

# ECOM181 Macroeconomics for Policy

## 2022/23 Semester 1

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# Plan for today

- Discussion based on key reading
- Relating to solow model
- Growth accounting based on production function (more in TA session)

# Growth accounting: multi-factor productivity estimates, UK: October to December 2019

Statistical bulletin ONS

# Questions to discuss

- What are the factors behind the productivity slowdown?
- Why do you think the Global Financial Crisis has persistent effects on productivity?
- What do you think of the potential impact of Brexit on productivity in the UK?

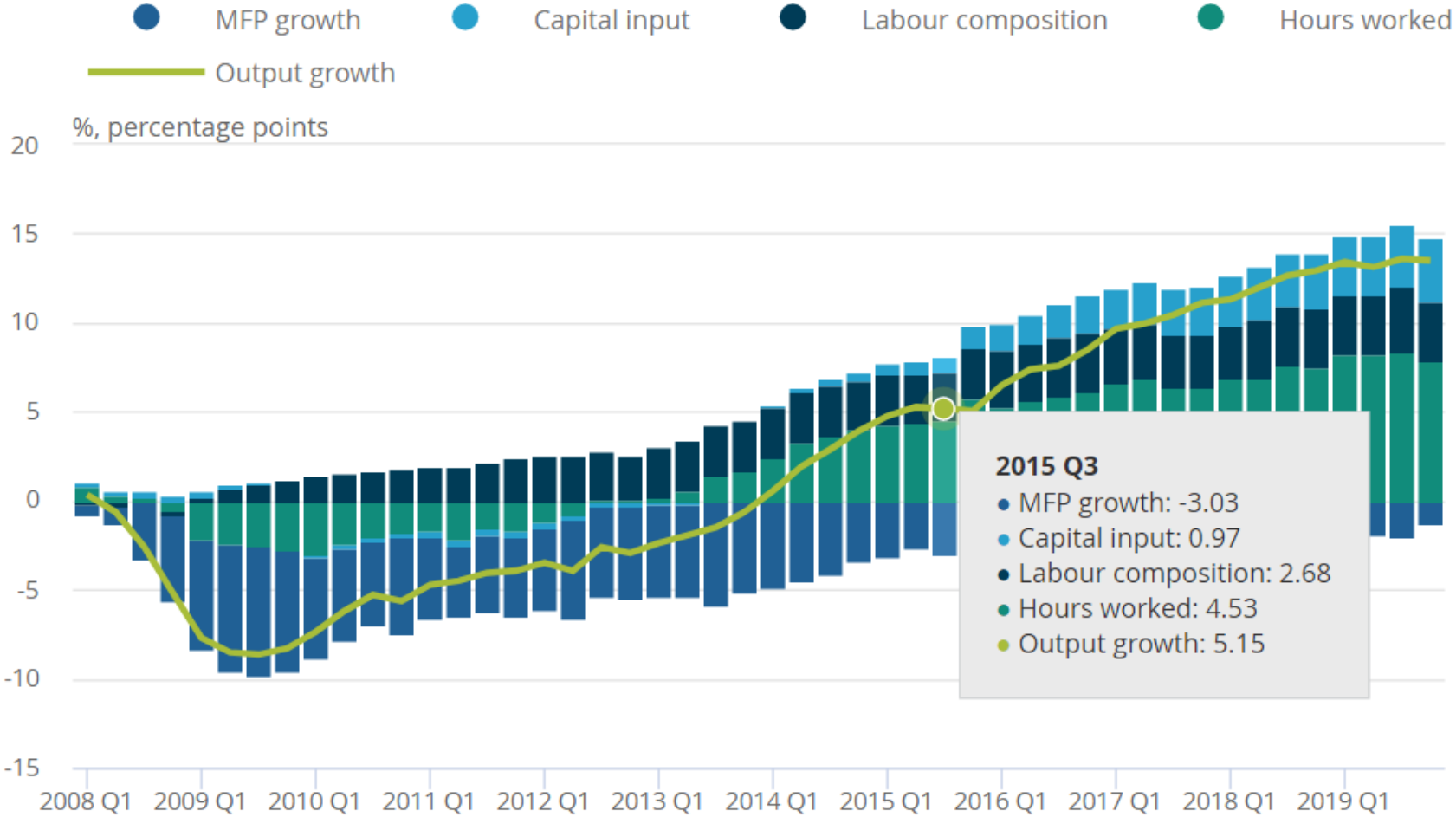
# Questions to discuss

- What are the factors behind the productivity slowdown?

