

# Economic growth

School of Economics, University College Dublin

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Broadly speaking the EU has two main aims

1. Ensure political stability
2. Improve living standards, i.e. economic growth

EU can address economic growth through

1. International factors

- ▶ Exchange rate regimes; terms of trade; capital flows

2. Policy

- ▶ Promoting competitiveness; full employment; work quality; social cohesion; innovation

Can summarise output in **Cobb-Douglas function**

$$Y_t = A_t K_t^\alpha L_t^\beta \quad (1)$$

$K$  is capital

$L$  labour

$A$  accounts for technology.

**Technology** is an important source of growth

- ▶ Increase in  $A_t$  results in higher output without having to raise inputs
- ▶ Measure of productive efficiency
- ▶ Can fluctuate for various reasons, e.g. new technology, government regulation, management style

Increase in  $A_t$  increases productiveness other factors: **Total Factor Productivity** (TFP).

Often interested in **productivity** in terms of output per worker

$$Y_t = A_t K_t^\alpha L_t^\beta \quad (2)$$

Divide by  $L_t$

$$\begin{aligned} \frac{Y_t}{L_t} &= A_t K_t^\alpha L_t^{\beta-1} \\ \frac{Y_t}{L_t} &= A_t \left( \frac{K_t}{L_t} \right)^\alpha L_t^{\alpha+\beta-1} \end{aligned} \quad (3)$$

$$\frac{Y_t}{L_t} = A_t \left( \frac{K_t}{L_t} \right)^\alpha L_t^{\alpha+\beta-1}$$

Shows three potential ways to increase productivity

1. Increase in number of workers
2. Capital deepening
3. Technological progress

**More workers** will only add to growth when

$$\alpha + \beta > 1 \quad (4)$$

Most growth theories assume constant returns to scale

$$\beta = 1 - \alpha \quad (5)$$

Production function becomes

$$\frac{Y_t}{L_t} = A_t \left( \frac{K_t}{L_t} \right)^\alpha \quad (6)$$



**Swan-Solow model** links output to capital, labour and technological efficiency parameter

$$Y_t = AF(K_t, L_t) \quad (7)$$

Key feature: diminishing marginal return to capital accumulation

- ▶ Increase in  $K$  will give progressively smaller increase in  $Y$

$$\frac{\delta^2 Y_t}{\delta K_t} < 0$$

- ▶ Assuming constant labour supply

Model assumes closed economy and no government sector

- ▶ No international trade or public spending

All output takes form of consumption or investment

$$Y_t = C_t + I_t \quad (8)$$

Capital depreciates

$$\frac{\partial K_t}{\partial t} = I_t - \gamma K_t \quad (9)$$

Capital stock depends on

1. Investments (+)
2. Depreciation rate (-)

Consumers save constant share of income: investments constant fraction of output

$$I_t = S_t = Y_t - C_t \quad (10)$$

Investment level given by

$$I_t = sY_t = sAF(K_t, L_t) \quad (11)$$

One off increase in technology level  $A$  same effect as one off increase in  $s$

- ▶ Capital and output gradually increase to a new level

## $K$ vs. $A$

Important difference between two growth determinants

- ▶ Savings rate  $s$  is subject to a limit
- ▶  $A$  does not face constraints.

