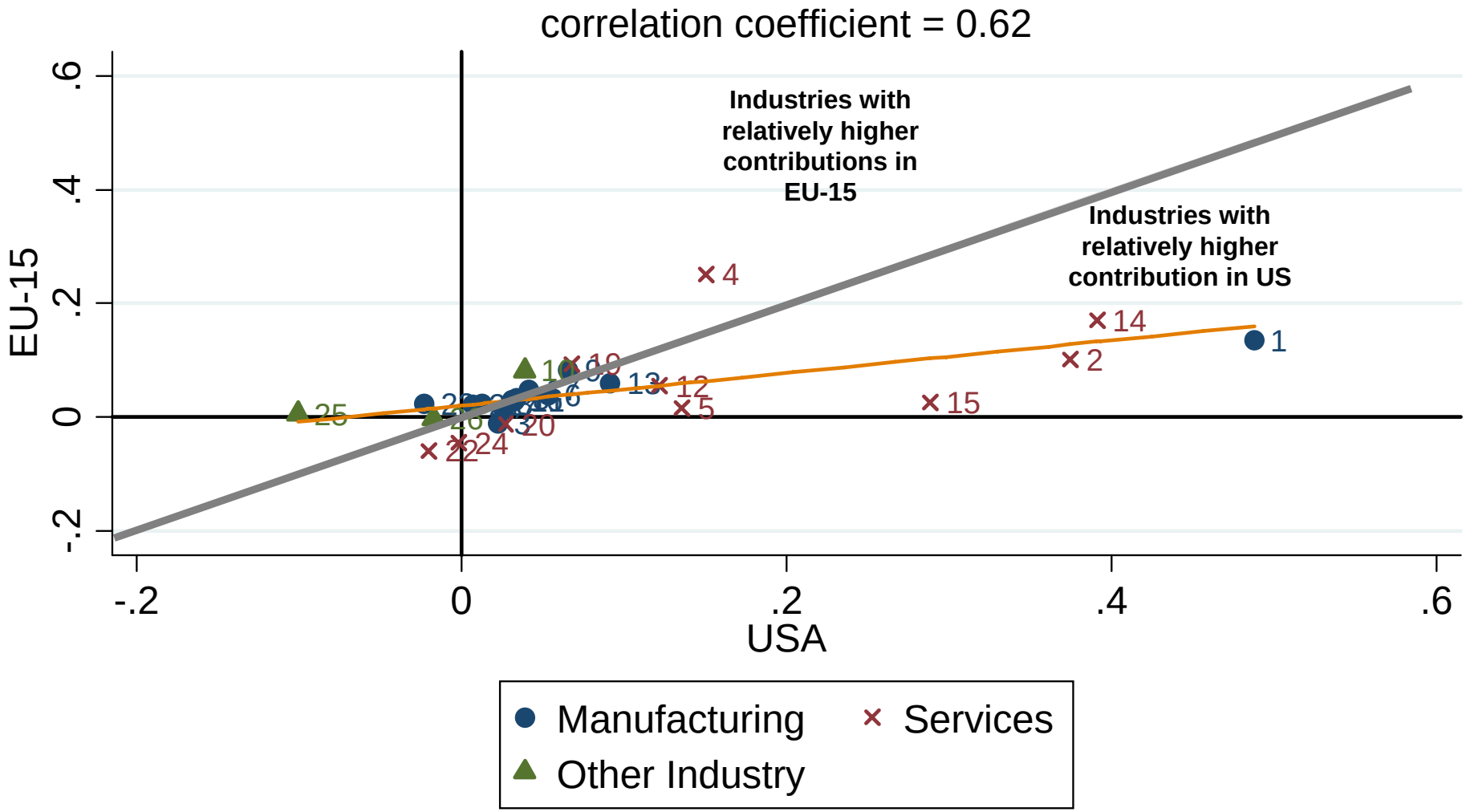
Which Industries Account for EU-US Productivity Growth Differential 1995-2005? Answer: High-tech and Services

Contribution to Output per Hour Growth by Industry

	USA	EU-15	Difference	Industry type	Growth or share?
Electrical and optical equipment	0.488%	0.134%	0.354%	M	Growth
Wholesale trade and commission trade, except of motor vehicles and motorcycles	0.375%	0.101%	0.274%	S	Both
Renting of m&eq and other business activities	0.288%	0.026%	0.263%	S	Share
Financial intermediation	0.391%	0.170%	0.221%	S	Share
Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel	0.135%	0.016%	0.119%	S	Growth
Retail trade, except of motor vehicles and motorcycles; repair of household goods	0.121%	0.055%	0.066%	S	Both
Post and telecommunications	0.150%	0.251%	-0.101%	S	Growth
Construction	-0.101%	0.005%	-0.106%	OI	Growth
Other Industries	0.547%	0.580%	-0.033%	n.a.	n.a.
Total output per hour growth*	2.342%	1.204%	1.138%	n.a	n.a.

***** Non-farm private sector

EU-15 and US: Relative industry contributions To total nonfarm private productivity (percentages)



*points labeled as 'rank of productivity growth rate in US from 1995-2003'

Source: EU KLEMS data

Similarities and Differences by Country (See Appendix for details on the Largest EU Economies)

- High tech contributes much less in all the countries.
- Spain and Italy had weak growth across the board.
- France and Germany have smaller productivity contributions from service industries.
- Productivity growth in the UK comparable to the US, on average, except for the greater contribution of high-tech in the US.

