Europe's Productivity Growth Slumps But Employment Surges

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Ian in SF, you can't see "MV=PY"

This is a Work in Progress

- At the end I'll tell you some of our plans for further research
- Today's Presentation Combines a Joint Version from Last September with a Solo Version of Ian's from February
- One Thing we have in Common: Loud Colors
- Since his first day as my RA 3.5 years ago, he has come up with inspired color schemes, like everything involving EU must be yellow-blue and US must be red-white-blue
- Occasional lapses here toward black and white

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%

Point of Departure: Post-95 Turnaround Plus New Heterogeneity

- 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: .9%
     - Y/N growth gap: .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:

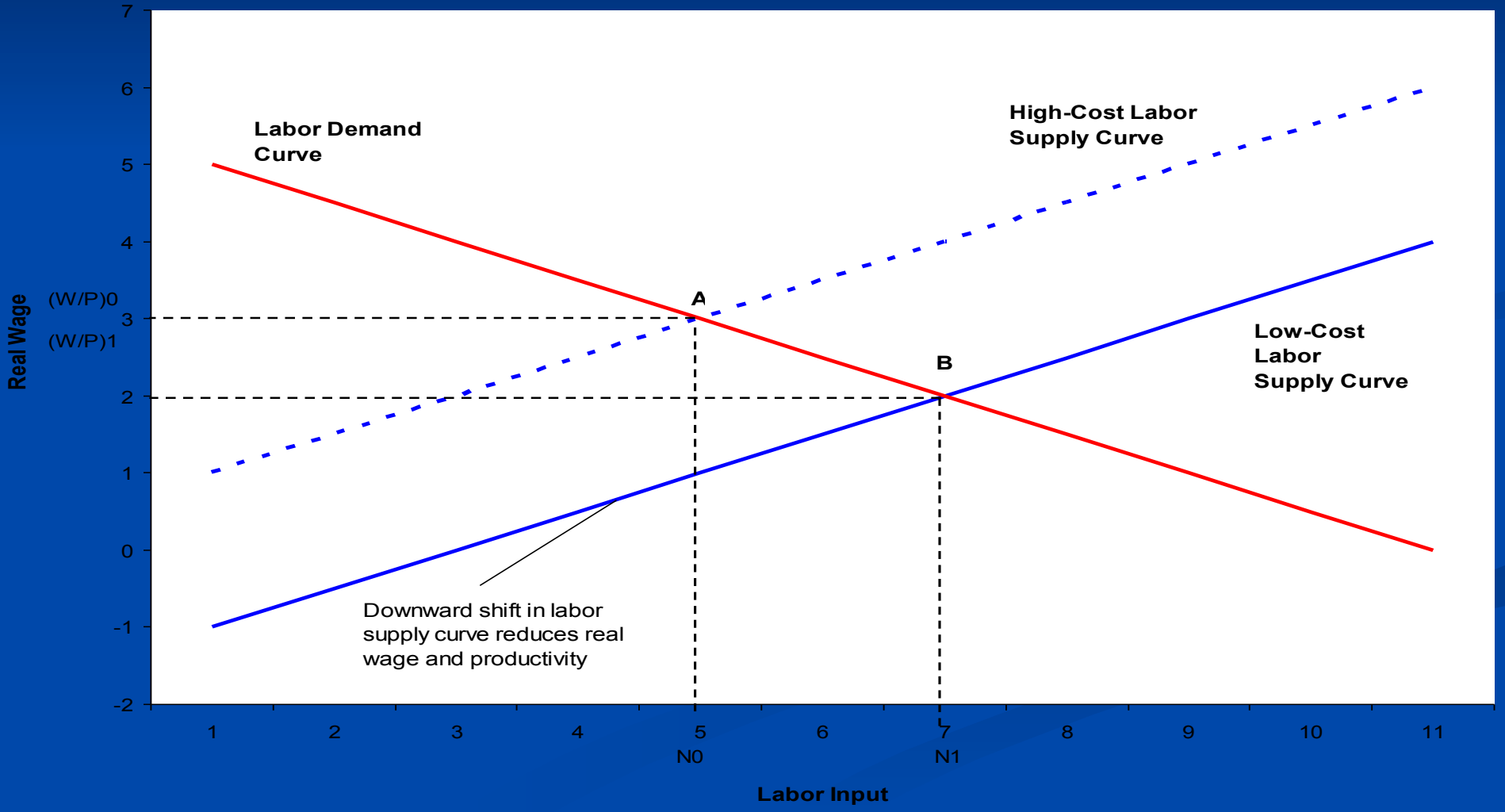
  $$Y/N = Y/H * H/N$$

  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

Textbook Labor Economics



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

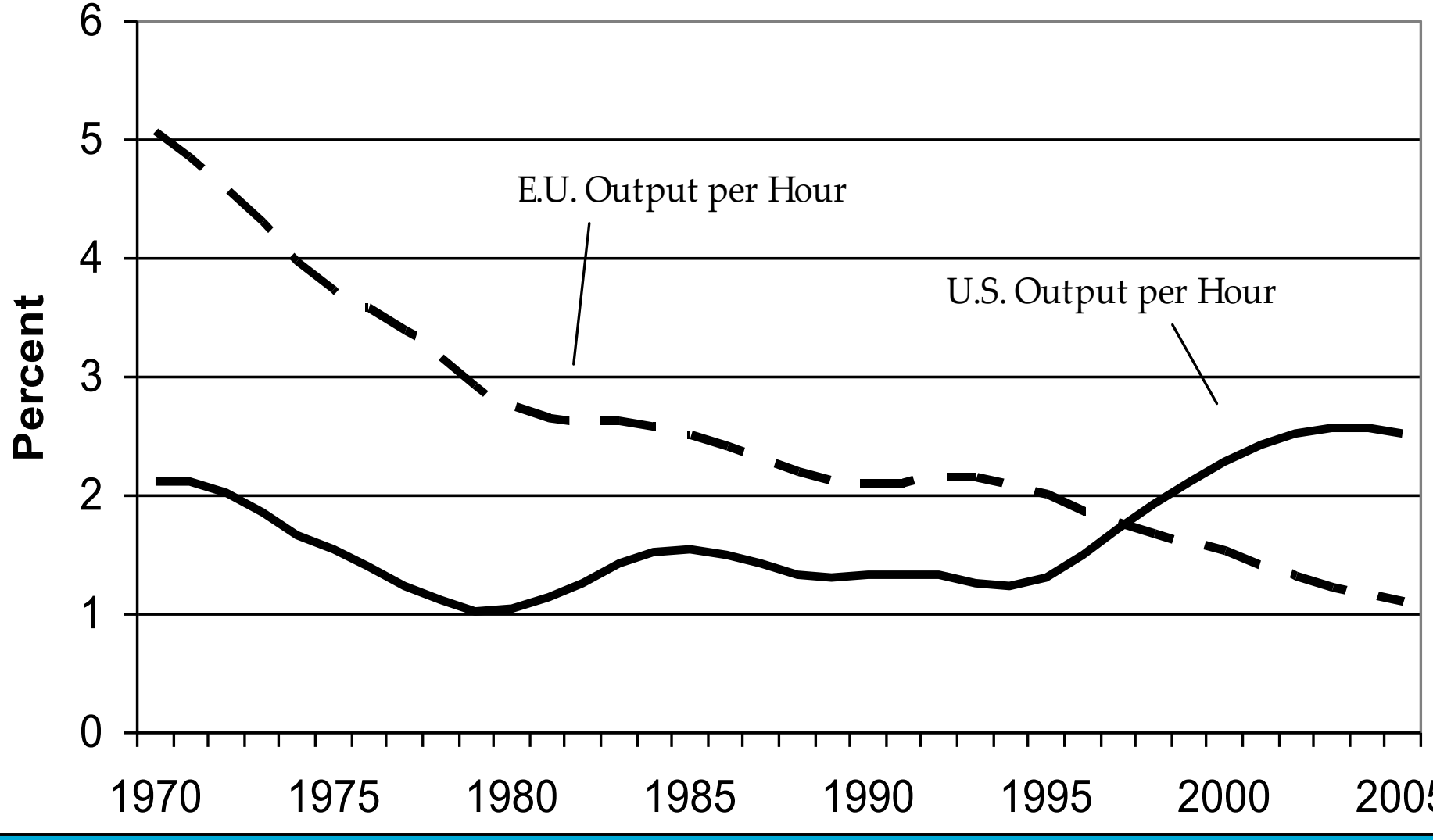
- Central Focus of Lit #2 on post-1995 turnaround in US Productivity Growth
  - Jorgenson, Ho and Stiroh (2006): '95-'00 due to ICT, '00-'05 something else
  - Retail is often noted
    - Van Ark, Inklaar and McGuckin (2003)
    - Foster, Haltiwanger and Krizan (2002) on new establishments
  - Baily 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