Implication: for long-term sustainable growth TFP increases matter

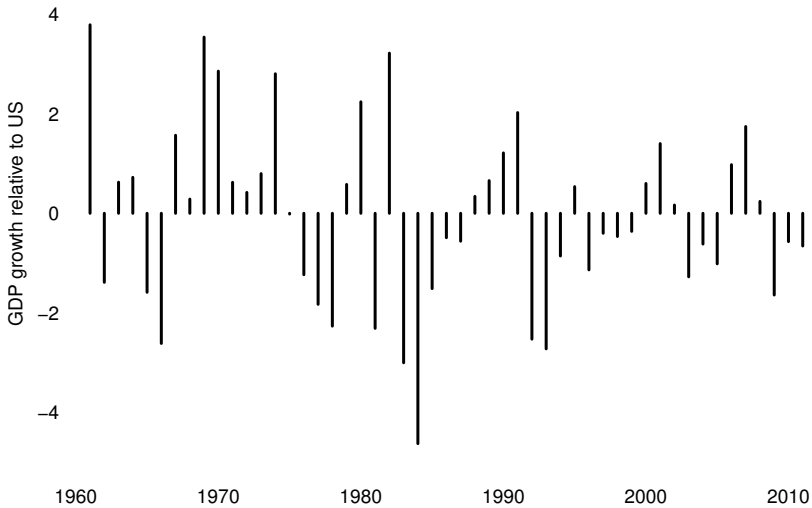
- ▶ Growth through capital accumulation will taper off over time producing a one-off increase in output per worker whereas TFP growth can lead to sustained higher growth rates of output per worker

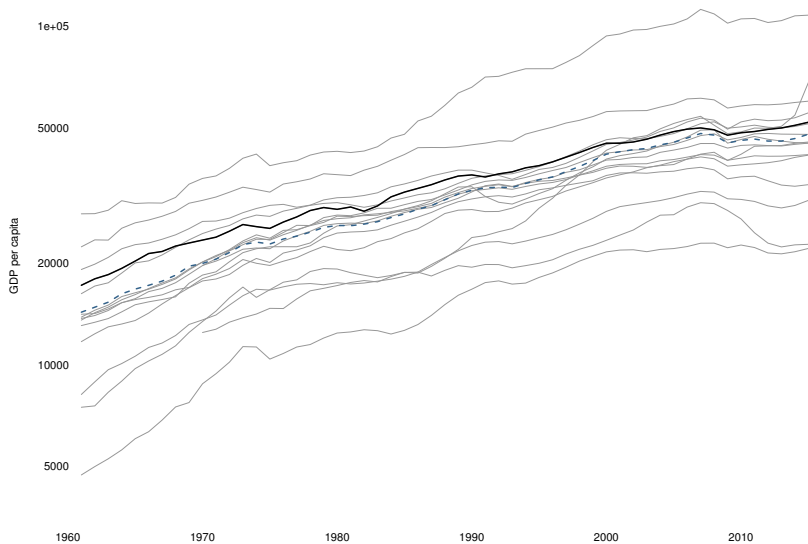
How well are EU countries doing in terms of economic growth?

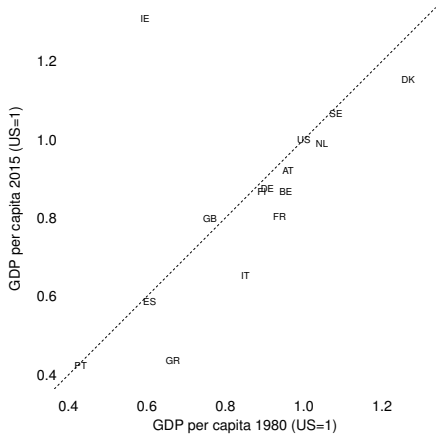
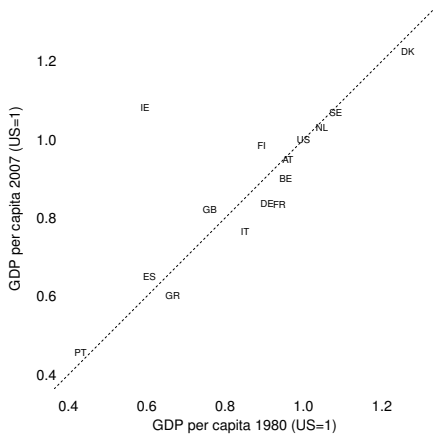
- ▶ Recall situation was pretty bleak following WW2