European Successes Show that Reform Can Boost Productivity

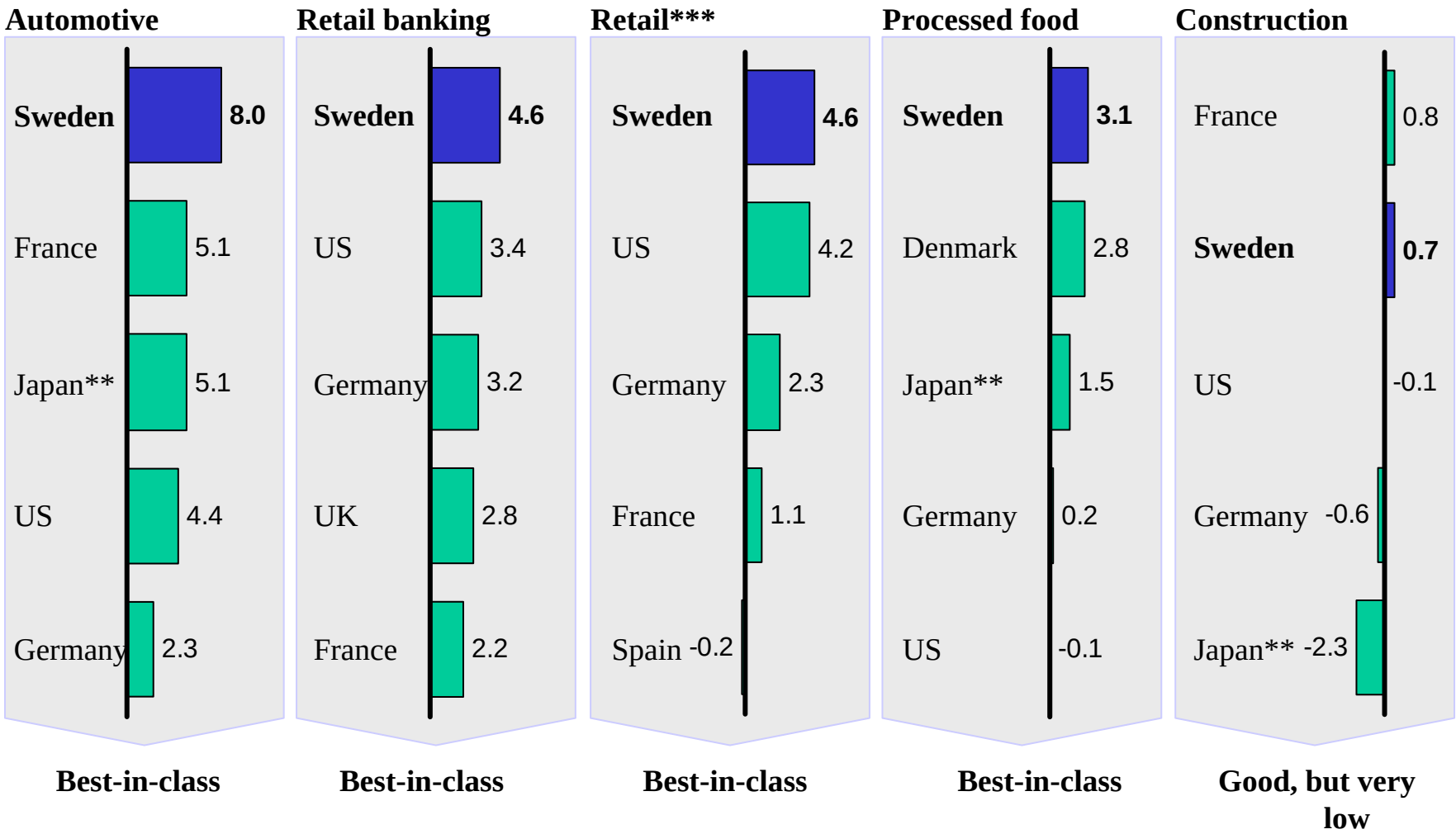
- **Mobile telephony is a new industry that developed in a competitive, flexible and well-regulated environment. Labor productivity in France was twice the US level in 2000.***
- **Competition and privatization in electric power have boosted productivity growth in Germany and the UK. Regulatory pitfalls in the industry are clear. ***
- **The auto industry in France was largely privatized, and has restructured, allowing it to catch up to the German level.***
- **The Single Market increased competition and caused intra-EU trade to surge and tradables prices to converge.**
- **Sweden is a good example where market liberalization resulted in stronger productivity growth…..**

***McKinsey Global Institute**

Swedish productivity growth has been very strong in industries where competition has increased

Percent CAGR *

McKinsey Sweden and McKinsey Global Institute



*1993–2003 for Automotive Sweden. 1995–2002 for retail banking. 1990-2003 for Processed food , Retail and Construction

**The most recent Groningen productivity data for Japan is from 2002

*** The US has the highest productivity growth if the wholesale industry is included

Source: Groningen productivity database, February 2005, October 2005; MGI/EFIC; McKinsey analysis

Other countries also support the case for liberalization to increase competitive intensity

- With a lag, the UK has moved from a weak economy to a relatively strong economy after privatization and liberalization.
- Australia: “Increasing competition was the driver” of Australia’s improved productivity performance. Ross Garnault of Australian National University.
- China is becoming one of the largest economies in the world following its move to market liberalization.
- India’s off-shoring industry developed without extensive regulation (unlike the rest of the economy) and is fueling stronger growth.

Conclusions on Boosting Growth in Europe

- Demographic change will result in a slowing of labor force growth or even a decline. Important to improve work incentives while preserving a reasonable safety net. A more flexible labor market is essential to productivity increase and job creation.
- Take advantage of existing opportunities to increase productivity:
  - Increase competitive intensity, especially in services
  - Allow industry structures to evolve, more productive companies expand and less productive ones decline. Do not prop up weak performers.
  - Most productivity growth comes from the diffusion of existing innovation
- Create new opportunities to increase productivity—and jobs:
  - Many new firms start in Europe, but subsequent growth is slow. What are the barriers? Land restrictions, regulations, labor market constraints.
  - Business process and product innovation is the source of new growth opportunities. Funding R&D may help, but is no guarantee.

Concluding Thoughts

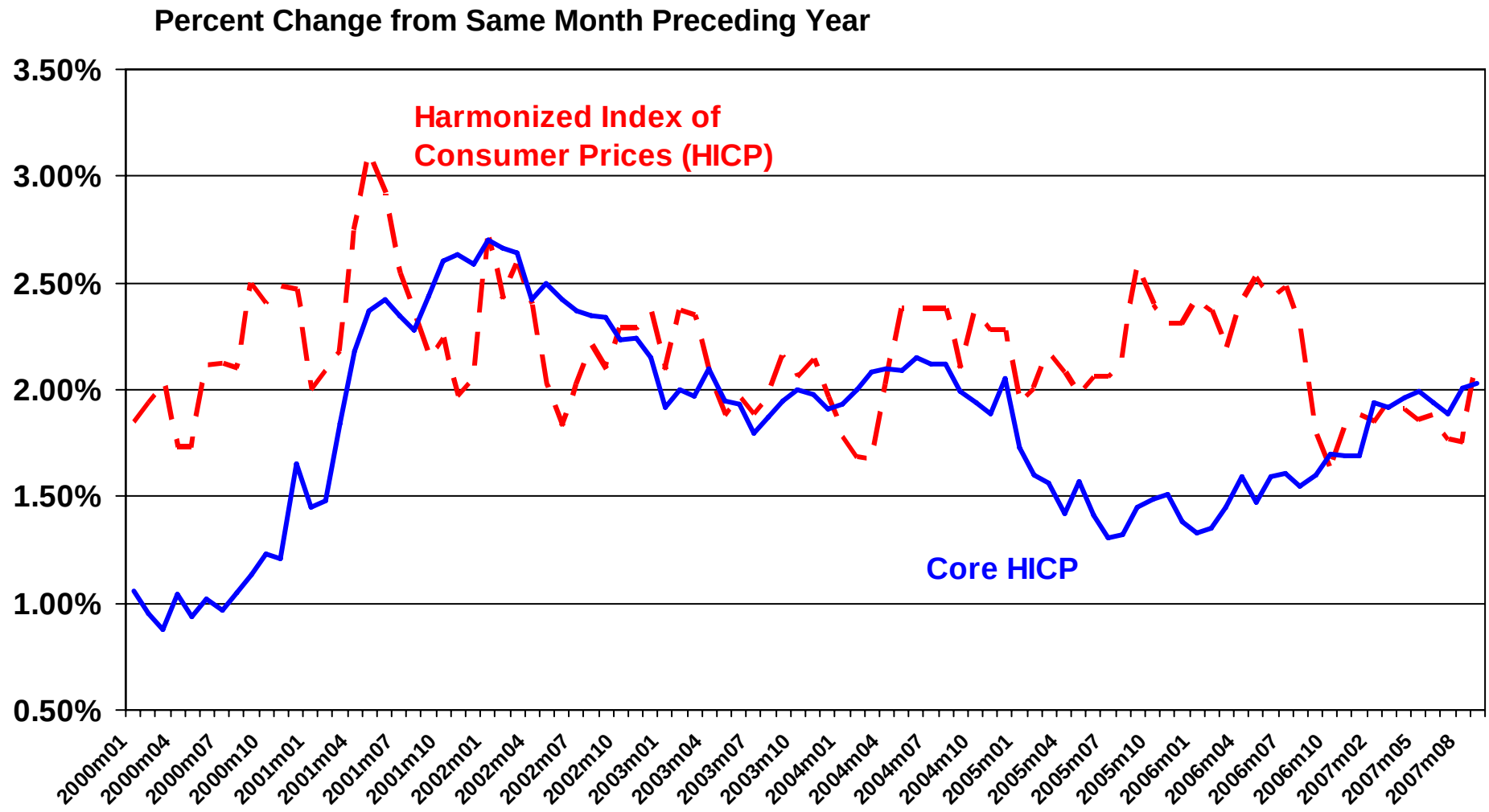
- Over the past thirty years, deregulation, new technologies and the expansion of international trade and investment have increased competitive intensity in the US.
- The US has allowed these market forces to play out more strongly than has Europe. More benefits and perhaps more costs. There has been a widening of the already-wide income distribution.
- The tough policy issue for the US is what to do about this: preserve the benefits of a dynamic economy while making sure those benefits are spread widely. Universal health care, better access to training and education, redistribution of income are all possible approaches.
- The current cyclical upturn in Europe is very welcome, as is the drop in unemployment. So far, however, there is not clear evidence of an improvement in trend growth, suggesting that growth will slow going forward.
- The tough policy issue for many European economies is how to respond to changing market forces. It is impossible to avoid their impact in the long run, so policies must facilitate change and competition and not try to prevent it.