Literature #3: relationship between Y/H and H/N

- 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

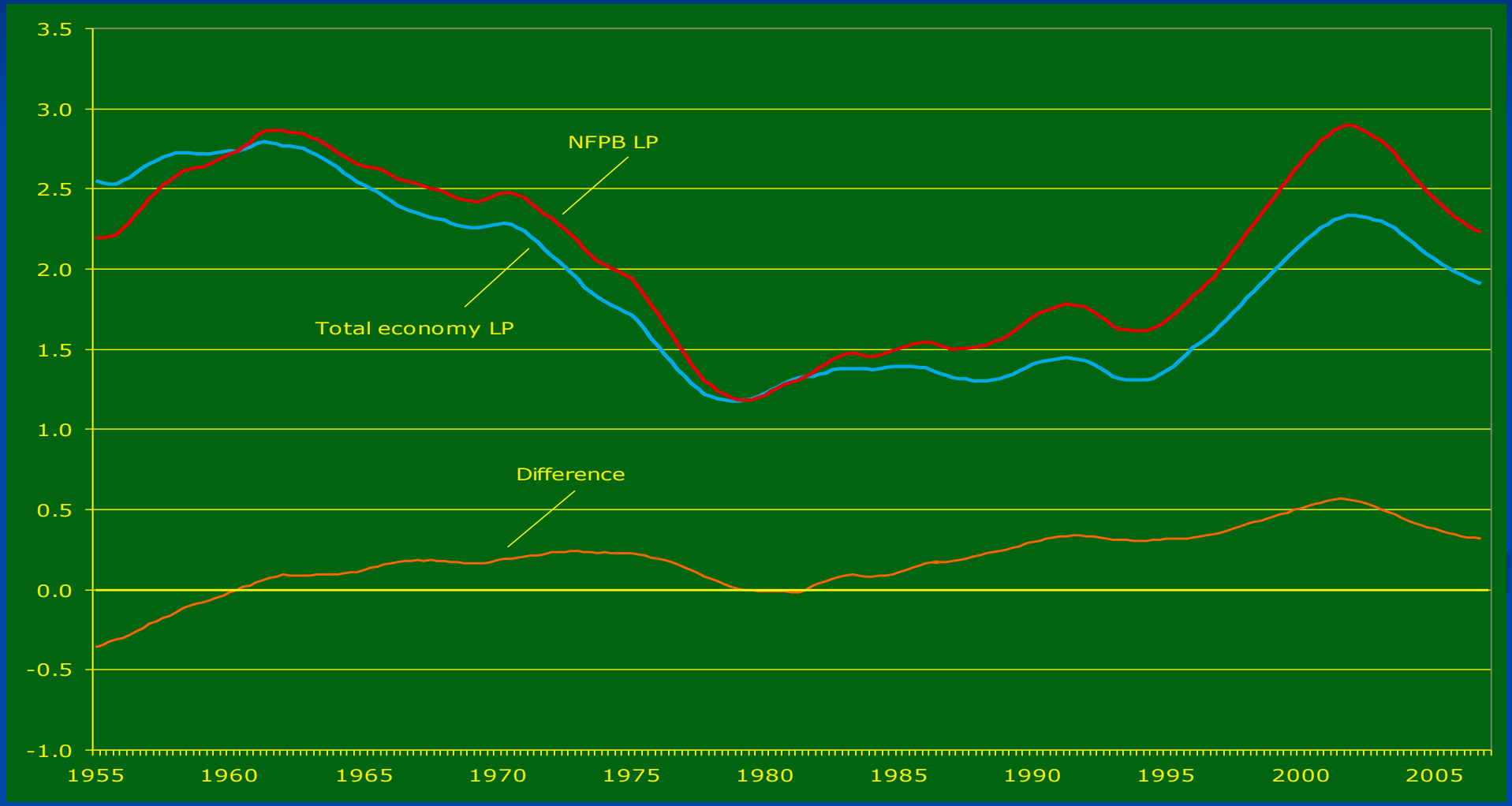
Figure 1. Trends in Output per Hour, Output, and Hours, U.S. and EU, Anual Growth Rates, 1970-2005

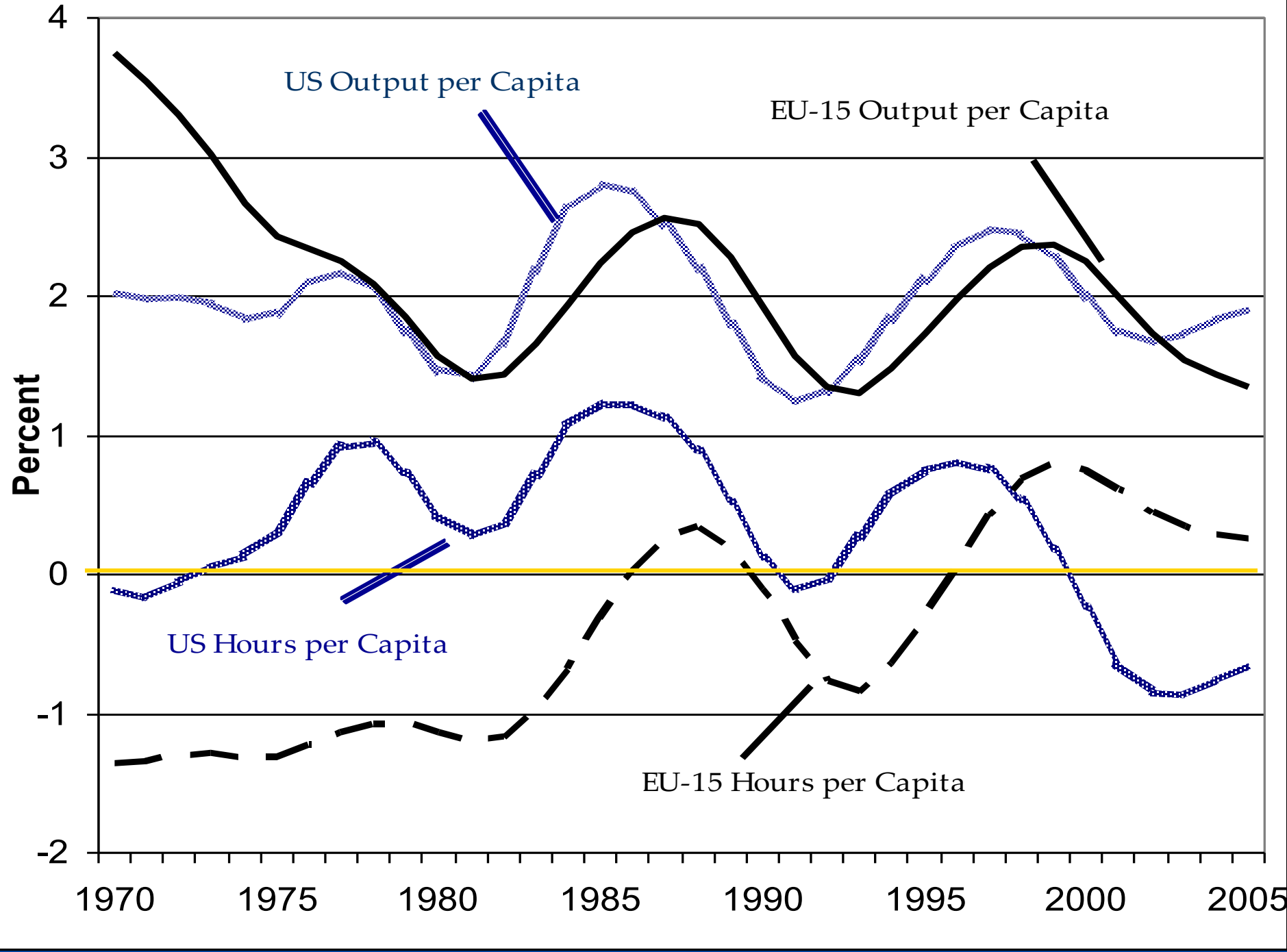


Interpreting the Post-1995 Turnaround

- 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

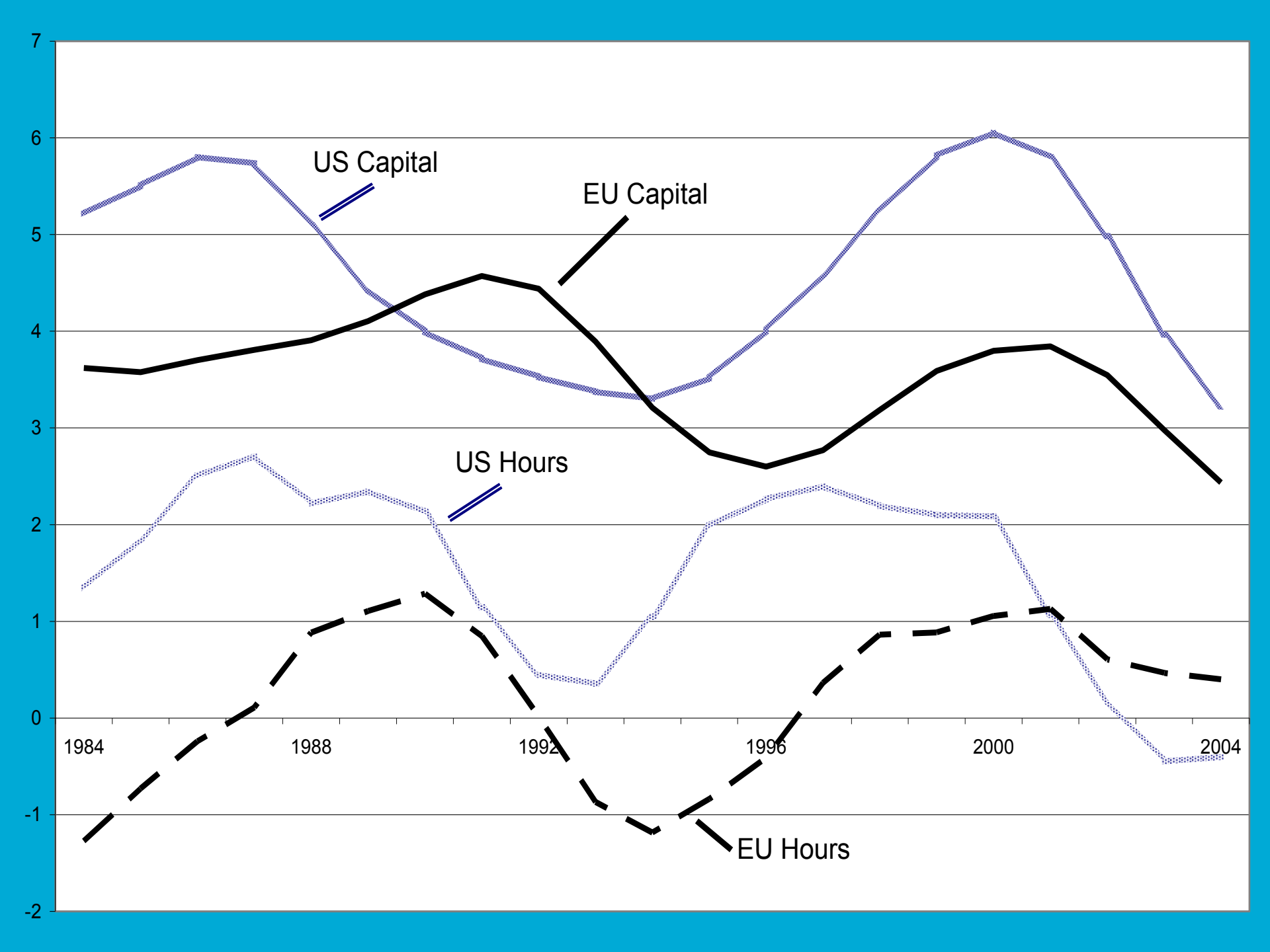
New US Productivity Trends Based on March 2007 Quarterly Data