To answer question can take two approaches

1. Compare to USA
2. Development of new EU member states









European productivity reduction can be attributed to

1. Taxation level
2. Regulations
3. Level of competition

On the other hand, in Europe there is

1. Better quality of living
2. Lower inequality

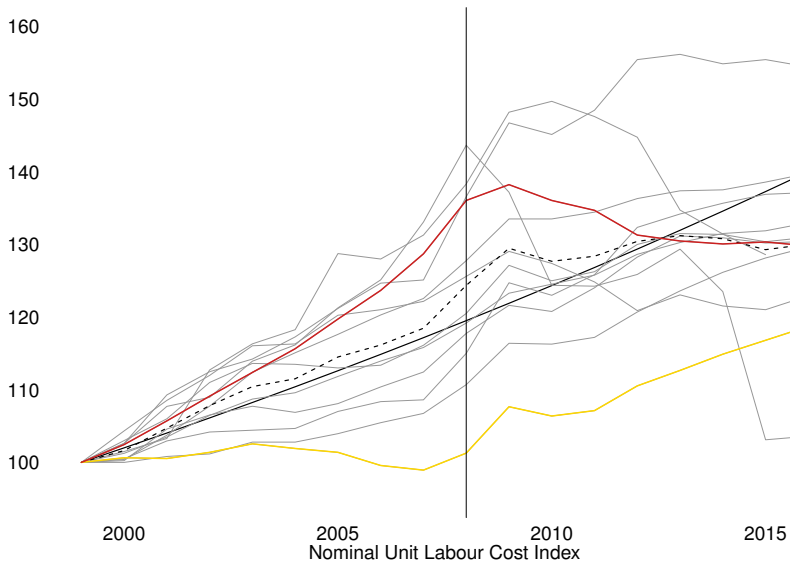
## Two main issues concerning EU economic growth

### 1. Lack of competitiveness

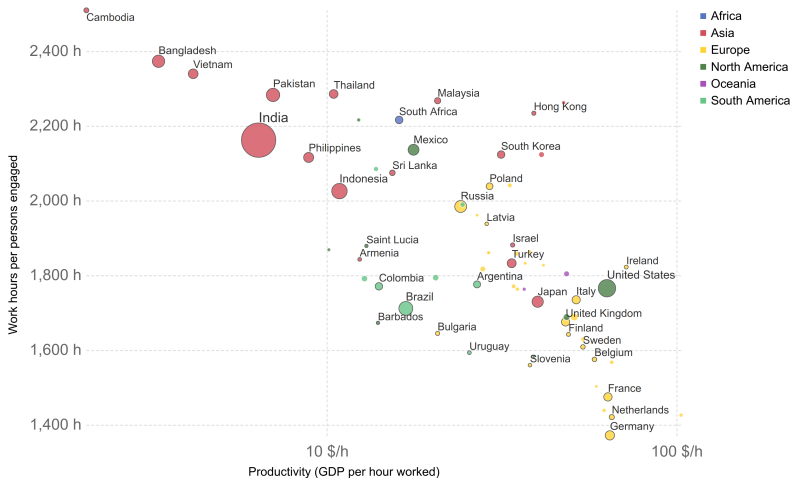
- ▶ Difficult to measure: can proxy with relative unit labour costs
- ▶ Nominal wage growth rate out pacing labour productivity

### 2. Low employment rate

- ▶ EU GDP per capita 35% below US
- ▶ European works less; output-per-hour is comparable



# Productivity vs Annual hours worked, 2014



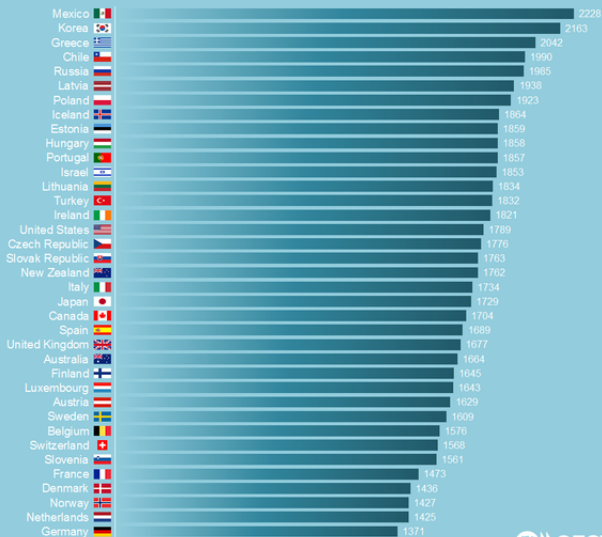
Source: Work hours per persons engaged, Productivity (GDP per hour worked)