Appendix Summary

- Slides 31 and 32. One possible explanation for the Okun's law charts is that the NAIRU has changed. Evidence for this and implications.
- Slide 32 Methodological note
- Slides 35 to the end repeat slides 20 and 23 for the largest EU-15 economies relative to the US.

Any Sign of a Decline in the NAIRU? Maybe.

The Core Rate of Inflation Rises Once Unemployment Drops Below 8 ½ to 8 percent—both in 2001 and 2006. But the acceleration is much less steep in the current episode.



Source: European Commission

What Happens if the NAIRU Changes?

- If a decline in the NAIRU involves shifting workers from unemployment to employment, this will generate a one-time or temporary increase in potential output growth.
- In principle, the Okun's law relation should stay on track in this case. The one-time rise in potential GDP exactly offsets the decline in the NAIRU.
- If the decline in the NAIRU involves shifting workers from unemployment to out of the labor force, then this would predict a decline in the unemployment rate but no change in potential output growth. This could explain the pattern in Europe, but does not seem consistent with the strong labor force growth.
- On balance the aggregate data do not support the hypothesis that there has been a structural increase in productivity growth in the Eurozone. If anything, there may have been a modest decline.
- The mix of jobs and workers may be playing a role. France has a very high level of GDP per hour, but has very low employment, especially of low-skill workers. Spain has seen massive increases in employment, with very high immigration, mostly of low-skill workers. Expanding employment opportunities for lower-skilled workers in Europe is a good thing, even if it depresses average labor productivity for a while.

Methodological Note

- Industry productivity growth rates are simply measured as the growth rate of Real Value-Added per Full-Time/Part-Time Employee (BEA data) or Hour Worked (GGDC data).
- Contributions to total nonfarm productivity is calculated using a model developed by McKinsey Global Institute (MGI) where:

$$\text{Contribution of industry } i \text{ to aggregate prod. growth} \approx \left(\text{Contribution of industry } i \text{ to Real VA growth} - \text{Contribution of industry } i \text{ to employment growth} \right) \times \frac{\text{Agg. Employment in Period1}}{\text{Agg. Employment in Period2}}$$

And "Contribution to industry *i* to Real VA growth" is calculated using the following formula developed by BEA (1999) in "A Preview of the 1999 Comprehensive Revision of the National Income and Product Accounts":

$$\frac{100 * ((p_{it}/(P^F_t) + p_{i,t-1}) * (q_{i,t} - q_{i;t-1})}{\sum_j ((p_{j;t}/P^F_t) + p_{j;t-1}) * q_{j;t-1}}$$

Where: P^F_t is the Fisher price index for the aggregate in period t relative to period $t - 1$;

$p_{i;t}$ is the price of component i in period t; and

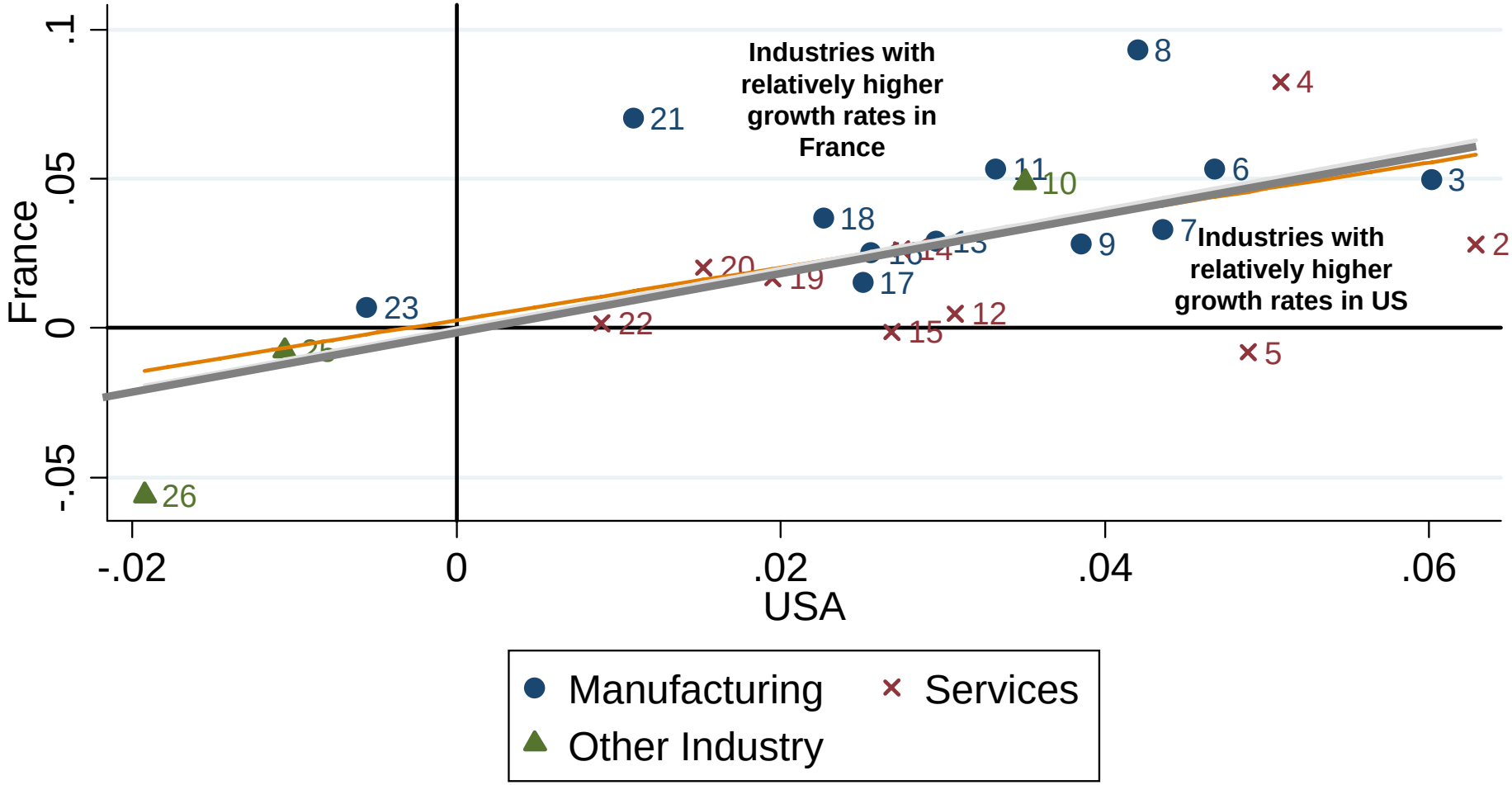
$q_{i;t}$ is the quantity of component i in period t.