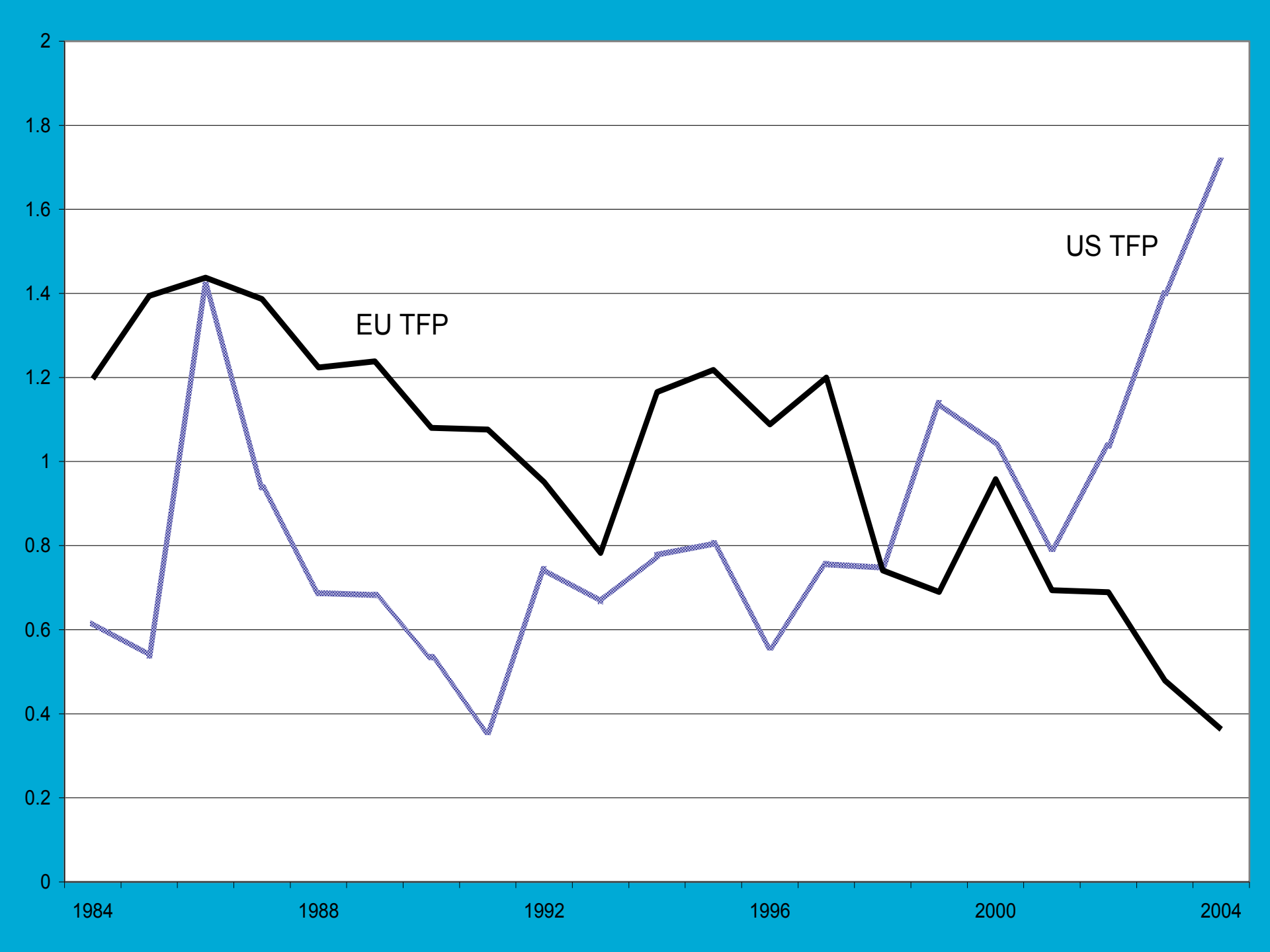

US Output per Capita
EU-15 Output per Capita
US Hours per Capita
EU-15 Hours per Capita
Percent
4
3
2
1
0
-1
-2
1970
1975
1980
1985
1990
1995
2000
2005

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


7
6
5
4
3
2
1
0
-1
-2
US Capital
EU Capital
US Hours
EU Hours
1984
1988
1992
1996
2000
2004

- 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


2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1984
1988
1992
1996
2000
2004
EU TFP
US TFP

Defining Tigers and Tortoises, Pop Shares and Private ALP Growth

- Tigers: Ireland, Finland, Greece
  - Pop Share: 5% ALP 4.79%
- Middle: Sweden, Austria, UK, Germany, Portugal, France
  - Pop Share: 61% ALP: 2.45%
- Tortoises: Belgium, Netherlands, Denmark, Luxembourg, Spain, Italy
  - Pop Share: 34% ALP: 0.72%

	Productivity Growth Rates			Hours per Capita Growth Rates			Output per Capita Growth Rates		
	1970-1995	1995-2005	Difference	1970-1995	1995-2005	Difference	1970-1995	1995-2005	Difference
US	1.42	2.30	0.88	0.55	-0.14	-0.69	1.97	2.15	0.18
EU	2.89	1.40	-1.49	-0.80	0.55	1.35	2.09	1.95	-0.14
Tigers	2.93	2.95	0.02	-0.67	1.22	1.89	2.26	4.17	1.91
Middle	2.80	1.86	-0.94	-0.84	-0.08	0.76	1.96	1.78	-0.19
Tortoises	3.05	0.39	-2.66	-0.75	1.59	2.34	2.30	1.98	-0.32

- We break the EU-15 into three groups based on post-’95 Y/H growth:
  - Tigers: Ireland, Finland and Greece
  - Middle Countries: Sweden, Austria, UK, Germany, Portugal and France
  - Tortoises: BeNeLux, Denmark, Spain and Italy

A closer look at the Tortoises

- Mainly driven by Spain and Italy

Spain:

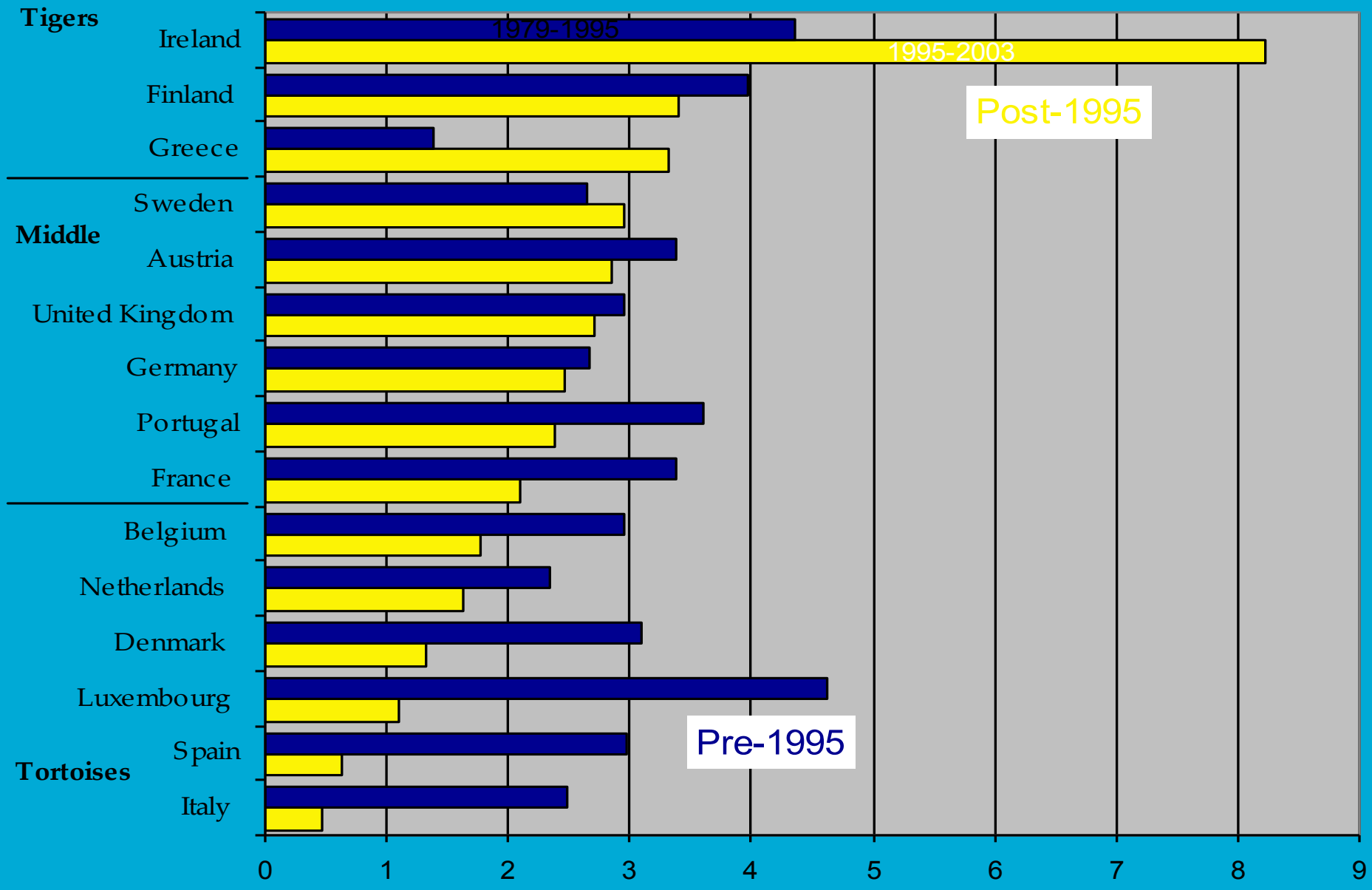
- -4.44% turnaround in Y/H
- *+5.01%* turnaround in H/N

Italy:

- -2.25% turnaround in Y/H
- +1.08% turnaround in H/N

- Had we ranked the countries according to output per capita, Spain would be a Tiger

Figure 2. Private Economy Labor Productivity Growth by Country: 1979-1995, 1995-2003



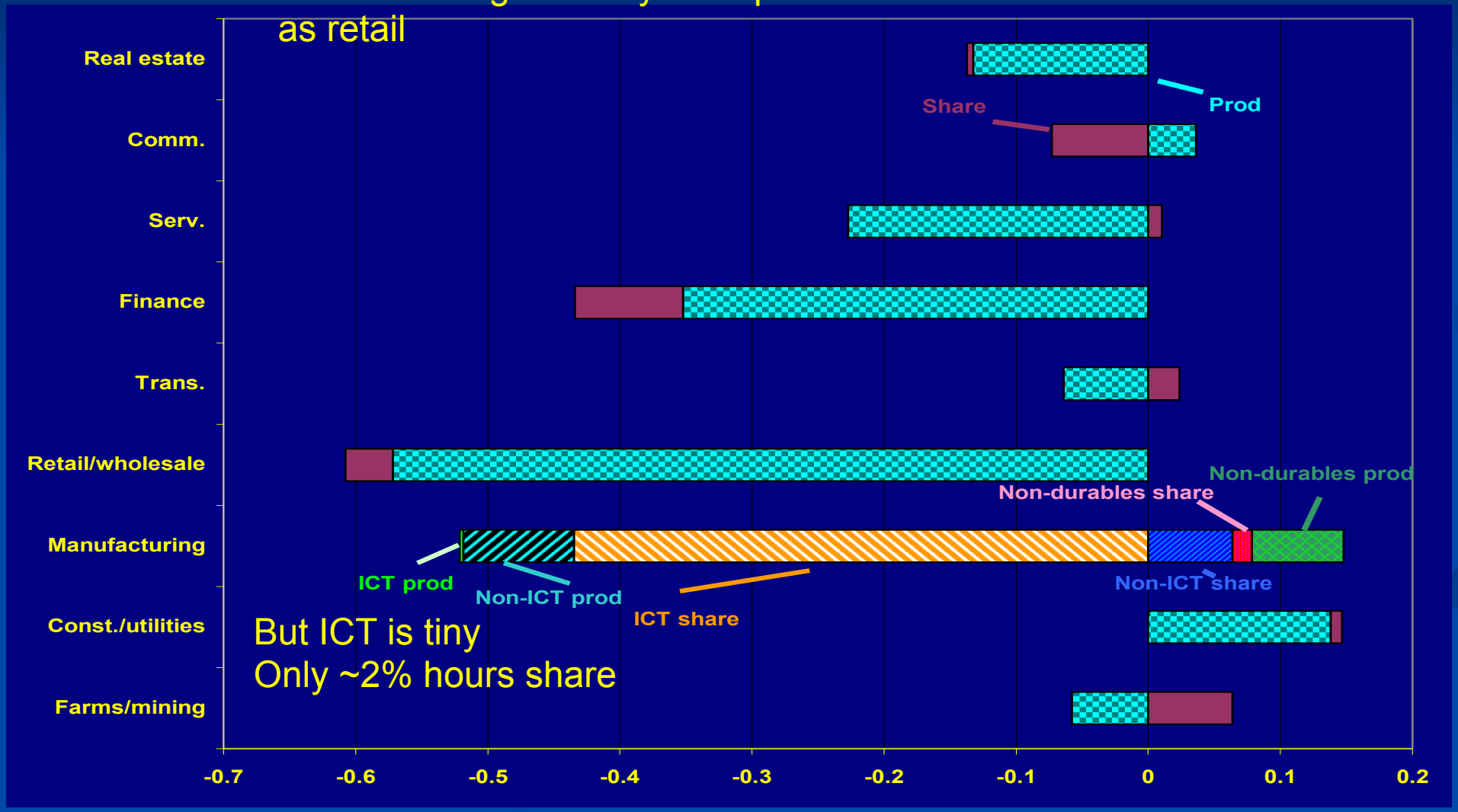
Making Sense of Cross-EU Heterogeneity

- Notice the homogeneity pre-1995 and heterogeneity post-'95
- The only two countries with a noticeable acceleration are Greece and Ireland
- Sweden a bit up and UK a bit down
- Sharp declines for France, Portugal, and all the Tortoises
- For most of the remainder of the paper, we focus only on the middle countries and tortoises
  - The tigers are special cases – they do not provide any policy lessons for the rest of the EU

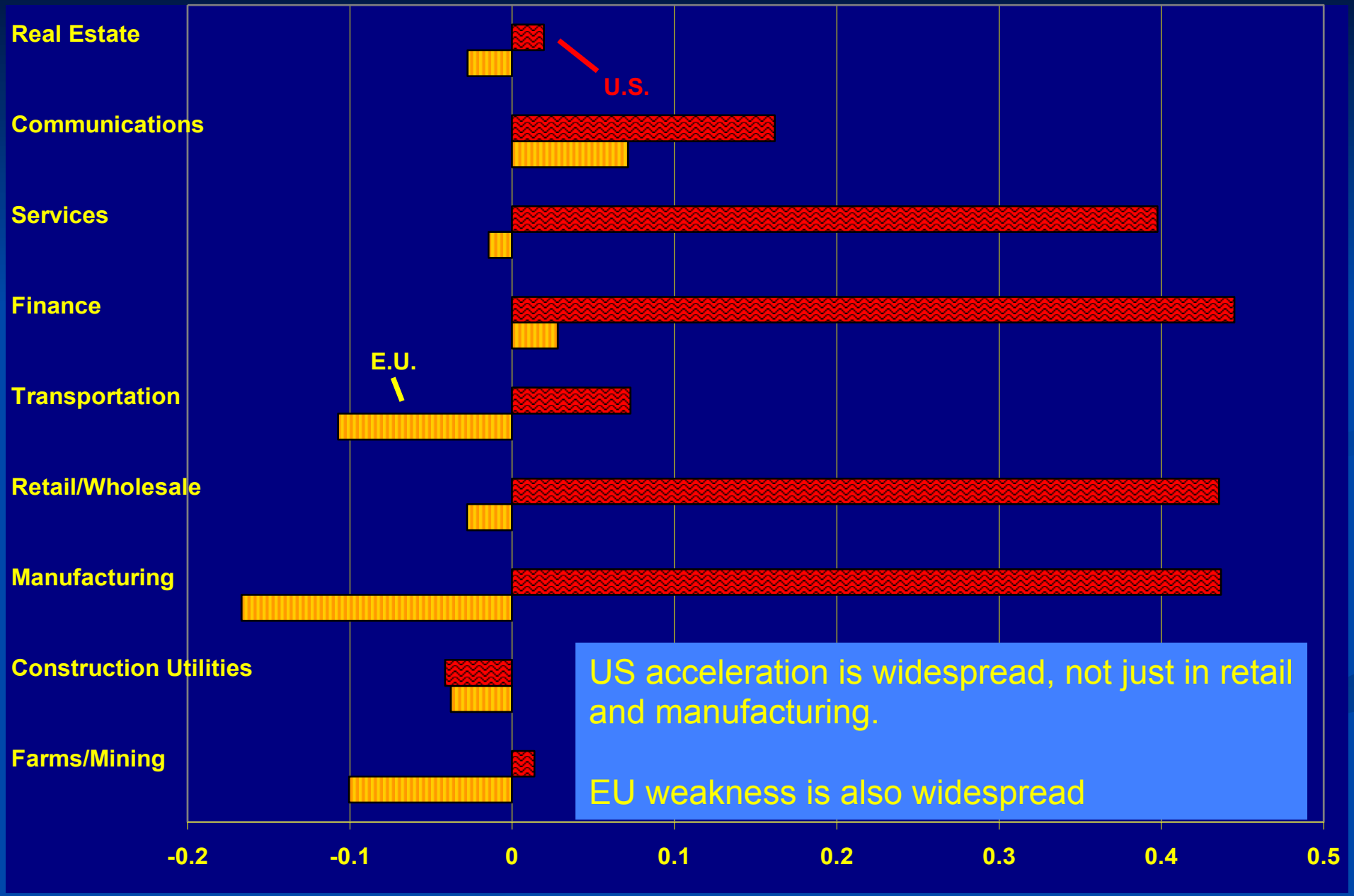
The New Results in this Paper at the Industry Level

