

# Monetary Policy

Part 3: Monetary Policy at the Zero Lower Bound on Nominal Interest Rate

Exercise 8: Monetary Policy Transmission, Zero Lower Bound

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## Task 1: Term Structure Theory

## Task 1 (a)

Explain the three stylized facts on the term structure of interest rates.

## Task 1 (a)

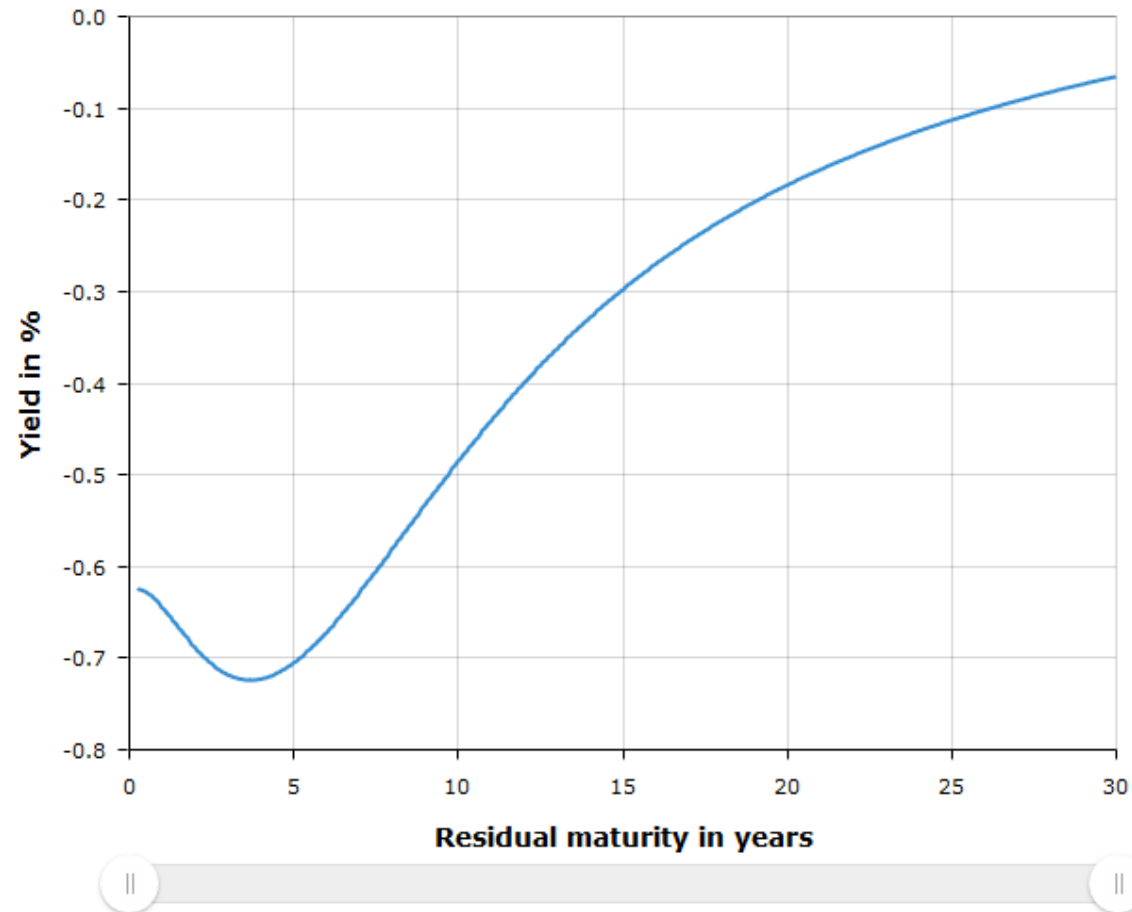
Term structure of interest rates:

1. Yields of bonds of different maturities move overall together over time
2. When short term yields are low, the yield curve is more likely to have an up-ward slope; when short-term yields are high, yield curves are more likely so slope downward (inverted yield curve)
3. Yields curves slope upwards most of the time

# Task 1 (a): situation in the European market in 2021

AAA rated bonds  All bonds All ▼

**Spot rate** | Instantaneous forward | Par yield **Curve** | Yields | Parameters



*Dashed lines indicate the spot rate based on all government bonds; solid lines on AAA-rated bonds only.*