Relative Industry Productivity Growth Rates for Individual EU-15 Countries

France and US: Industry productivity growth comparisons

without Electrical and Optical Equipment

correlation coefficient = 0.59



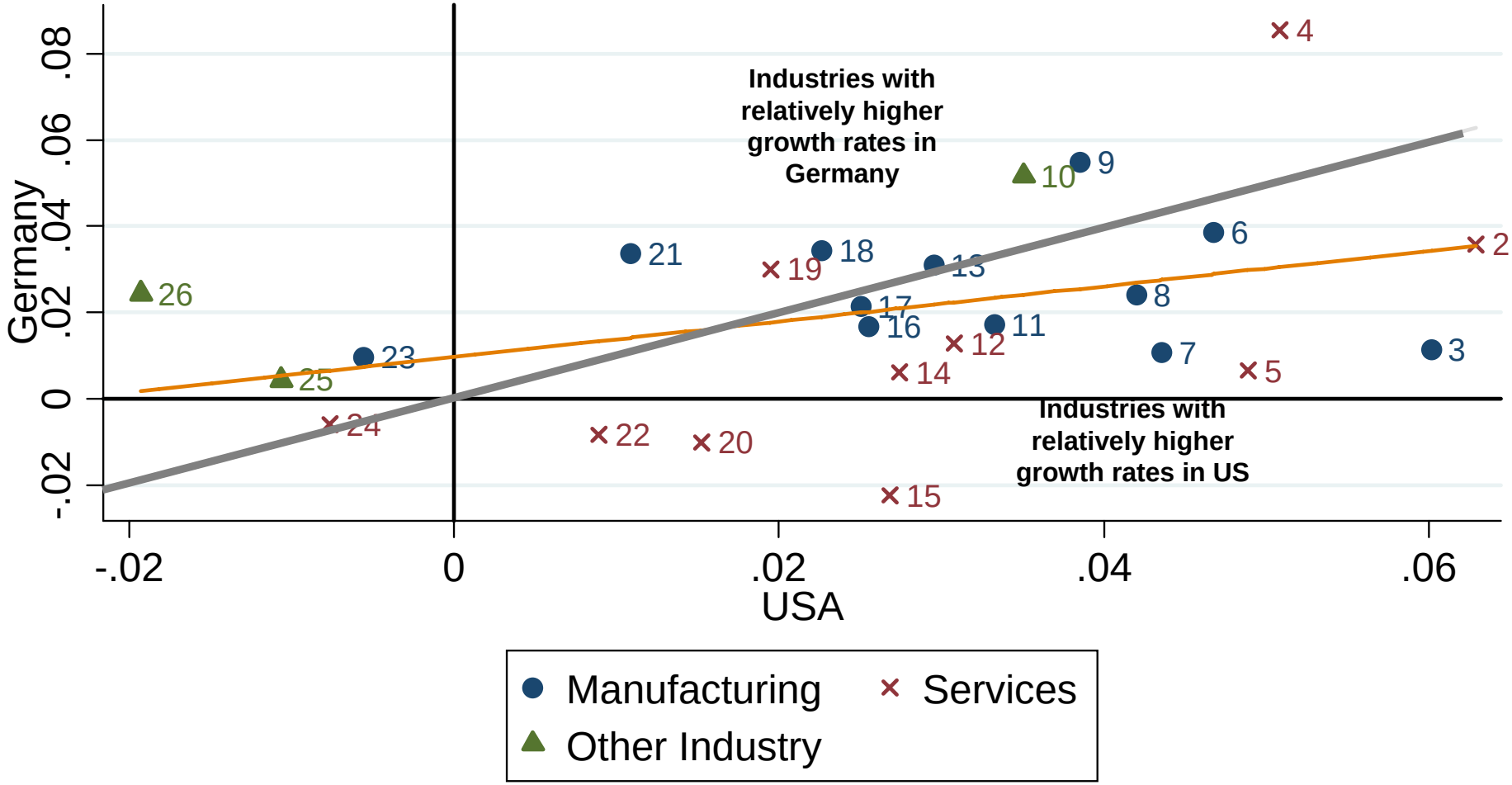
*points labeled as 'rank of industry productivity growth in US from 1995-2003'

Source: EU KLEMS data

Germany and US: Industry productivity growth comparisons

without Electrical and Optical Equipment

correlation coefficient = 0.38



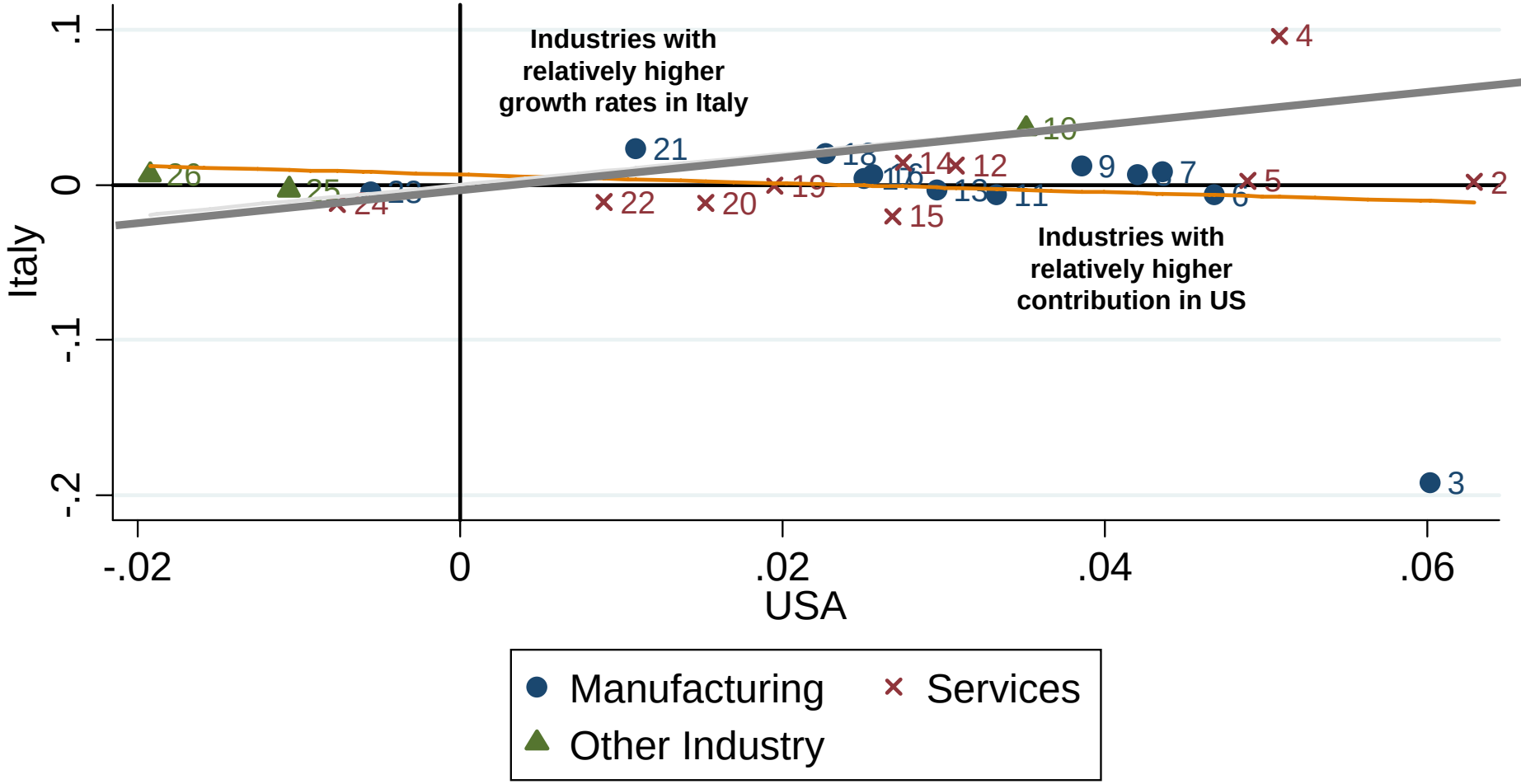
*points labeled as 'rank of industry productivity growth in US from 1995-2003'