- 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

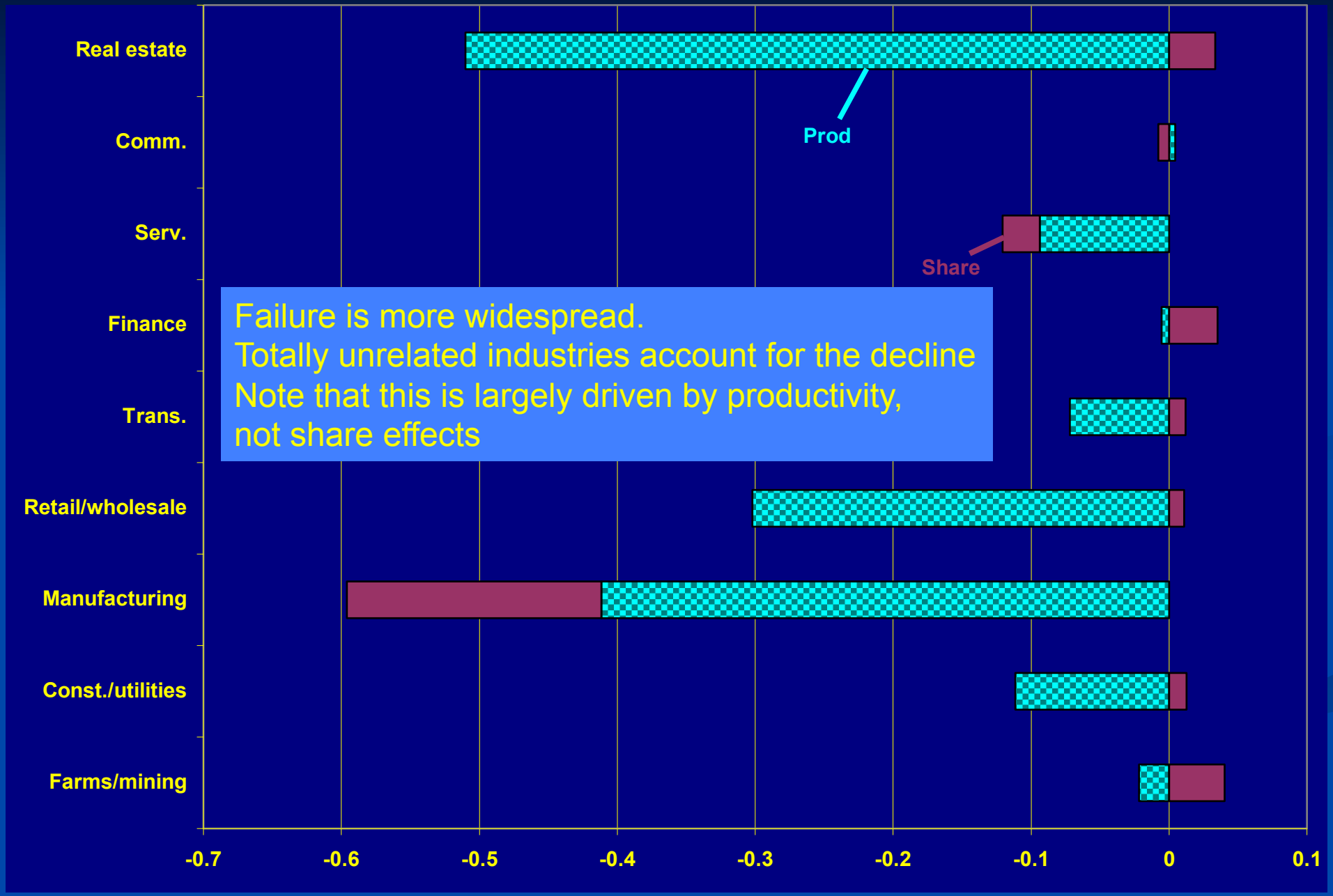
Contributions, Productivity vs. Share Effects, in EU-US, 1995-2003



ALP growth multiplied by nominal shares



Tortoises vs. Middle



Interpreting the Tortoise Problem after 1995

- Failure is across the board
- Consistent with basic theme of paper, that there is a macro cause
  - How much due to a reduction in taxes and in regulations?
  - How much remains for an exogenous decline in TFP growth?
- Understanding Share Effects
  - ICT Share higher in US vs EU and also middle vs tortoises
  - Big EU share deficit in retail/wholesale and services, consistent with high tax story
- Part of Tiger success is moving resources, out of agriculture for Greece and Ireland, into ICT mfg for Ireland and Finland

Research Strategy

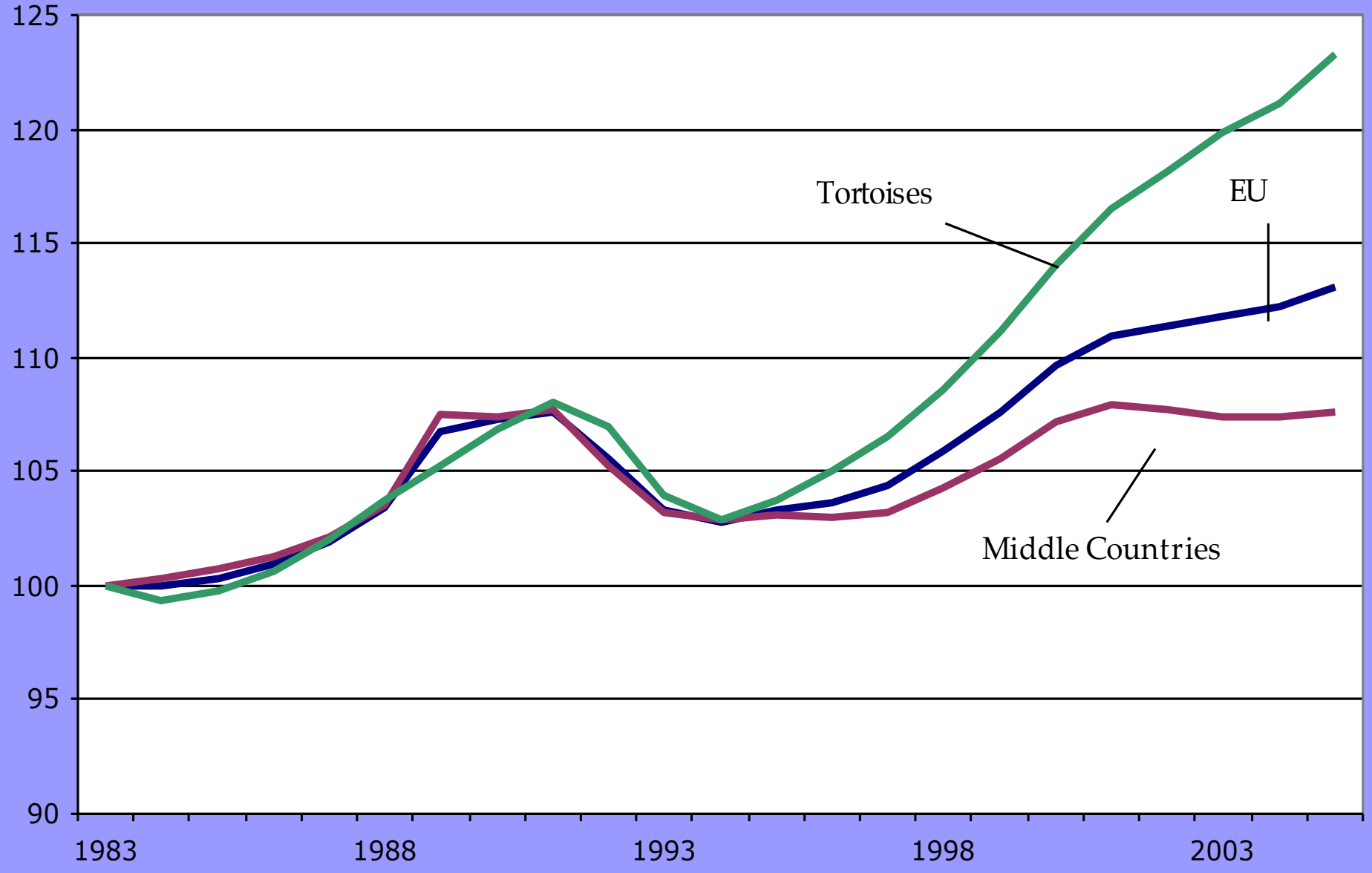
- Divergence across the EU has increased
- The Y/H slowdown in the tortoises in most countries is balanced by healthy H/N growth
- We are going to then try to break down the determinants of the middle-tortoise gap in Y/H growth and relate it to H/N growth

Qualification: We're Not Dealing with Capital Adjustment

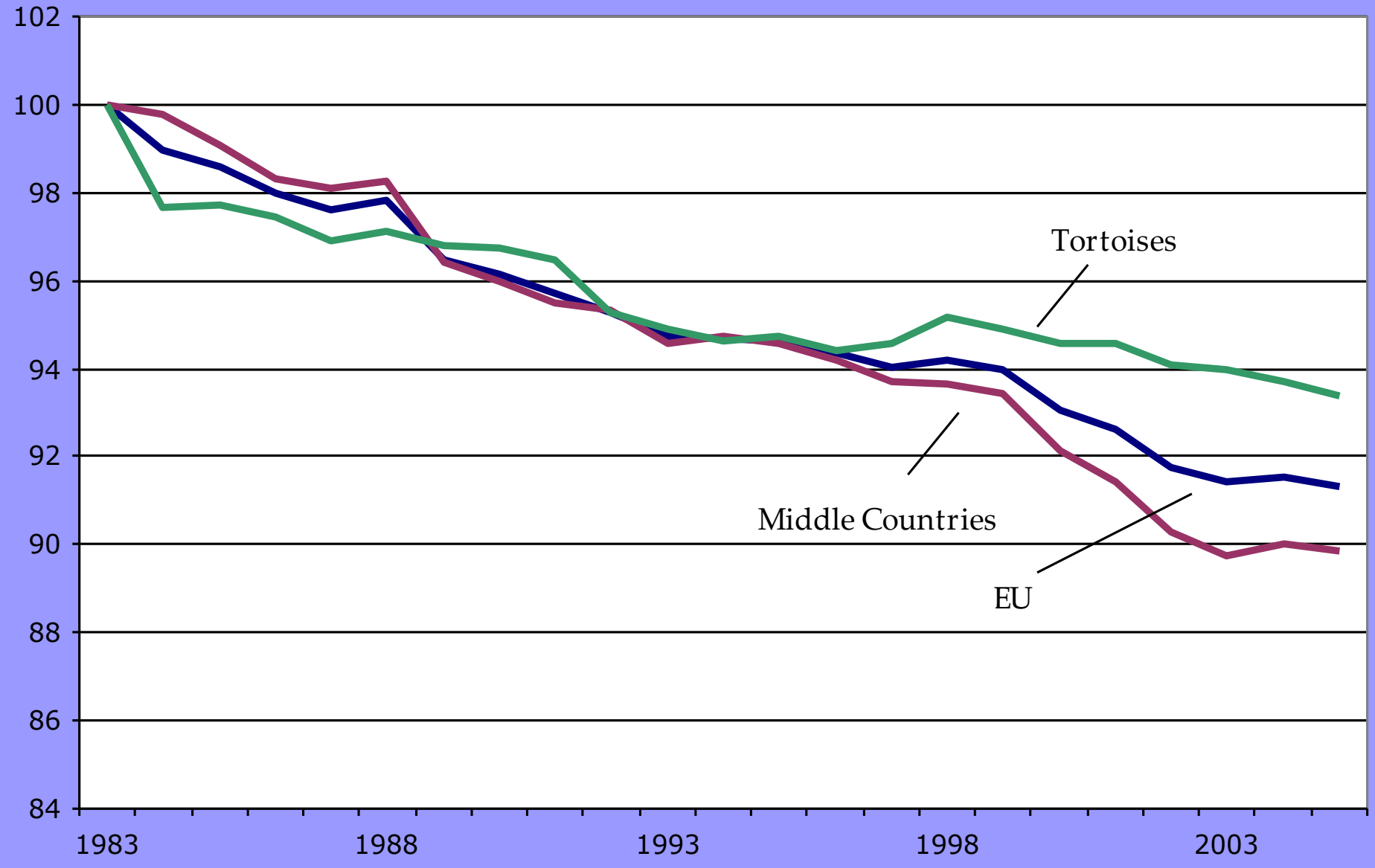
- ALP Growth =
  - Δ labor quality
  - + Δ capacity utilization
  - + capital deepening
  - + *TFP*