OurWorldInData.org/working-hours/ • CC BY-SA



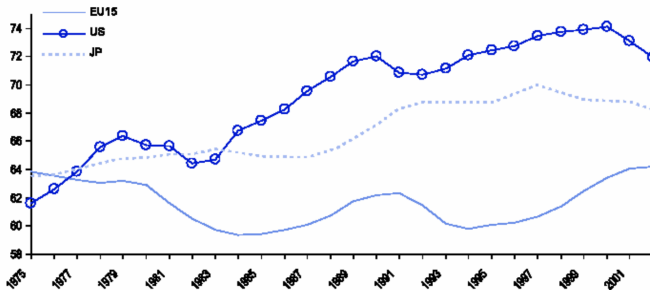
# Hours worked per year

Average, 2014 (2013 for Belgium, Korea and Turkey)



Source: OECD (2015), Hours worked (indicator), doi: 10.1787/47be1c78-en

**Figure 1. Employment rates in the EU, US and Japan 1975-2002**  
**(% of working population)**



Source: European Commission (2003)

Employment rate is lower because

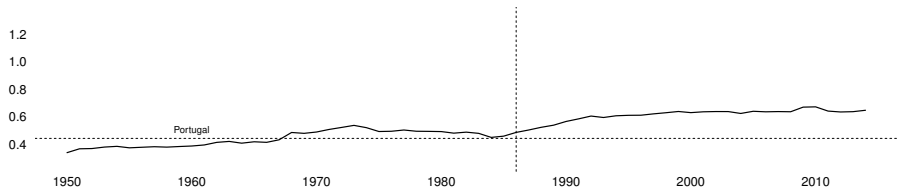
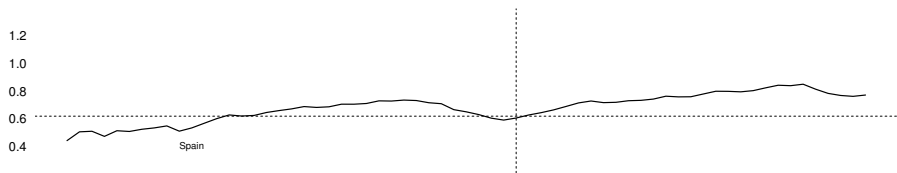
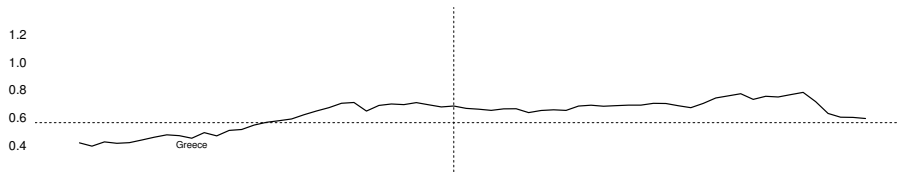
1. Relatively few new jobs are created
2. Unemployed Europeans spend more time searching for employment