Source: EU KLEMS data

Italy and US: Industry productivity growth comparisons

without Electrical and Optical Equipment

correlation coefficient = 0.13



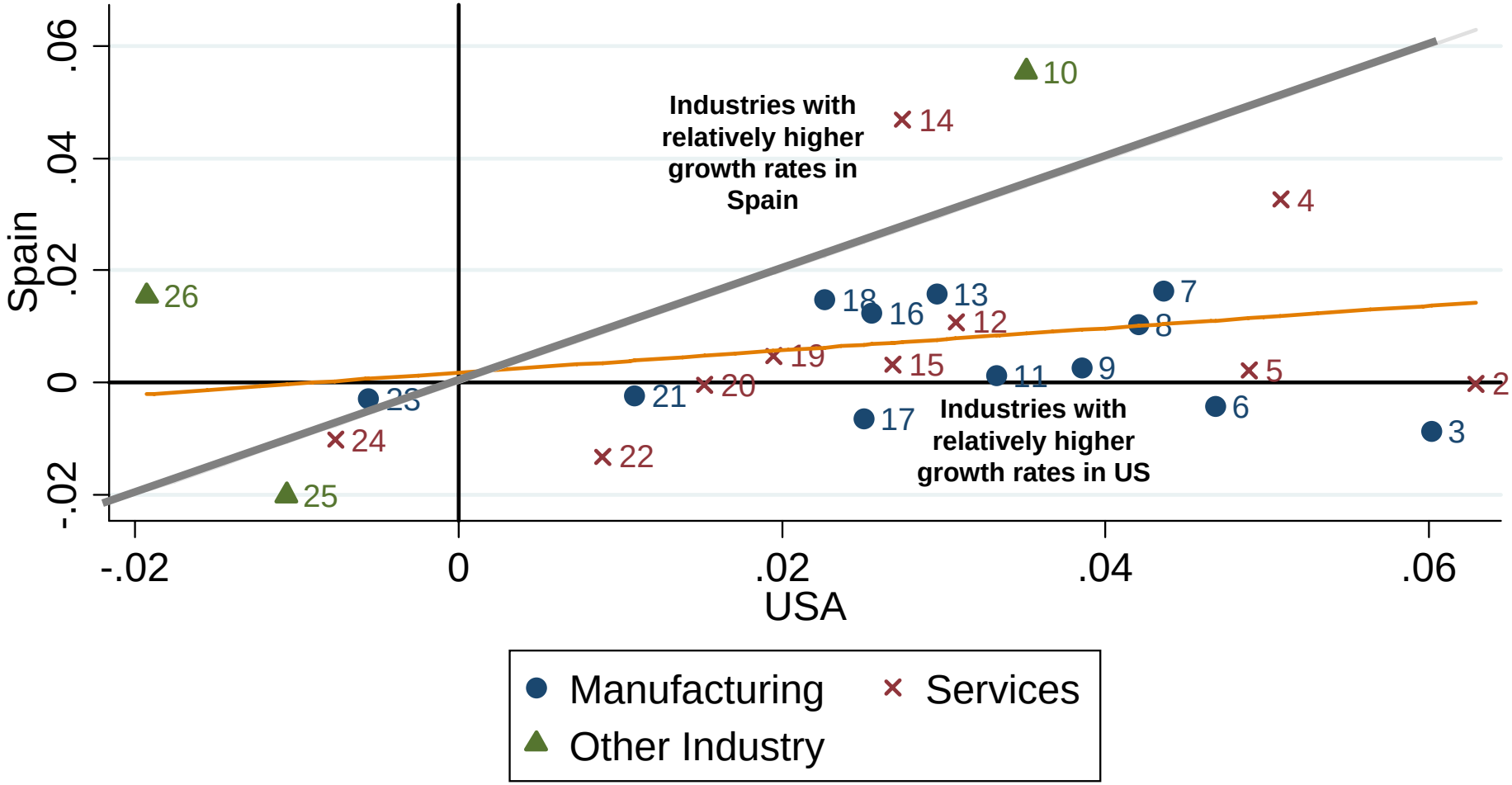
*points labeled as 'rank of industry productivity growth in US from 1995-2003'