- We focus for now on capital deepening
  - Simple one-factor framework based on the textbook labor demand curve with fixed capital
  - Making capital adjustment endogenous next on our agenda
  - Also next on agenda is tracing link from policy changes to labor quality (e.g., changes in Female LFPR decreases average labor force experience and perhaps average education)

Figure 4. Employment per Capita



Hours per Employee



Interpreting the Graphs of E/N and H/E

- (H/N) = (E/N) * (H/E)
- ’79-’95 US minus EU H/N growth: 1.01%
  - Half from employment per capita (E/N), half from hours per employee (H/E)
  - US had rising E/N, EU had falling H/E
- ’95-’04, gap was -.76% (EU had higher growth)
  - E/N gap was -.85%, H/E .09%
  - Almost entirely explained by a shift up in EU E/N
  - H/E seems to have stabilized
- So when comparing employment to ALP, E/N is the margin we are going to focus on

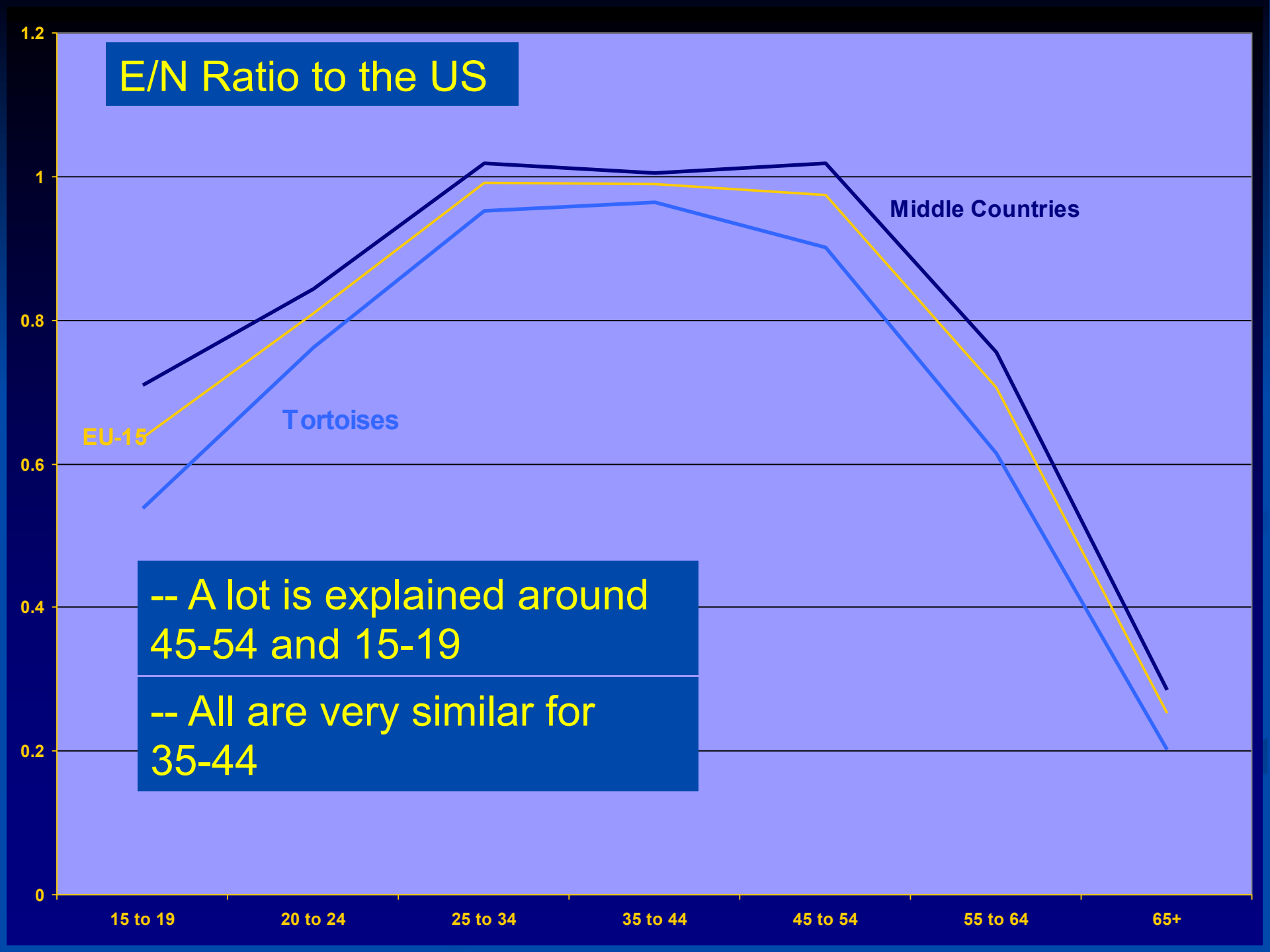

E/N Ratio to the US
1.2
1
0.8
0.6
0.4
0.2
0
Middle Countries
EU-15
Tortoises
-- A lot is explained around 45-54 and 15-19
-- All are very similar for 35-44
15 to 19
20 to 24
25 to 34
35 to 44
45 to 54
55 to 64
65+

Figure 7. Difference in Growth Rates of Employment per Capita by Sex-Age Group, Tortoises minus Middle Countries, 1995-2005 minus 1985-1995, Employment and Share Effects

- Contributions to the difference in the turnaround in the Middle countries versus the Tortoises

- This is the standard shift-share analysis from industry-level productivity studies (see Stiroh and van Ark and Inklaar)
- Note that the Tortoises have a big passive advantage – share effects for 25-34
- Large employment effects for prime age women
  - Slightly smaller for prime age men
- Teens and retirement aged contribute little

Male and Female employment rates

				Average Growth Rates		
Middle	**1985**	**1995**	**2005**	**85-95**	**95-05**	**turnaround**
Male	65.85	62.30	60.79	-0.55	-0.25	0.31
Female	41.46	44.81	48.09	0.78	0.71	-0.07
Tortoises	**1985**	**1995**	**2005**	**85-95**	**95-05**	**turnaround**
Male	57.72	57.93	60.94	0.04	0.51	0.47
Female	26.02	30.97	39.88	1.74	2.53	0.79

- Notice the enormous growth in female E/N
  - It even manages to have the biggest acceleration following 1995
- Men in the Tortoises have caught up, women still have a long way to go

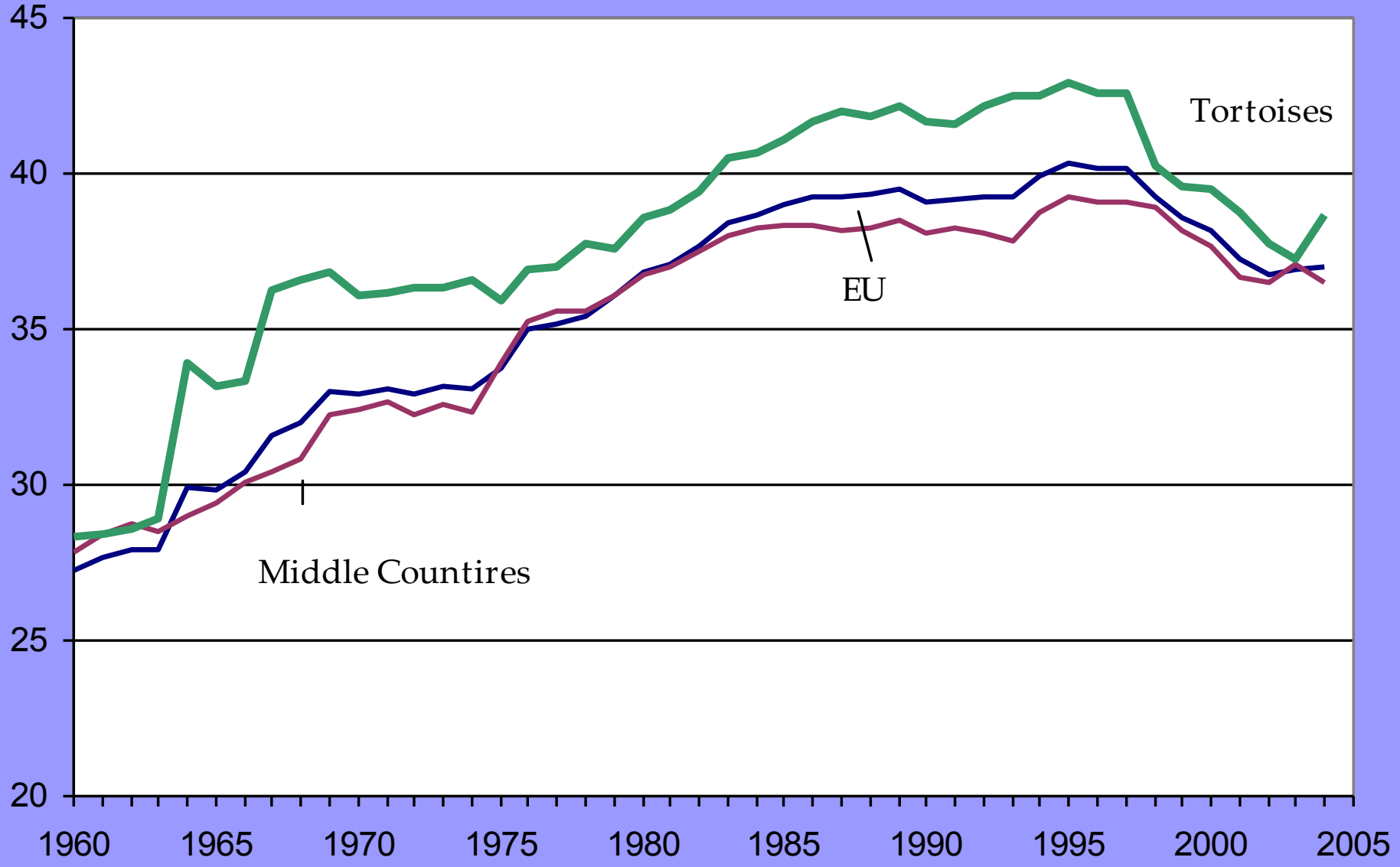
Variables to explain E/N

- Tax wedge
- EPL – measures of bargaining coordination, firing restrictions, etc.
- Percentage of employees part time
  - Actually see little evidence of the business cycle
  - We can see whether part time employees are new entrants to the labor force
- Union density
  - Union density and union power aren't the same
  - France has always had lower union density than the US