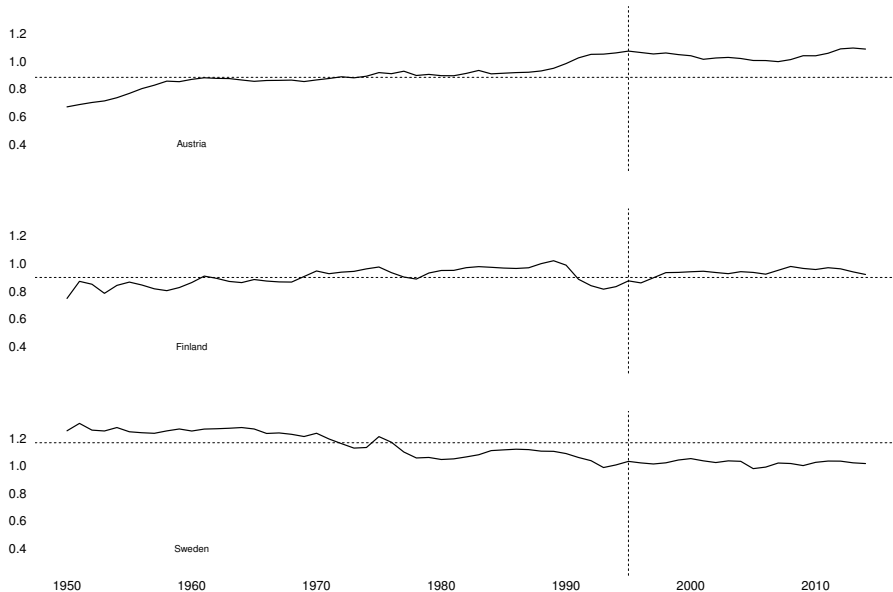
Besides using US as counterfactual can look at new member states

1. 1970s: Denmark, the United Kingdom, and Ireland
2. 1980s: Former juntas; Greece, Portugal, and Spain
3. 1995: Former non-aligned countries; Austria, Finland, and Sweden
4. 2000s: Former East Bloc countries









## 2005 evaluation of 1995 members

### **Austria**

- ▶ Lower prices resulting in 2% welfare effect
- ▶ Additional 0.5% GDP growth annually

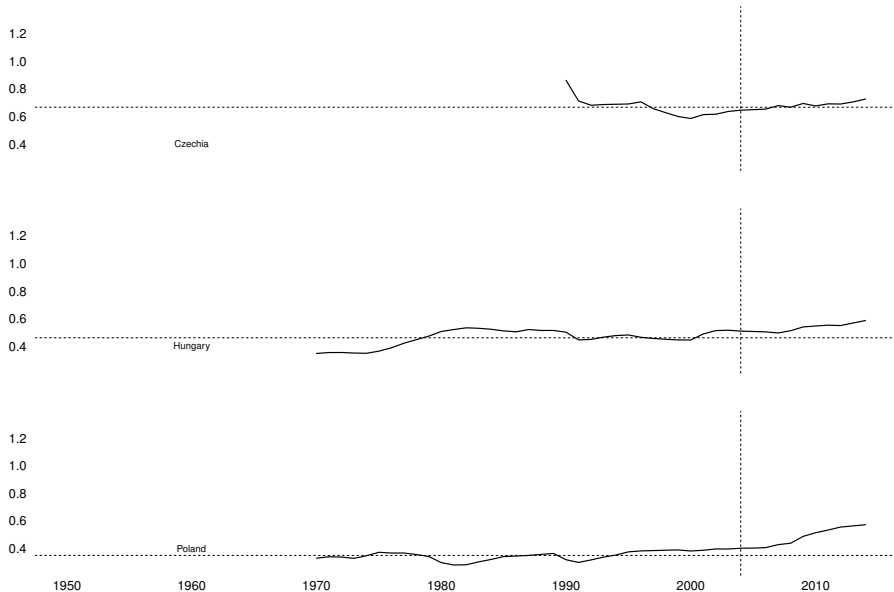
### **Finland**

- ▶ Increase in trade and investment
- ▶ Lower consumer prices
- ▶ Large overall impact on economy

### **Sweden**

- ▶ Estimated 0.4% increase in trend growth
- ▶ Increase in competition and FDI
- ▶ Improvement in fiscal and monetary policy

In general evaluation showed that joining the EU had been beneficial.