Source: EU KLEMS data

Spain and US: Industry productivity growth comparisons

without Electrical and Optical Equipment

correlation coefficient = 0.24



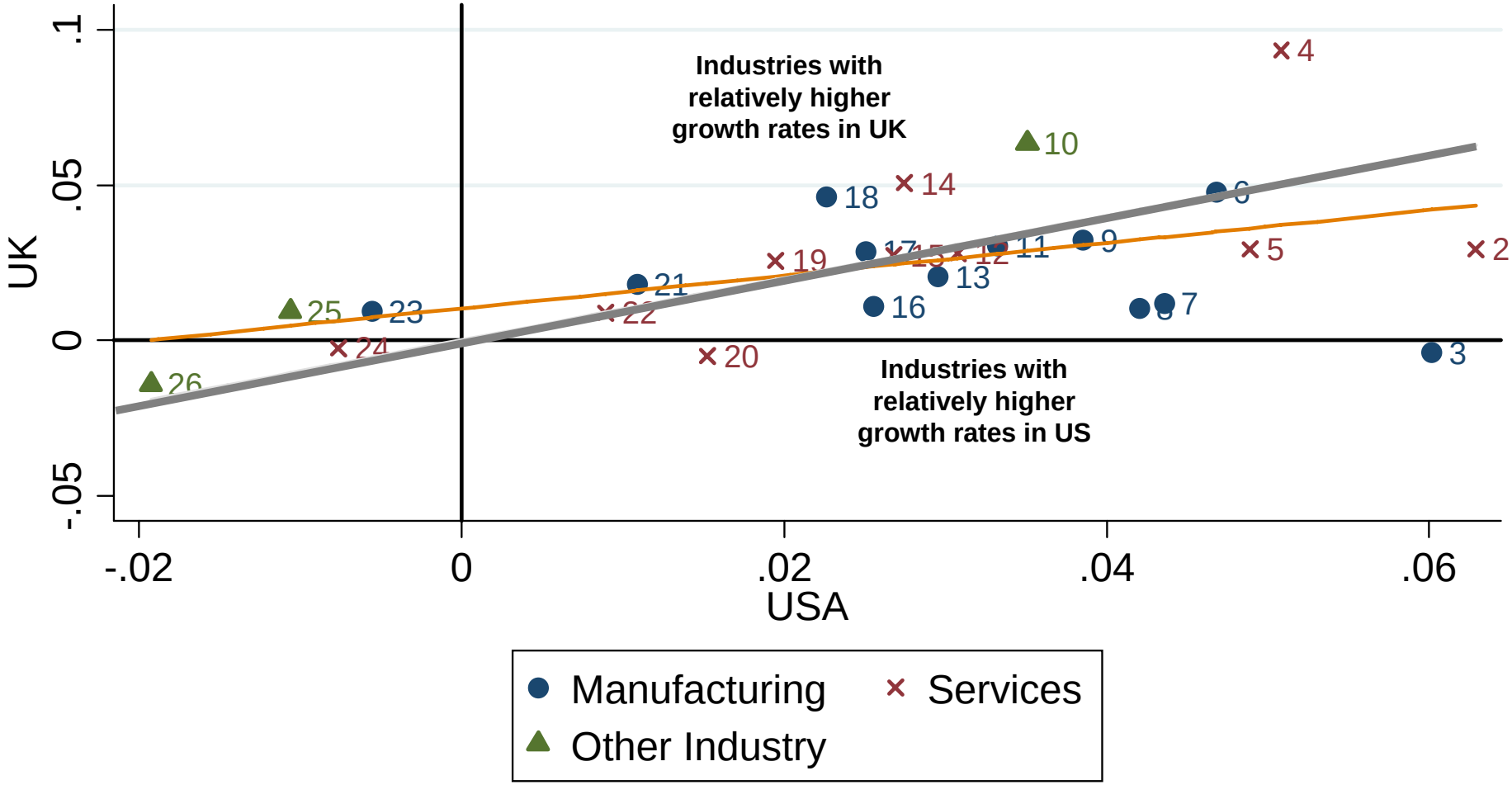
*points labeled as 'rank of industry productivity growth in US from 1995-2003'

Source: EU KLEMS data

UK and US: Industry productivity growth comparisons

without Electrical and Optical Equipment

correlation coefficient = 0.48

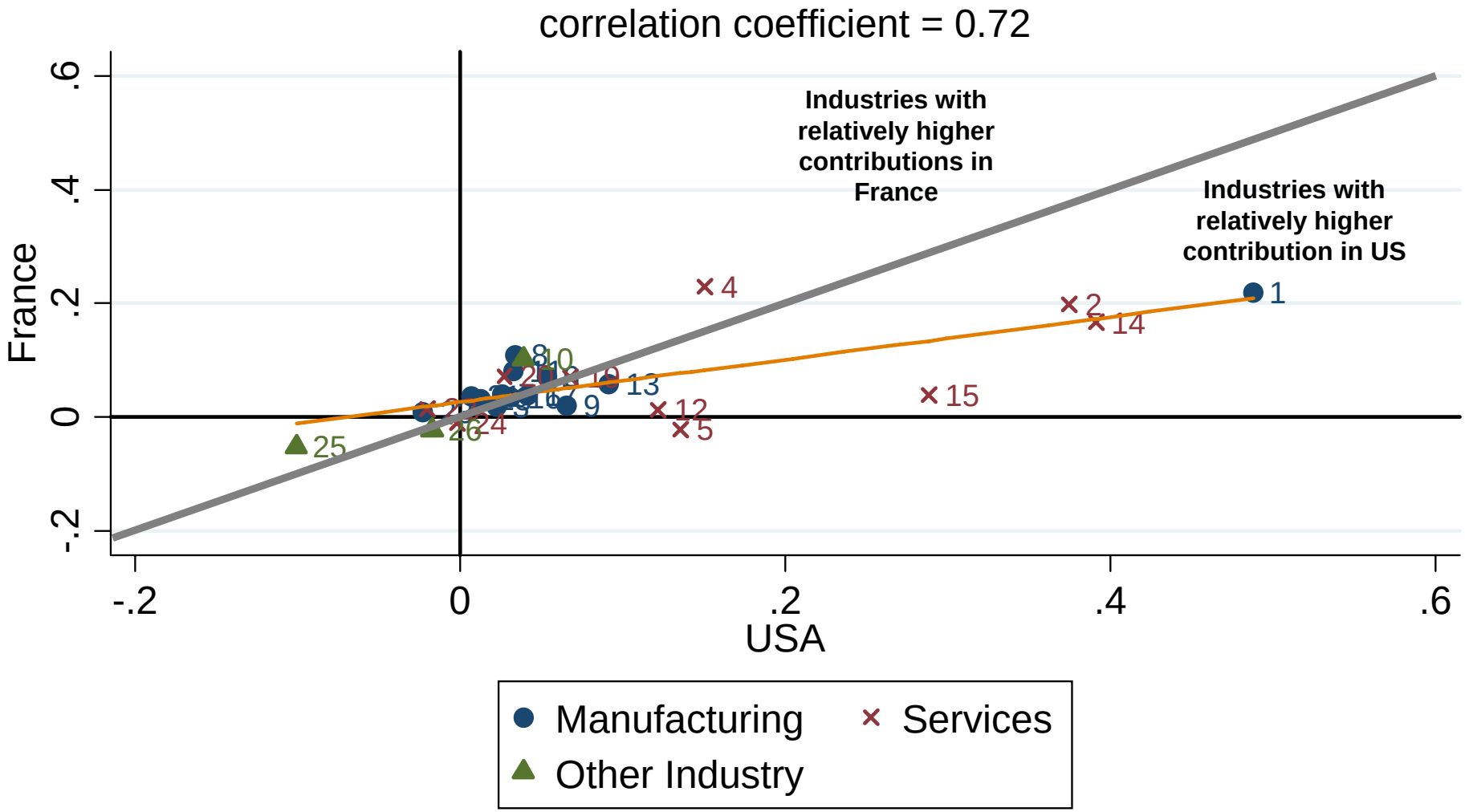


*points labeled as 'rank of industry productivity growth in US from 1995-2003'