# Output growth and productivity

- Output has been growing, but not due to growth in productivity (MFP)
- Instead, hours worked has been driving growth

# Hours worked is driving growth

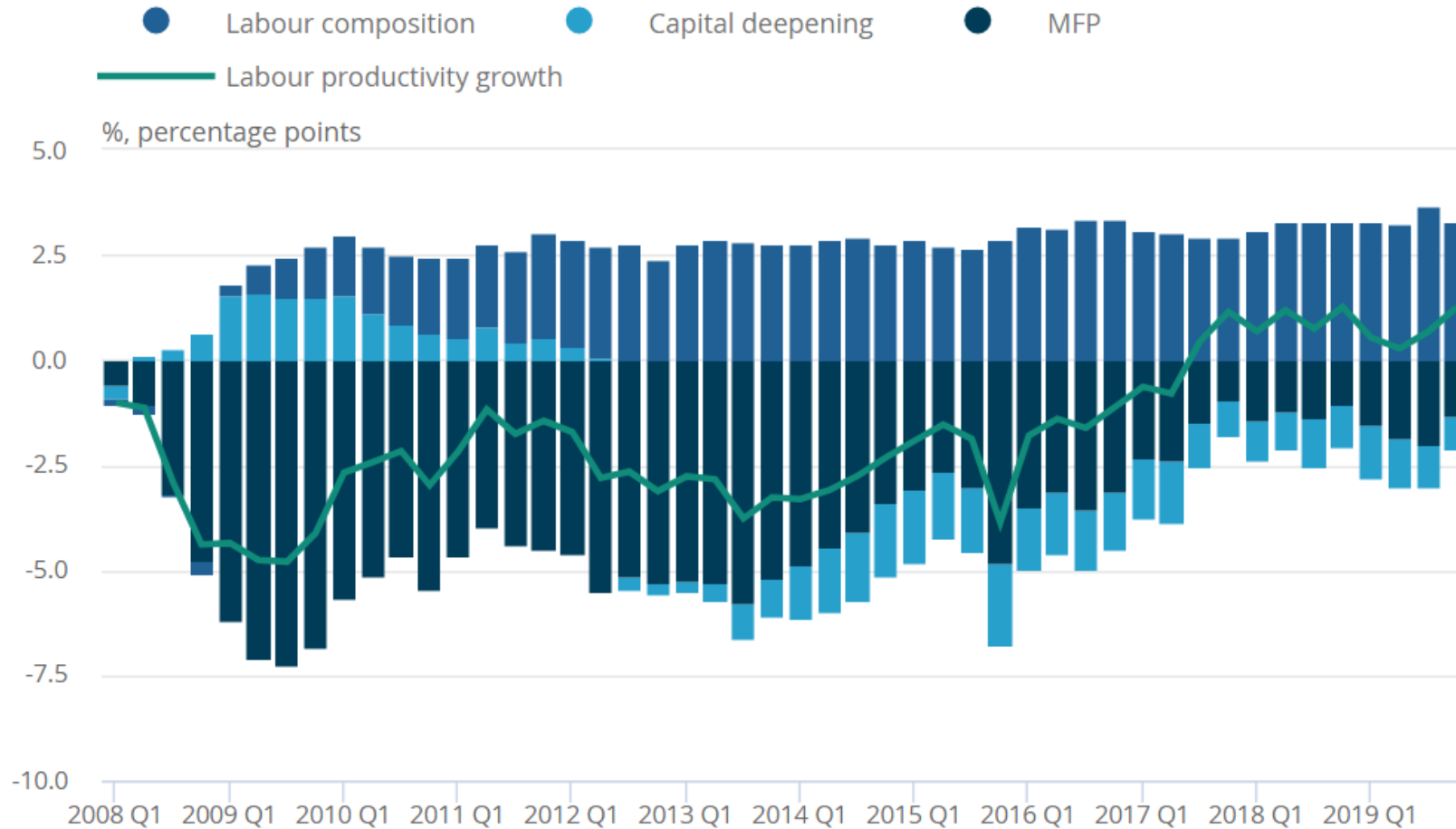


# Output growth and productivity

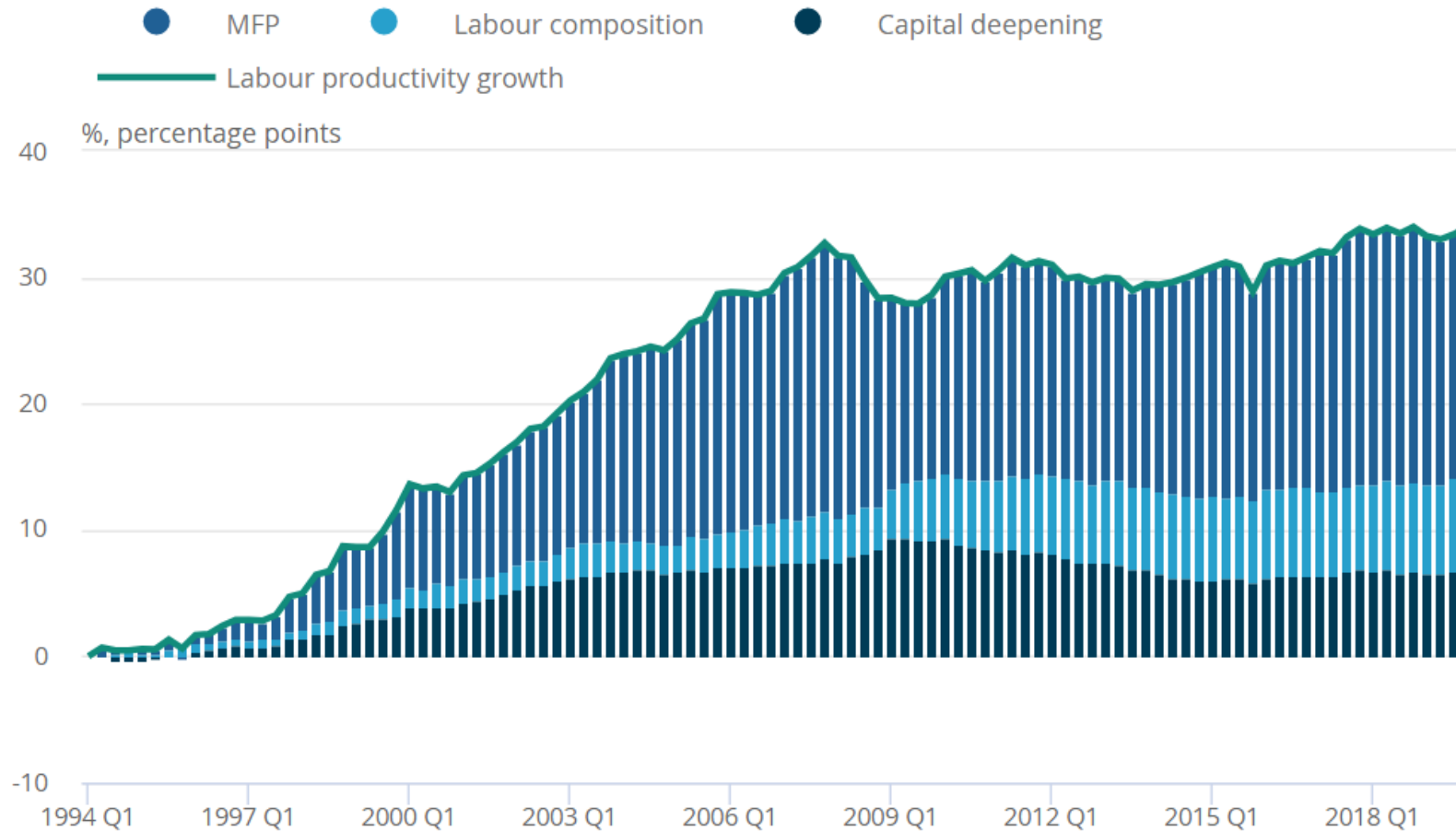
- Output has been growing, but not due to growth in productivity (MFP)
- Instead, hours worked has been driving growth
- Output per hour worked (labor productivity) has not been growing
  - And any growth there is driven by labor composition
  - MFP has been having a negative influence
  - And capital recently as well