## Growth accounting

$$G_t^Y = G_t^A + \alpha G_t^K + (1 - \alpha) G_t^L \quad (12)$$

Output growth equals

1. Technology growth
2. Weighted average of capital and labour growth rates

Weight determined by  $\alpha$

- ▶  $1 - \alpha$  fraction of income paid to workers rather than compensating capital

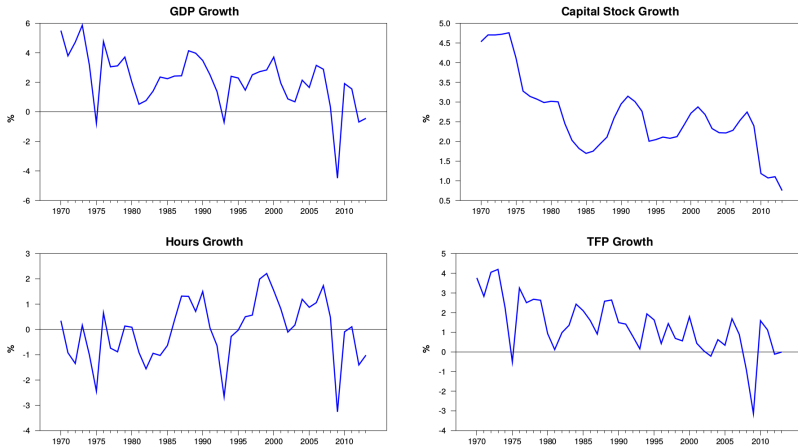
Table 1: Decomposition of Euro Area and US Output Growth Rates (%)

Period	Euro Area				United States			
	$\Delta y$	$\Delta a$	$\Delta k$	$\Delta l$	$\Delta y$	$\Delta a$	$\Delta k$	$\Delta l$
1970-1976	3.6	2.7	1.5	-0.5	3.1	0.9	1.2	1.0
1977-1986	2.1	1.6	0.8	-0.4	3.1	0.7	1.2	1.2
1987-1996	2.3	1.5	0.8	0.0	2.9	0.9	1.1	0.9
1997-2006	2.2	0.7	0.8	0.7	3.1	0.9	1.6	0.7
2007-2013	-0.3	-0.2	0.5	-0.6	1.0	0.5	0.7	-0.2
2000-2013	0.9	0.2	0.7	0.0	1.7	0.5	1.1	0.2
2010-2013	0.1	0.3	0.3	-0.5	2.1	0.7	0.5	0.9

**Note:** The table shows the contribution of growth in labour inputs, capital inputs and TFP to total output growth.

# Figure 1

## *Determinants of Euro Area Output Growth: 1970-2013*





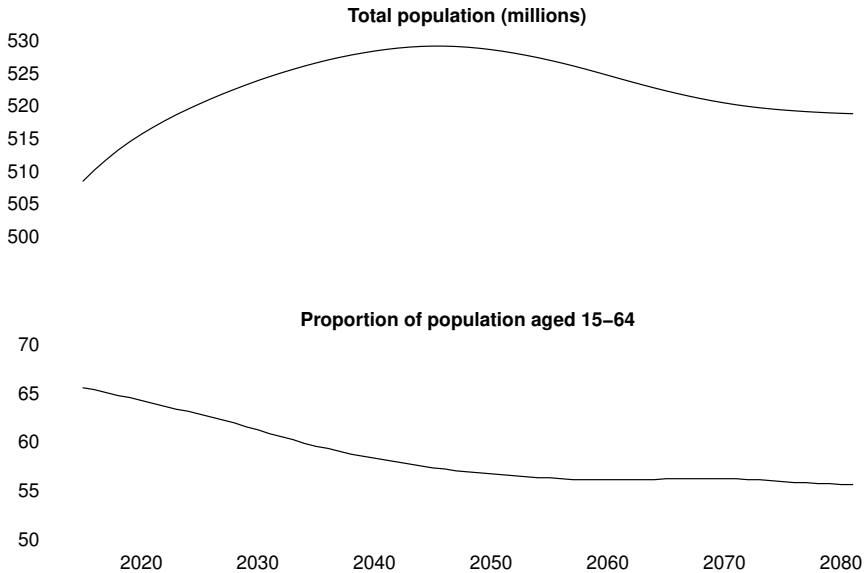
## Europe vs. US

Similar development but since 1990s US growth has been 1.3 percentage points higher