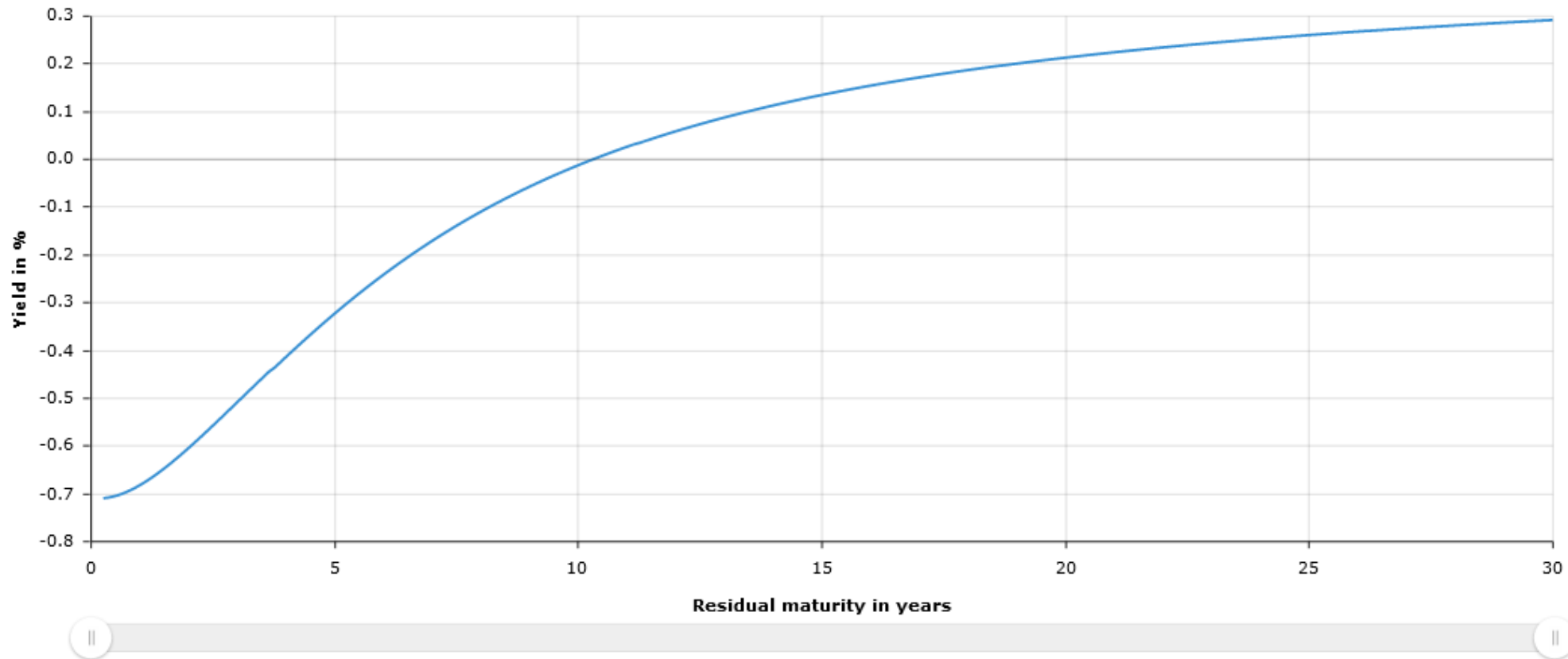
# Task 1(a): current situation in the European market (Jan 2022)

19 January 2022 

AAA rated bonds  All bonds Select maturity ▾

**Spot rate** | Instantaneous forward | Par yield

**Curve** | Yields | Parameters



*Dashed lines indicate the spot rate based on all government bonds; solid lines on AAA-rated bonds only.*

## Task 1 (b)

Which of the theories mentioned in the lecture can and which cannot explain the three stylized facts on the term structure of interest rates? Which assumptions do the theories require?

## Task 1 (b)

Expectations theory:

- Explains different slopes of the yield curve
- Assumption: short- and long-term bonds are perfect substitutes

Segmented markets theory:

- Explains the (most of the time) upward sloping yield curve
- Assumption: no substitutes

Liquidity premium theory:

- Explains all characteristics
- Assumption: imperfect substitutes



## Task 2: Monetary Policy Transmission

## Task 2 (a)

Show that a monetary policy shock affects inflation and output negatively by calculating partial derivatives of the solution to the IS-MP-PC model.

## Task 2 (a)

$$\pi_t = \theta \pi_t^e + (1 - \theta) \pi^* + \theta (\gamma \varepsilon_t^y + \varepsilon_t^\pi - \alpha \gamma \varepsilon_t^i), \quad \theta = \frac{1}{1 + \alpha \gamma (\beta_\pi - 1)}$$
$$y_t = y_t^* - \theta \alpha (\beta_\pi - 1) (\pi_t^e - \pi^* + \varepsilon_t^\pi) + (1 - \theta \alpha \gamma (\beta_\pi - 1)) \varepsilon_t^y + \alpha (\theta \alpha \gamma (\beta_\pi - 1) - 1) \varepsilon_t^i$$

## Task 2 (b)

What are the four transmission channels of monetary policy?