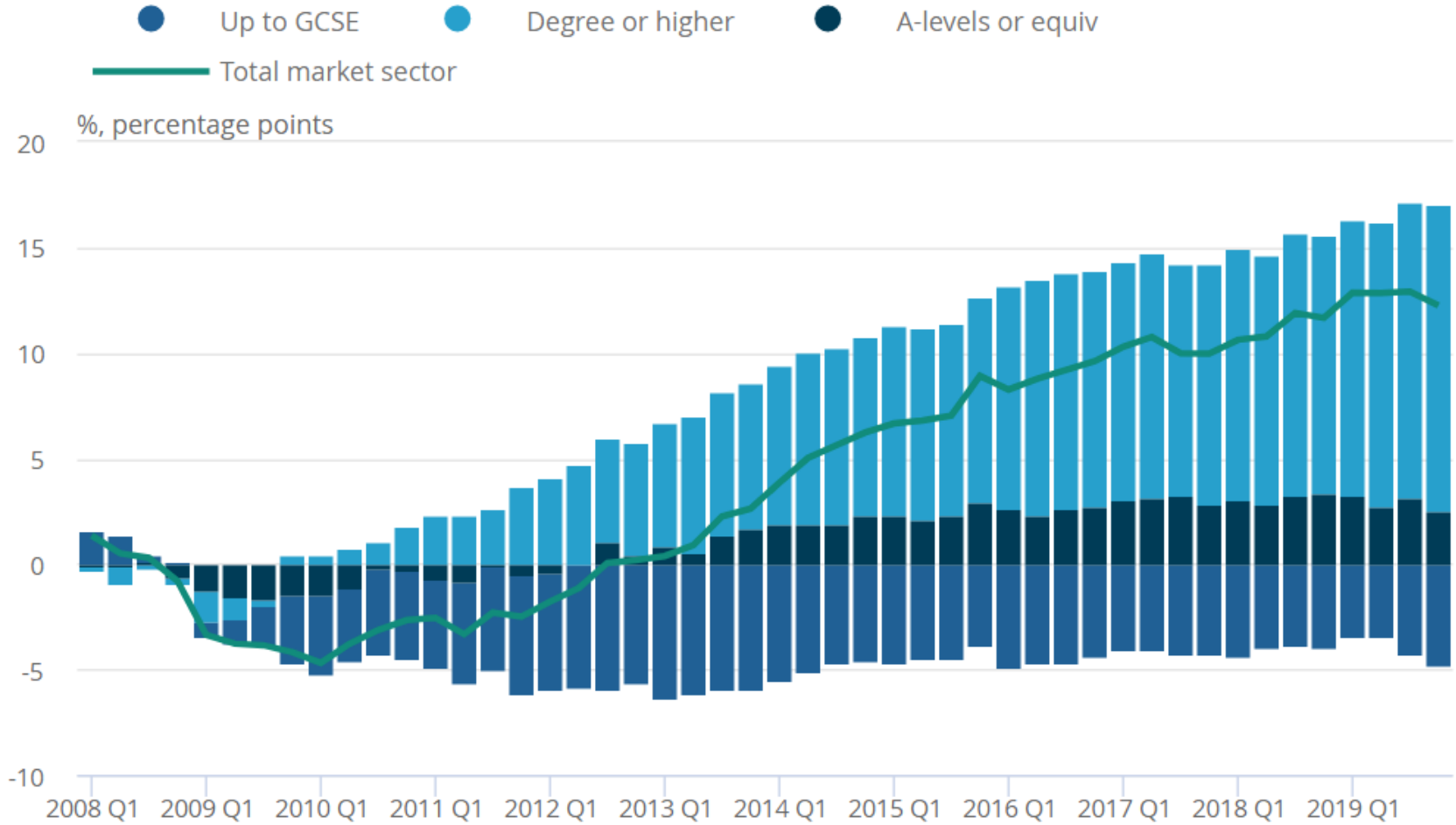
# Slow productivity growth driven by labor composition



# Slow productivity growth driven by labor composition



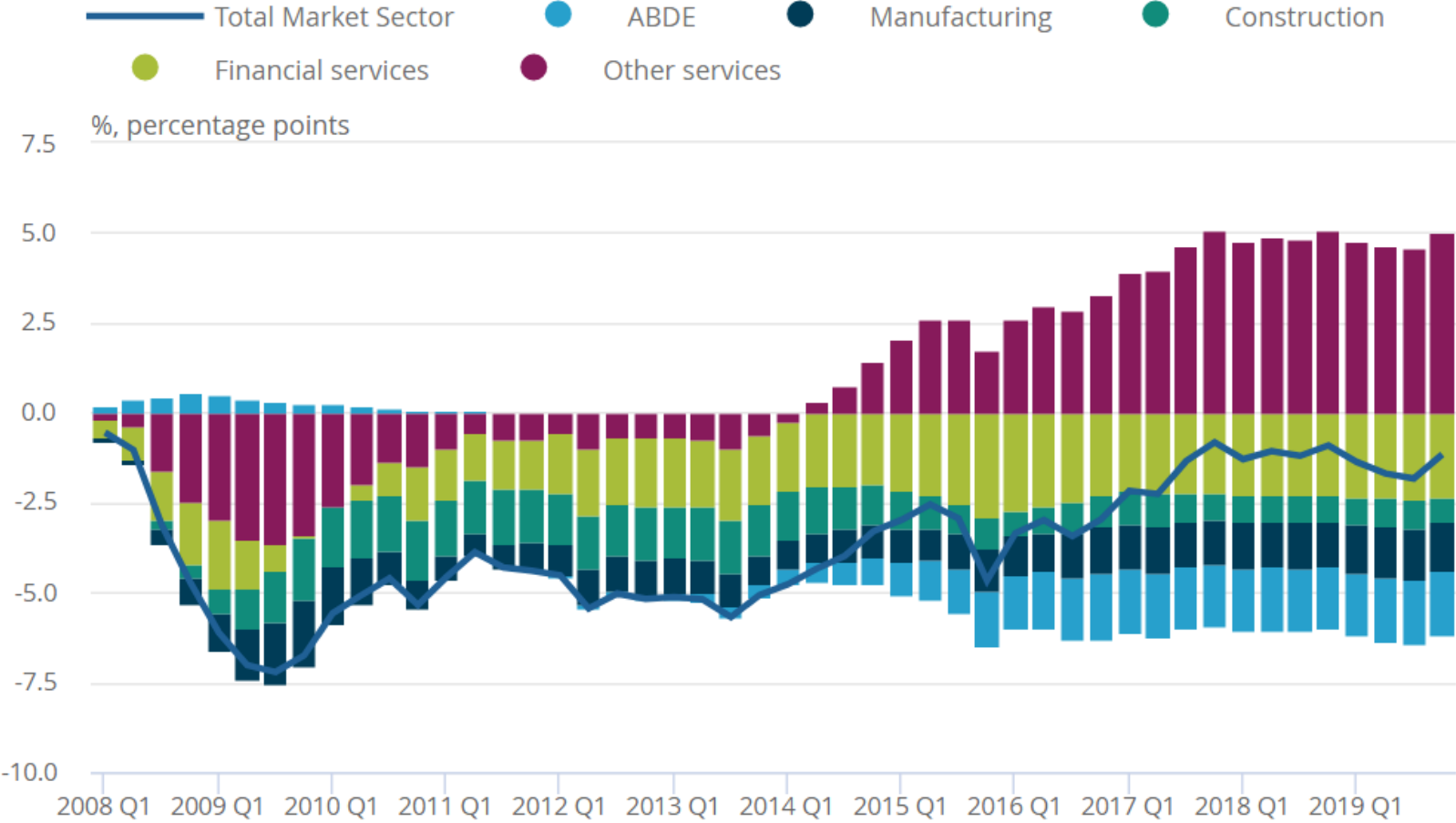
# Labor composition: more hours for high-skilled workers