- Explanatory variables are the tax wedge, EPL, union density and net reservation wage
  - Net reservation wage measures generosity of unemployment benefits

- We don't worry about factors affecting teens or those near retirement because those age groups don't drive much of the divergence within the EU

Figure 5. Tax Wedge



- Recall Prescott's claim that the entire gap between EU and US employment can be explained by tax wedges
- If tax wedges are the main drivers of employment variation, the compression in EU taxes is interesting

- Policy and E/N are converging but Y/H is diverging

Employment Protection Legislation (EPL)

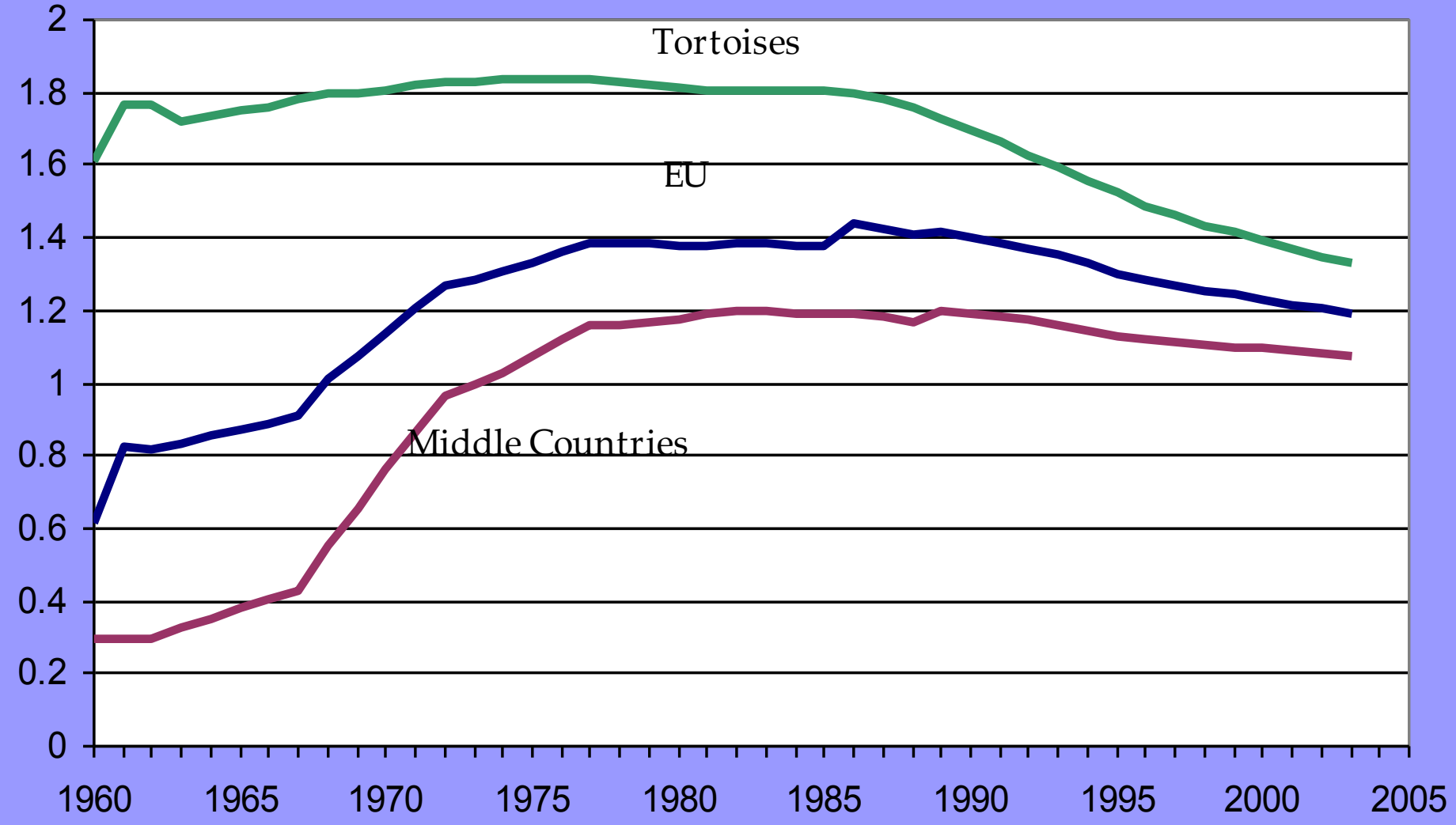
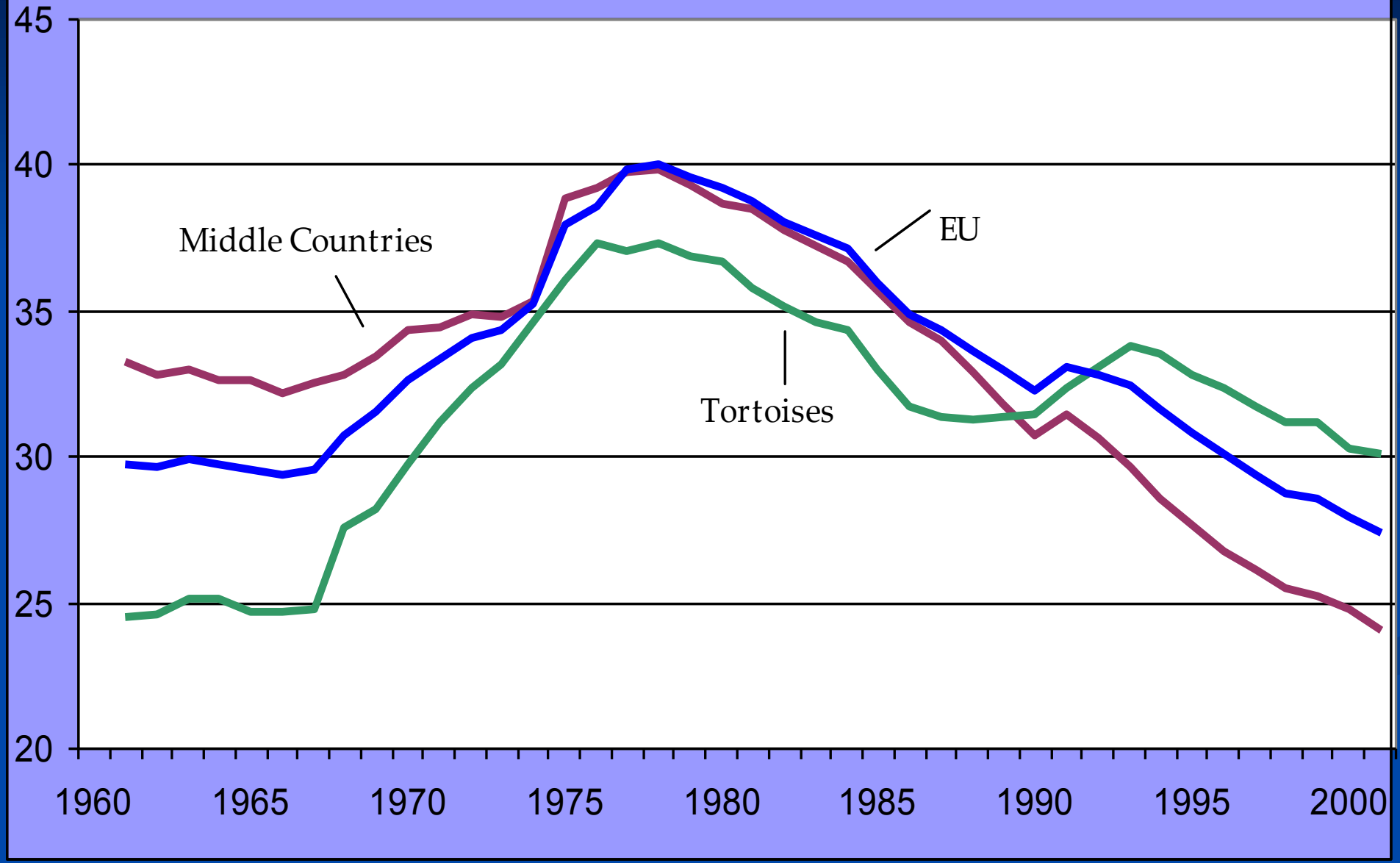
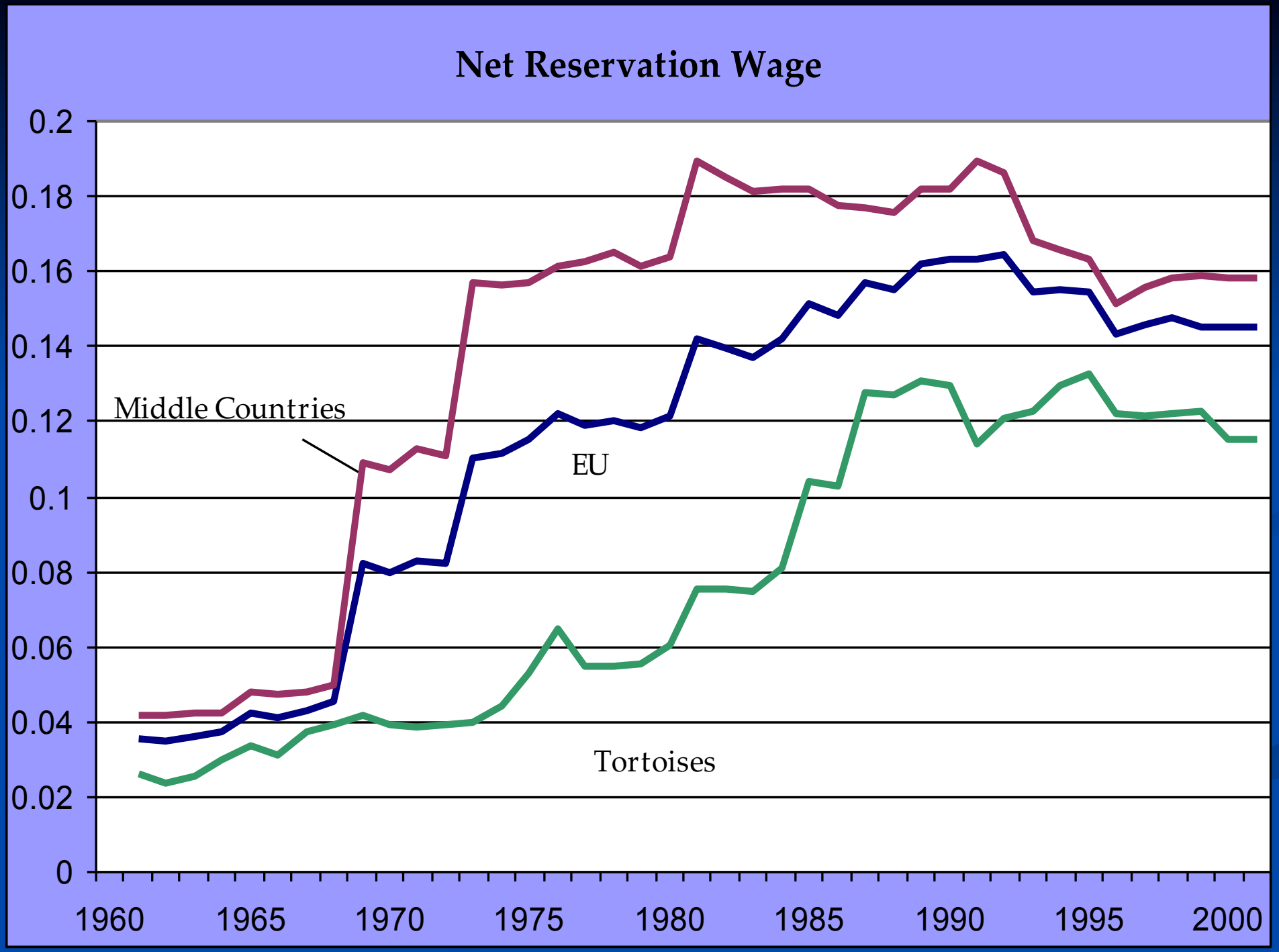