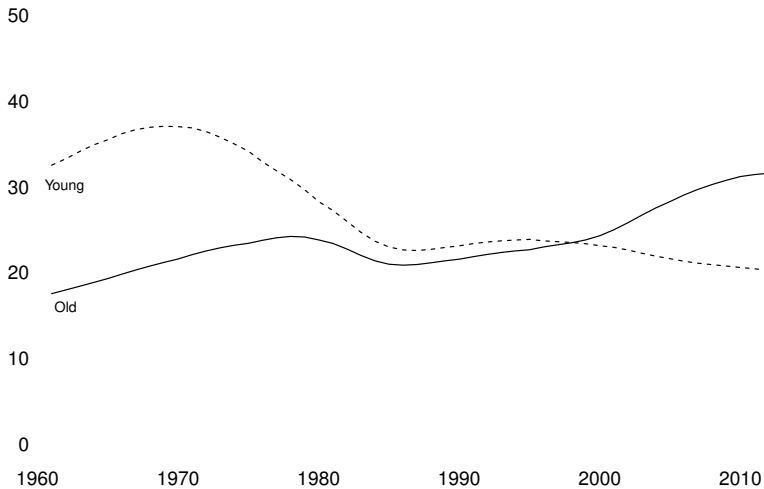
- ▶ Output per worker has declined in Europe
- ▶ Reduction in TFP growth

Past output growth

1. Reliance on capital (labour minor role)
2. Less on TFP improvements



## Age dependency Germany



## Population aging poses serious problem

- ▶ Population growth slowing down; expected to peak middle of century
- ▶ Working population (15-64 years) already peaked

Possible further reduction in hours worked: reducing output growth

- ▶ Assuming employment rate returns to pre-crisis levels

Europe's macroeconomic problems are twofold

1. Short term

- ▶ Weak aggregate demand
- ▶ High levels of public and private debt

2. Long term

- ▶ Demographic challenges

## **Structural reforms** required to boost productivity

### 1. Labour market

- ▶ Reducing long-run unemployment rates
- ▶ e.g. protection against dismissals, regulation of part-time work

### 2. Pension

- ▶ Workers can work to a later age
- ▶ Switzerland: high rate of labour participation among older workers

### 3. Broader regulatory reforms

- ▶ e.g. taxes, education policies, etc.

2000 **Lisbon strategy** aimed to address these issues, deregulating

- ▶ Labour markets
- ▶ Product markets

Aim was to create

*the most dynamic, knowledge based economy in the world by 2010*

Failed

Lisbon strategy focused specifically on

- ▶ Problems posed by the public sector
  - ▶ Risk-taking was discouraged by large bureaucracies
  - ▶ Public services that are often inefficient
  - ▶ Policies that protect jobs rather than people
- ▶ Salience of national interests
  - ▶ Protectionist measures that inhibit competition in the services sector
  - ▶ Absence of unified research space



## **Europe 2020**

New 10-year strategy rolled out in 2010

- ▶ Responsibility for structural reforms lies with the national governments
- ▶ Should rely on the European single market and the common trade policy

## **Employment**

- ▶ Target of 75% employment rate of 20-64 year-olds

## **Innovation**

- ▶ Invest 3% of EU's GDP in R&D

## **Climate/energy**

- ▶ Limit greenhouse gasses by 20-30% compared to 1990 levels
- ▶ 20% of energy requirements coming from renewable energy
- ▶ Increasing energy efficiency by 20%

## **Education**

- ▶ Reduce school dropout rate below 10%
- ▶ 40% of 30-34 year old completing tertiary education

## **Social inclusion**

- ▶ Reduce people at risk of poverty or social exclusion with 20 million