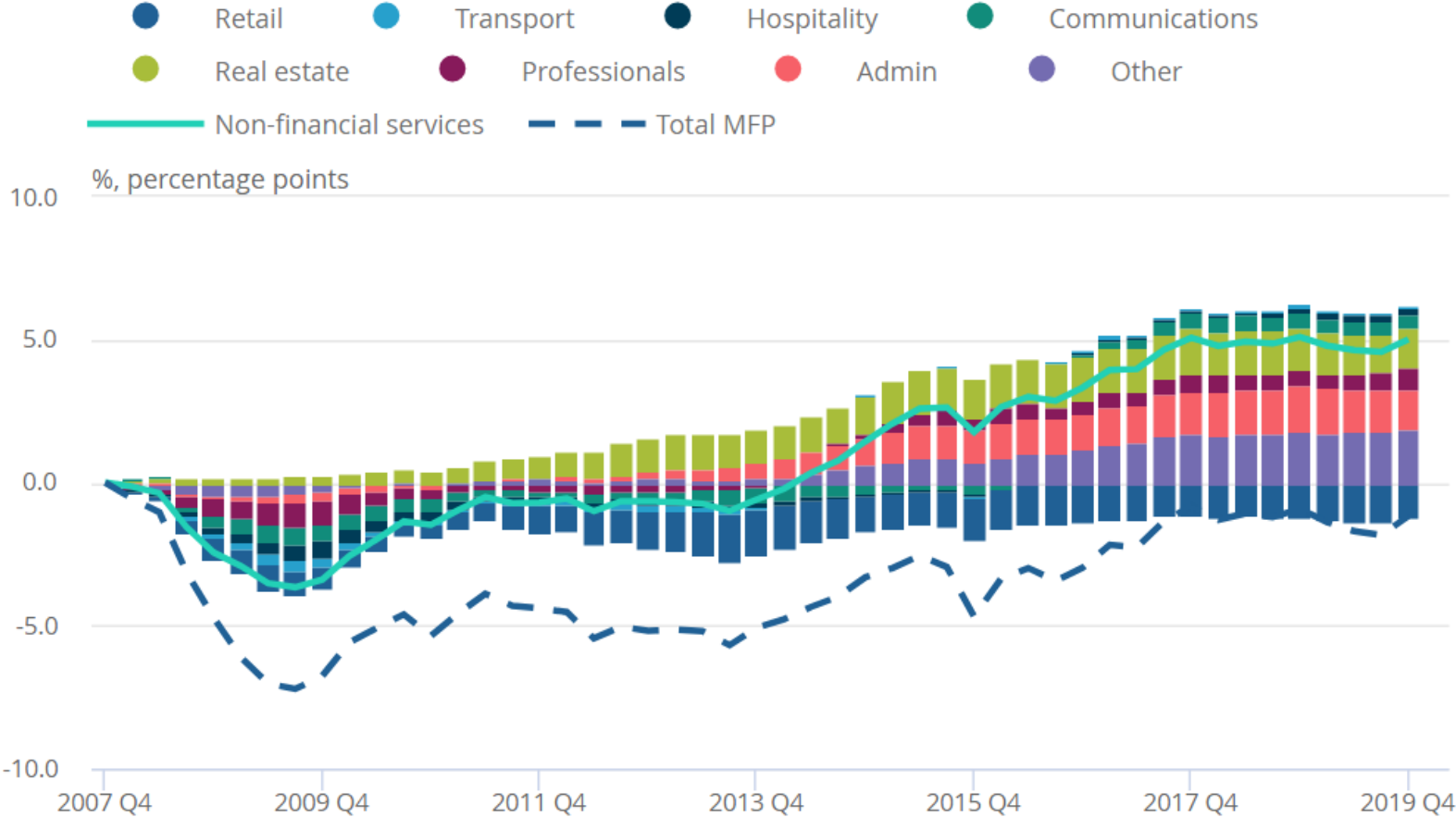
# MFP growth

- Improvement in technology and efficiency of the production process (MFP) has not been driving growth.
- But does that perhaps depend on the sector?