Source: EU KLEMS data

Relative Contribution Charts for Individual EU-15 Countries

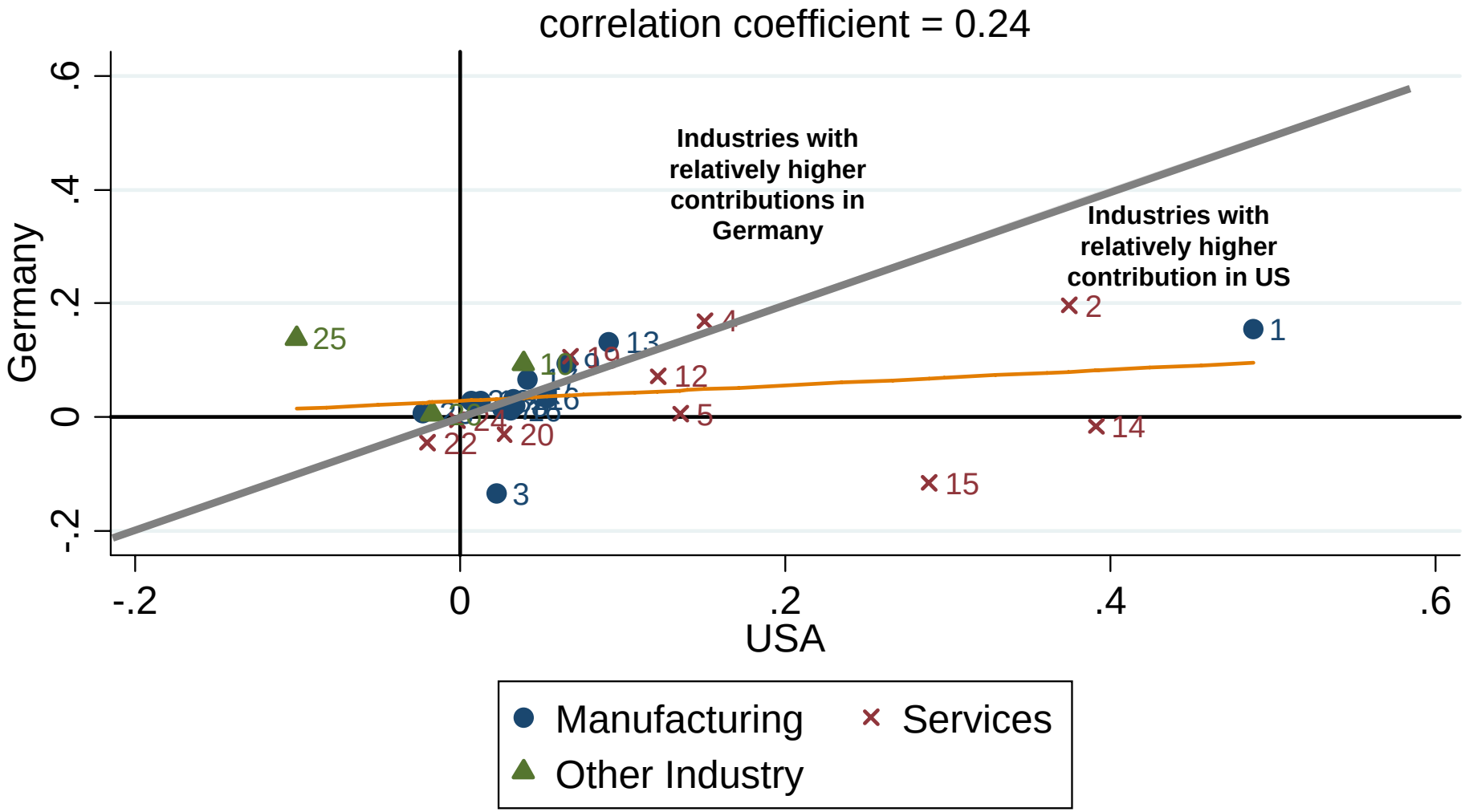
France and US: Relative industry contributions to total nonfarm private productivity (percentages)



*points labeled as 'rank of contribution to total US productivity growth from 1995-2003'

Source: EU KLEMS data

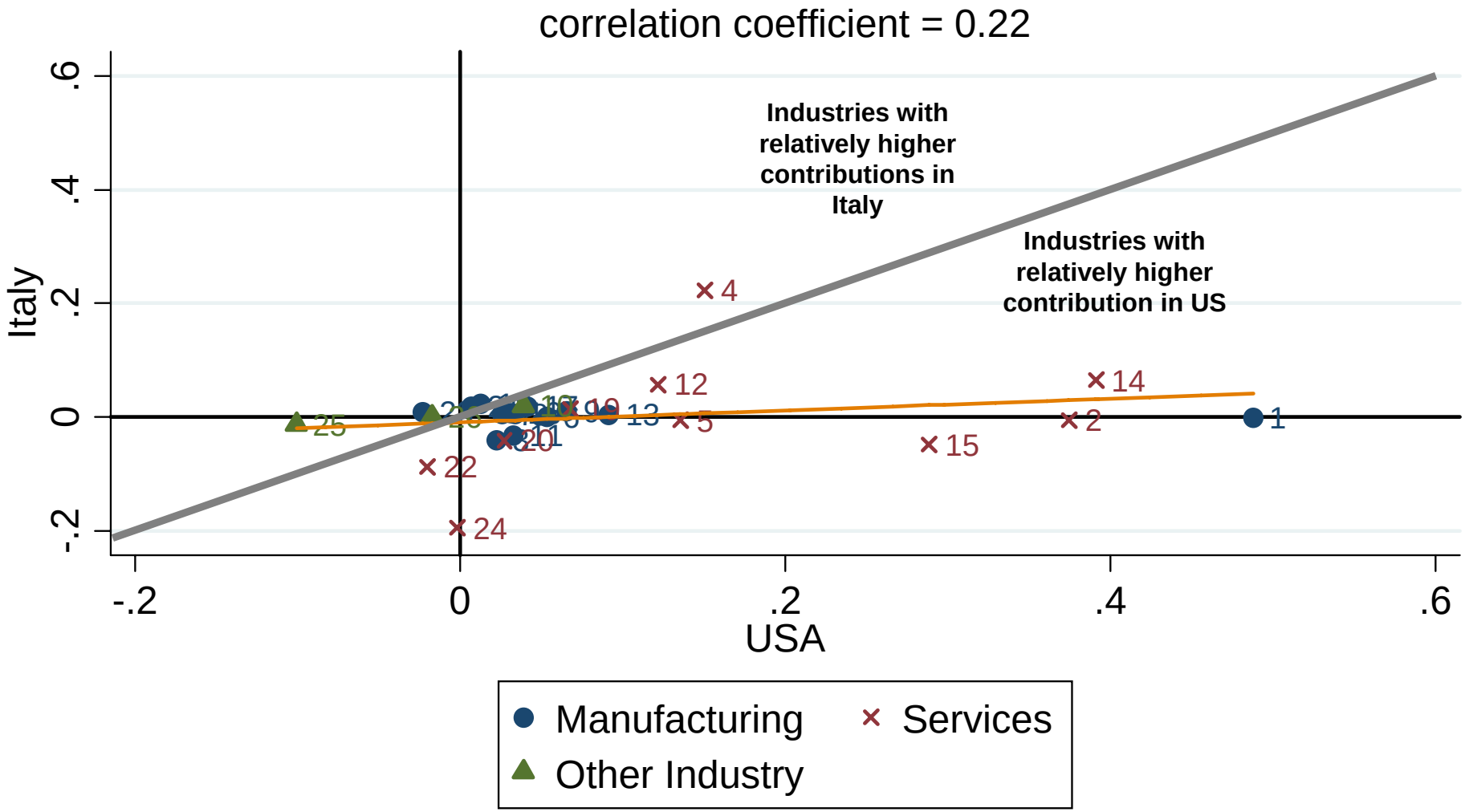
Germany and US: Relative industry contributions to total nonfarm private productivity (percentages)



*points labeled as 'rank of contribution to total US productivity growth from 1995-2003'