Figure 6. Union Density




Net Reservation Wage
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1960
1965
1970
1975
1980
1985
1990
1995
2000
Middle Countries
EU
Tortoises

Interpreting the Graphs of the Explanatory Variables

- EPL shows the same convergence
- Union density shows the familiar decline
  - This is a messy variable because union power is critical
  - The US has more unions than France
- The net reservation wage has risen, with the Tortoises converging up rather than down

Variable				
Tax Wedge	-0.51 ***	0.01	-0.68 ***	-0.30 ***
EPL			-0.01	0.10 ***
Union Density			-0.23 ***	0.15 ***
Output Gap	1.12 *	1.88 **	0.79	1.42 *
Net Reservation Wage			0.10 ***	0.06 ***
R2	0.59	0.01	0.66	0.23
RMSE	0.135	0.205	0.122	0.181
Number of Observations	352	352	352	352
Fixed Effects?	yes	no	yes	no

- Regressions of employment per capita
- Population weighted, US and Lux. excluded
- Notice the importance of fixed effects
- Net reservation wage and EPL have positive coefficients

Gender	Age	Tax Wedge	EPL	Net. Res. Wage	Output Gap	Union Density	R2
Men	15-24	-1.02 ***	0	-0.05 ***	2.95 ***	0.1 **	0.81
Women	15-24	-1.03 ***	0.02	-0.04 *	2.5 ***	0.14 ***	0.88
Men	25-34	-0.23 ***	0.01	-0.02 ***	1.26 ***	-0.02 *	0.66
Women	25-34	-0.43 ***	0.13 ***	0.08 ***	1.14 **	-0.07 *	0.74
Men	35-44	-0.26 ***	0	0.01	0.73 ***	-0.04 ***	0.53
Women	35-44	-0.8 ***	0.13 ***	0.19 ***	0.56	-0.28 ***	0.82
Men	45-54	-0.5 ***	-0.03	0.09 ***	0.25	-0.21 ***	0.49
Women	45-54	-0.93 ***	0.08	0.23 ***	0.2	-0.54 ***	0.8
Men	55-64	-0.43 ***	-0.07 **	-0.11 ***	0.77 *	0.19 ***	0.82
Women	55-64	-0.67 ***	0	0.01	0.81 *	-0.15 ***	0.95
Men	65+	-1.26 ***	0.08	-0.47 ***	-2.1	0.15	0.78
Women	65+	-1.34 ***	0.07	-0.42 ***	-1.83	0.18	0.75

- E/N regressions by age, FE included
- Note the effect of the output gap declines with age (see Jaimovich)
- Tax wedge has smaller effect on men and prime age workers
- Union density almost always has negative effects

Qualifications for the Next Phase of the Research

- One problem with all of these regressions is that they have no place for a trend
  - Any exogenous trends are forced to show up in the coefficients of trending RHS variables
- In future work, we need to explore either adding a linear trend or some sort of kalman filtered trend
- We also need to check for coefficient instability
  - Marginal effects may be different at different levels of employment

Next We Turn to the Possible Tradeoff of Y/H vs. E/N

- We next run regressions of productivity growth on employment
  - See Gordon(1997), Beaudry and Collard (2001), McGuckin and van Ark (2005), basically any 1-factor model
- Even with instruments, the relationship is robust across countries and time periods
  - Beaudry and Collard provide evidence that the coefficient has shifted over time

Regressions of Productivity on Employment

Variable	Lags				
Employment Rate	0	-0.59	***	-0.52	***
	1	-0.09		-0.1	
	5	-0.05		-0.02	
	10	-0.07		-0.05	
Sum of all Lags		-0.81	***	-0.68	***
Standard Error		[0.13]		[0.13]	
Sum of Lags 1 and 2		-0.69	***	-0.62	***
Standard Error		[0.1]		[0.09]	
Change in Output Gap		0.82	***	0.78	***
Ratio to US LP		-0.022	***	-0.041	***
Fixed Effects?		no		yes	

- Instruments are explanatory variables from prior regressions

Comments on the Productivity Regressions

- Coefficient on employment is -.7 to -.8
- No bounce back with later lags
- Significant catch-up effect
  - Being 10% behind the US adds .2-.4% to ALP growth each year
- Country fixed effects do not affect results much, as opposed to employment regressions

- We can now ask how policy shifts affected productivity growth
  - This is very much back of the envelope – we need to be more careful in the future
- Two basic effects
  - Policy effect
  - Female cultural effect

- We can't identify the total cultural effect on women; we just get the gap the middle countries and tortoises:
  - Take residual male employment growth
    - Call Middle-Tortoise gap the endogenous part
  - To get exogenous female growth, take the Middle-Tortoise gap for female residuals, and subtract the endogenous effect
  - Basically, female residual growth minus male residual growth equals cultural effects
  - We can consider alternative identifying assumptions: get the B functions from regressions

- $E_{s,g} = A_s(POLICY_g)+B_s(ALP_g)+C_{s,g}$
  - S indexes genders {M,F}, G indexes country groups {I,T}; C represents cultural forces
  - POLICY is the vector of policy variables
  - ALP is labor productivity growth
  - Lower case letters represent first differences
- The residuals from the earlier regressions include the B terms
- $Resid_{s,g} = e_{s,g} – A_s(policy_g)=B_s(alp_g)+c_{s,g}$
- $Resid_{M,I}-Resid_{M,T}=B_M (ALP_I)- B_M (ALP_M)$
- $c_{F,I}-c_{F,T}=(Resid_{F,I}-Resid_{F,T})$
  $-(B_F(alp_I)-B_F(alp_T))$
- Two identifying assumptions:
  - $B_M= B_F$
  - $c_{M,I}= c_{M,T}=0$
- $c_{F,I}-c_{F,T}=(Resid_{F,I}-Resid_{F,T})-(Resid_{M,I}-Resid_{M,T})$

Excess employment growth in the Tortoises

	1995		2004		Avg. Growth Rate		
	Actual	Predicted	Actual	Predicted	Actual	Predicted	Residual
US	62.89	61.23	62.34	70.74	-0.10	1.61	-1.70
Middle	53.22	53.37	53.96	55.16	0.15	0.37	-0.21
Tortoises	44.02	43.33	49.58	45.31	1.32	0.50	0.82

- Using the above methodology, we get excess female growth of .63% per year
- Excess policy driven employment growth of .13%
- Note the massive overprediction for US employment growth
  - Short digression on US trends and forecasts

Breaking Down the Middle-Tortoise Gap

- .13% gap in predicted $\Delta E/N$

  $\rightarrow$.1% gap in Y/H

- .63% excess female E/N growth

  $\rightarrow$.48% gap in Y/H

- Adding the two exogenous employment shocks and multiplying by .75 gives a predicted shortfall of .58%
- Of the 1.47 percentage point gap, we can explain 38% with employment effects

- Should we expect this to continue?
- Women in the Tortoises still need to raise employment by 8% to catch up to the middle countries
  - Translates to a 7.7% total gap
  - Implies a further 5.75% shortfall
  - Over ten years would imply a shortfall of .58% per year
- Increased investment would offset some of this

Conclusions

- Across Europe we find a negative correlation between employment and productivity growth
- As labor markets have been liberalized, some countries have experienced huge rises in employment
- Exogenous shocks can explain about 40% of the shortfall in ALP in the tortoises
- Future research needs to identify the sources of the other 60%, starting with
  - a return to the industry-by-industry analysis
  - A dynamic analysis of capital adjustment