# How do different sectors contribute to MFP growth?



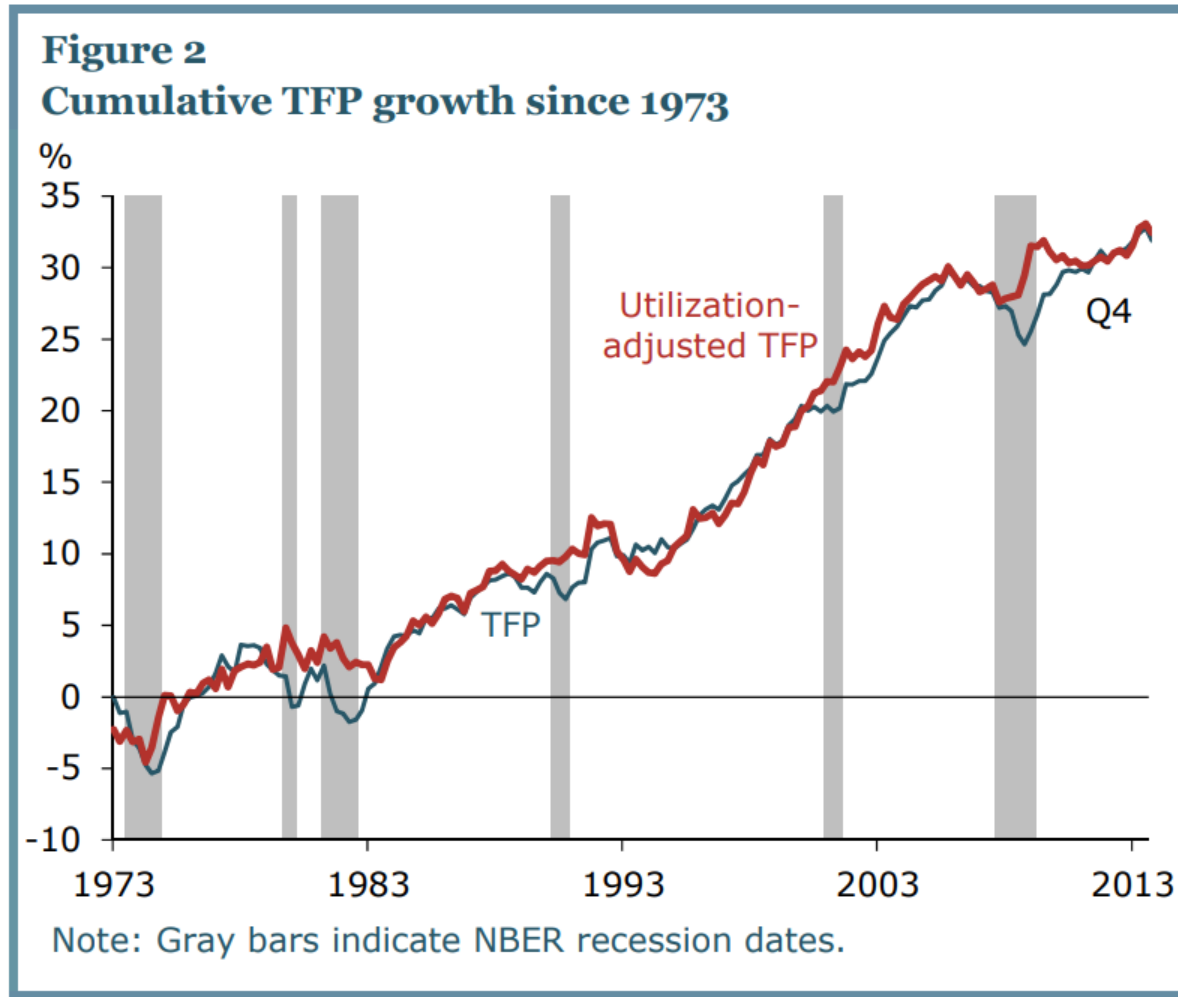
# Further decomposition of MFP growth (services)