Source: EU KLEMS data

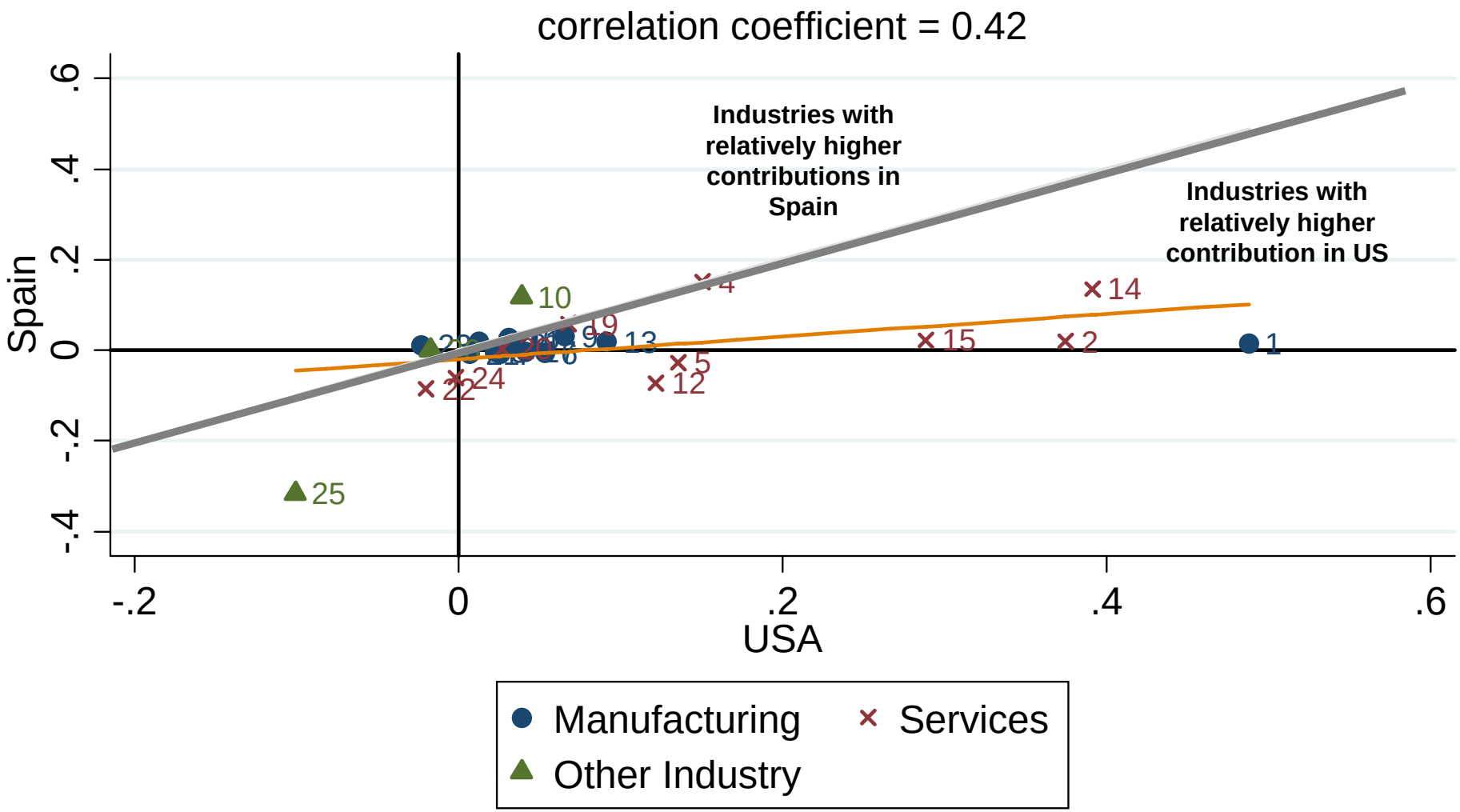
Italy and US: Relative industry contributions to total nonfarm private productivity (percentages)



*points labeled as 'rank of contribution to total US productivity growth from 1995-2003'

Source: EU KLEMS data

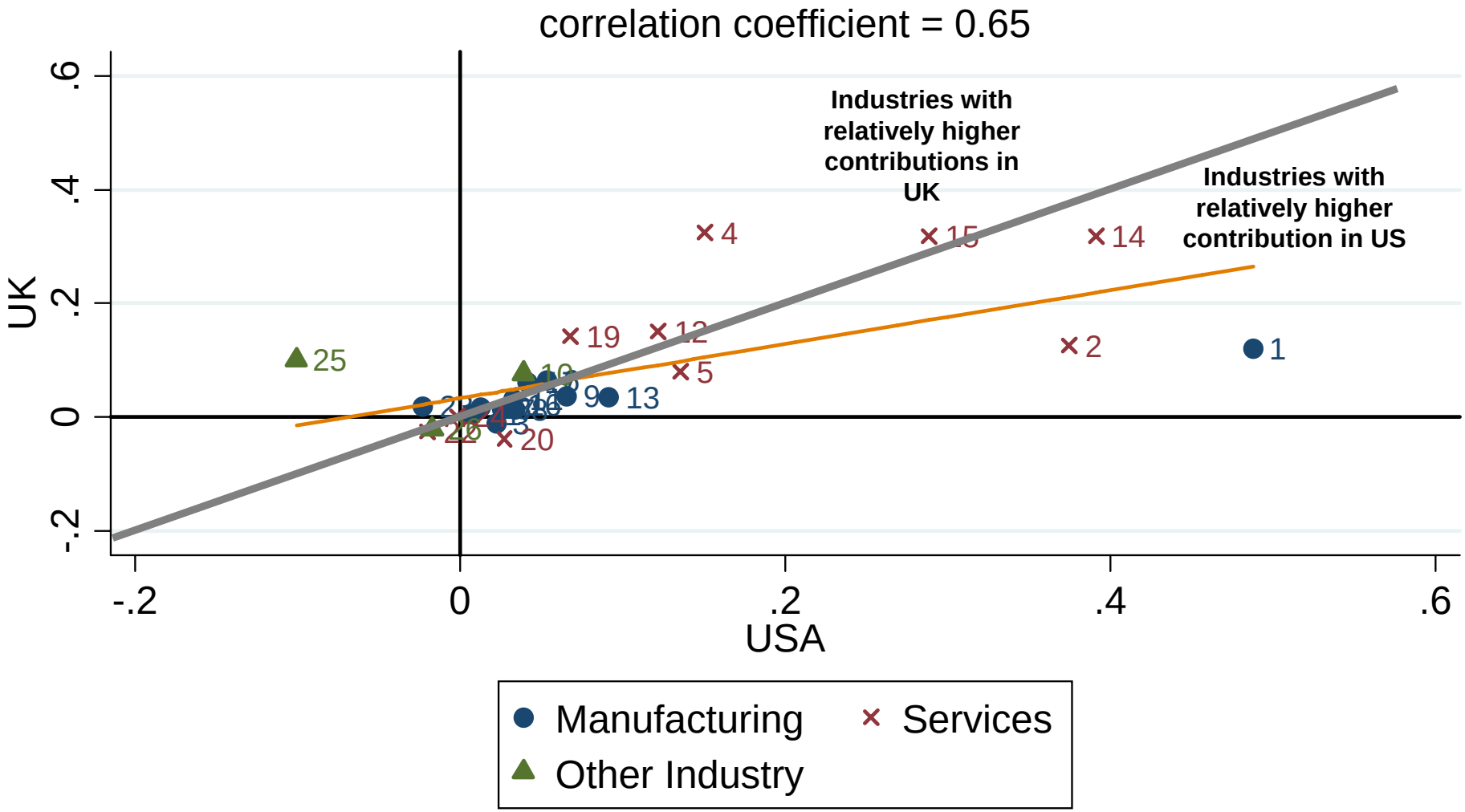
Spain and US: Relative industry contributions to total nonfarm private productivity (percentages)



*points labeled as 'rank of contribution to total US productivity growth from 1995-2003'

Source: EU KLEMS data

UK and US: Relative industry contributions to total nonfarm private productivity (percentages)



*points labeled as 'rank of contribution to total US productivity growth from 1995-2003'

Source: EU KLEMS data