# Questions to discuss

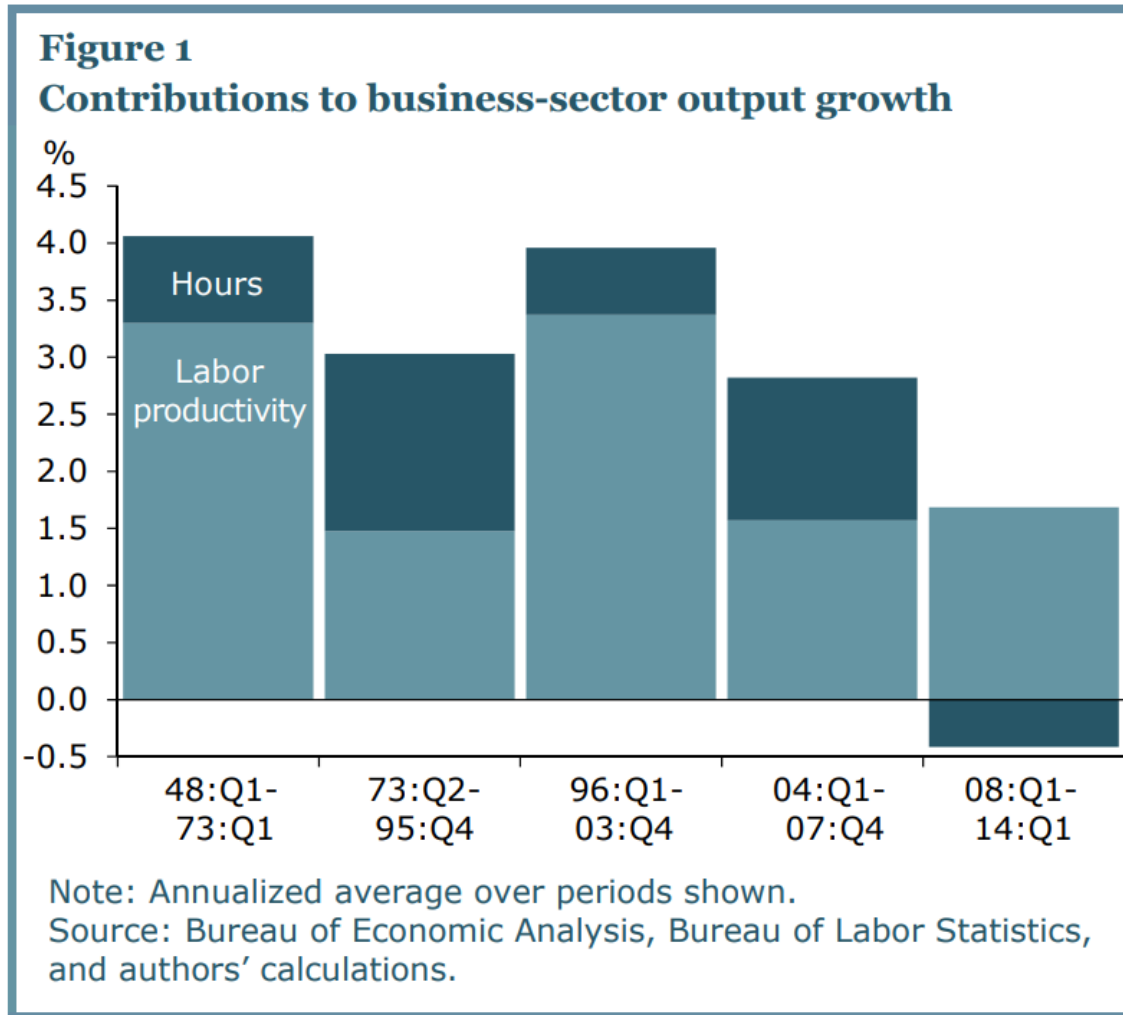
- Why do you think the Global Financial Crisis has persistent effects on productivity?

# Actually in the US the slowdown started before 2007

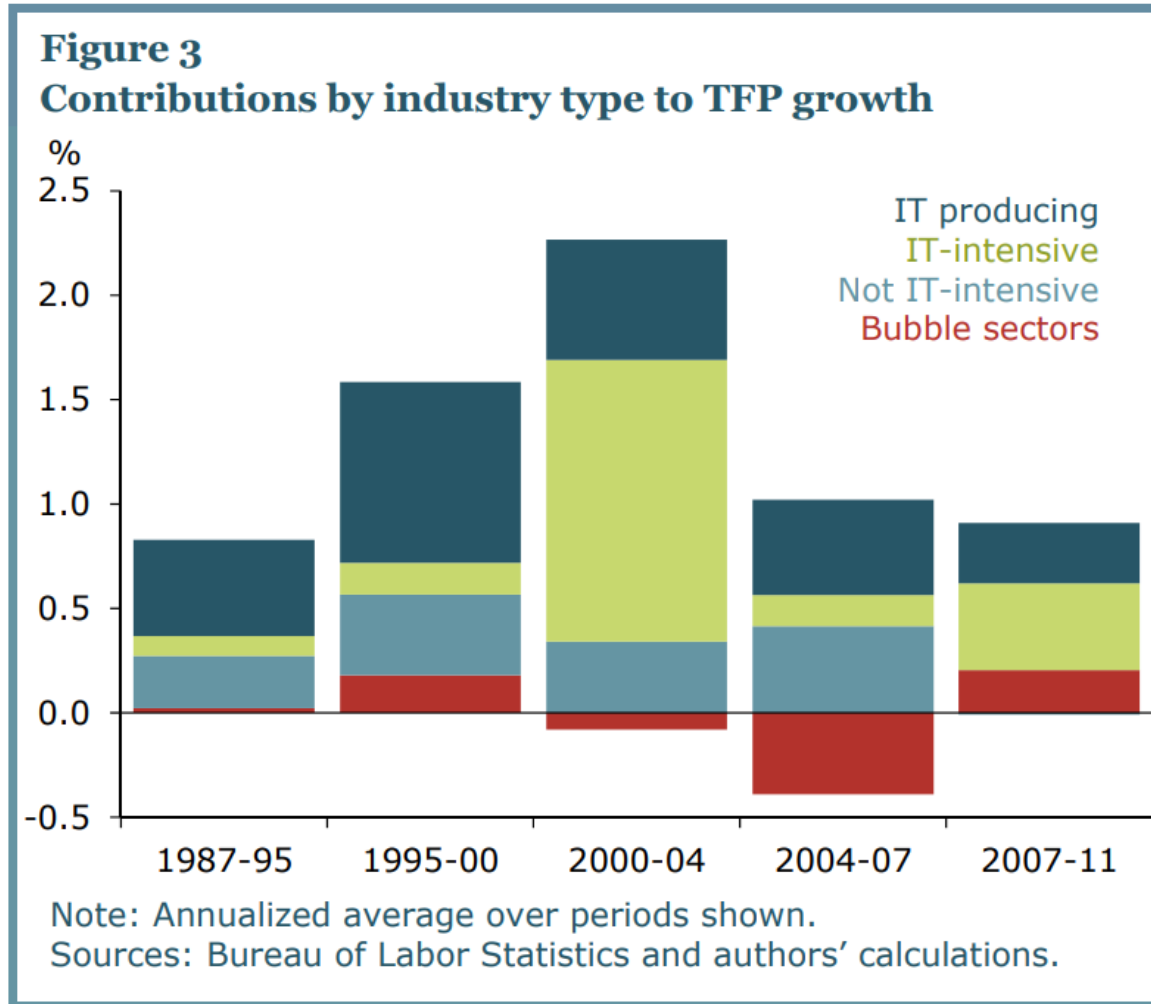




# Actually in the US the slowdown started before 2007



# Maybe it is IT?



# Questions to discuss

- What do you think of the potential impact of Brexit on productivity in the UK?

# Plan for today

- Discussion based on key reading
- **Relating to solow model**
- Growth accounting based on production function (more in TA session)

# Solow model

- Solow model focuses on role of capital per worker
    - determined in the long run by the saving rate of households
    - Short-run fluctuations may arise (convergence)
  - Hours worked is not modeled in detail
  - Quality of labor not modelled
  - MFP ( $A$ ) is exogenous and often assumed constant
- Good first step, but we need extensions / other models to understand actual economic growth.

# Plan for today

- Discussion based on key reading
- Relating to solow model
- **Growth accounting based on production function (more in TA session)**

# Growth accounting

- As part of the slow model, you saw the following production function

$$Y_t = A_t K_t^\alpha L_t^{1-\alpha}$$

- $Y_t$ : output
- $A_t$ : total factor productivity
- $K_t$ : capital input
- $L_t$ : labor input
- $1 - \alpha$ : labor share of income

- This can be written as

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

# Growth accounting

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

So we can decompose economic (per capita) growth in

- growth driven by MFP
- growth driven by a rising capital stock
- growth driven by an increase in hours worked

→ This is a simplified version of the decomposition that we just discussed



# Growth accounting

In the class (TA session) next week you will implement this using UK data:

- $Y_t$ : real GDP
- $N_t$ : working-age (15-64) population
- $K_t$ : real capital input
- $L_t$ : total annual hours worked
- $1 - \alpha$ : labor share of income

# Growth accounting

The tricky part is capital for which no time series is available.

→ Use investment time series to construct it, using perpetual inventory method

$$K_{t+1} = (1 - \mathit{delta})K_t + I_t$$

$$K_{1981} = (1 - \mathit{delta})K_{1980} + I_{1980}$$

$$K_{1982} = (1 - \mathit{delta})K_{1981} + I_{1981}$$

$$K_{2019} = (1 - \mathit{delta})K_{2018} + I_{2018}$$