## Task 2 (b)

Interest rate channel:

- An increase in the nominal interest rate leads to an increase in the real interest rate
- Assumption: nominal rigidities
- Investment demand ↓, Consumption demand ↓, Savings ↑
- *Intertemporal substitution of consumption*

Asset price channel:

- Interest rates and asset prices negatively related
- Real interest rate = opportunity cost of holding money
- Higher real interest rate -> higher discount on future cash flows

## Task 2 (b)

Risk channel:

- Lower interest rate -> value of collateral increases
- Higher risk in investment (possible)

Credit channel:

- Lower interest rate -> banks face lower interbank market interest rates
- Banks increase credit supply
- Related to adverse selection problem

## Task 3: The Zero Lower Bound

## Task 3 (a)

Why is it impossible for the central bank to levy an interest rate below the effective lower bound?



## Task 3 (a)

Effective lower bound:

- ELB < ZLB since hording cash might also have some cost
- When interest rate below ELB, agents withdraw their money from the bank.
- Holding cash at zero interest is more beneficial than negative interest on bank account.

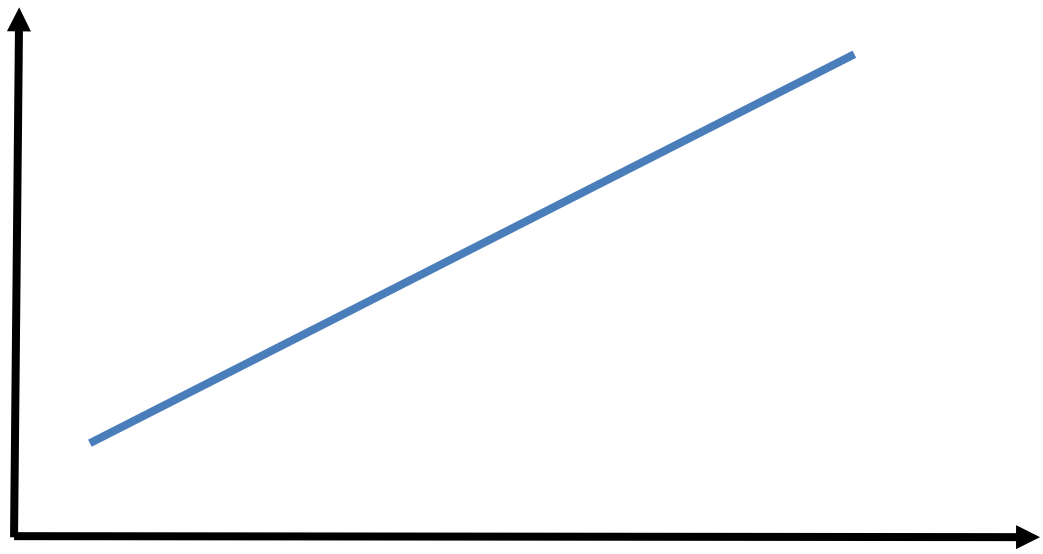
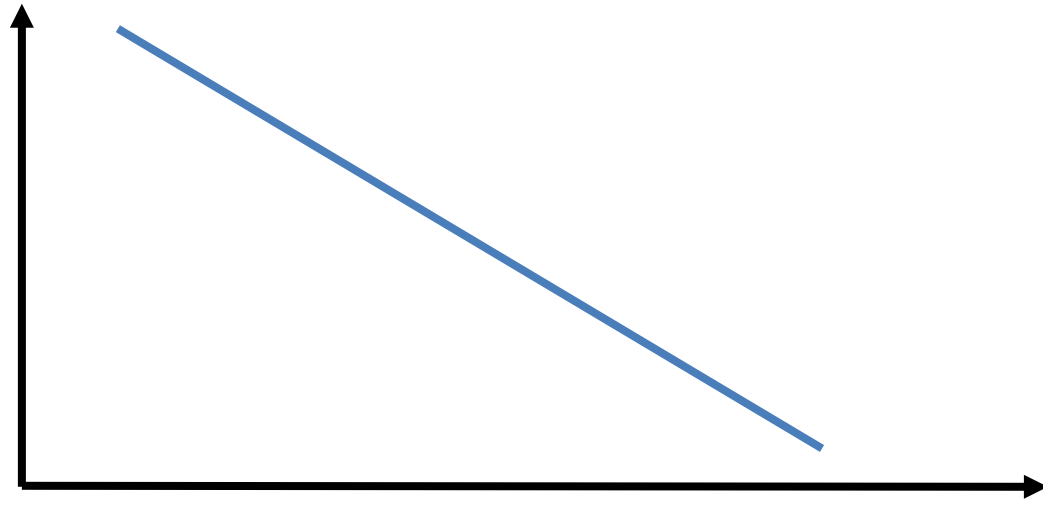
Adjusted monetary policy rule:

$$i_t = \max\{r^* + \pi^* + \beta_\pi(\pi_t - \pi^*), 0\}$$

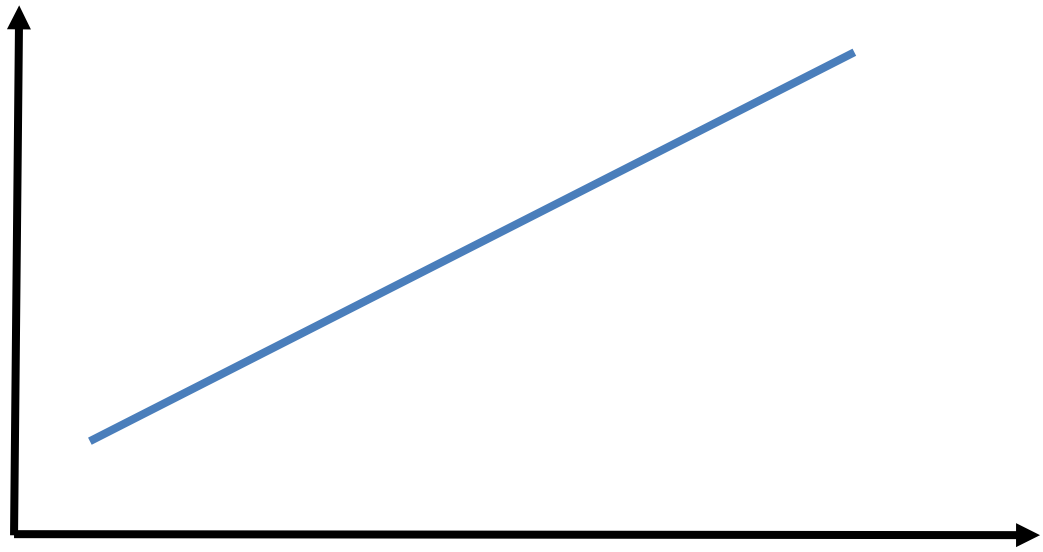
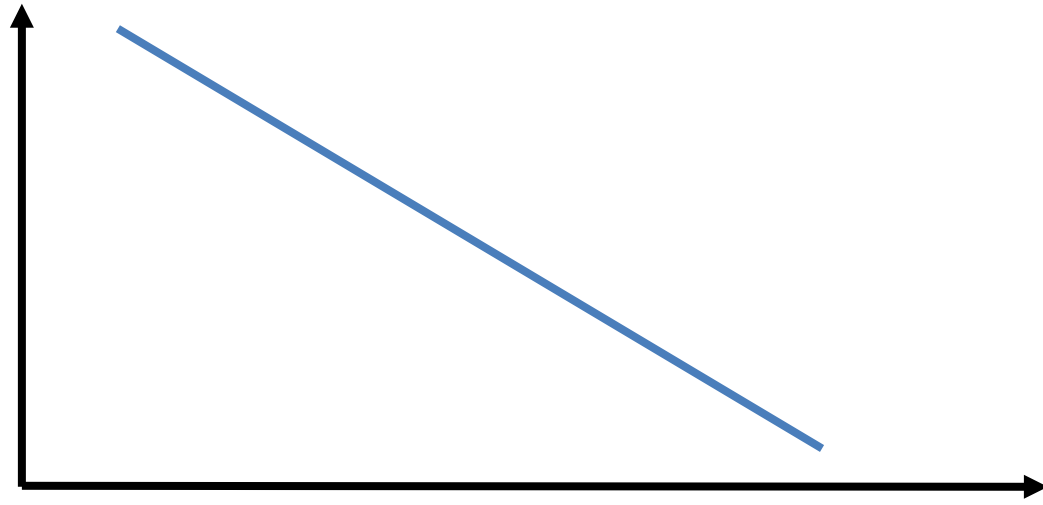
## Task 3 (b)

Consider a negative demand shock in the IS-PC model. How do the results change when we account for the zero lower bound on nominal interest rates?

# Task 3 (b): w/o ZLB



# Task 3 (b): w/ ZLB



## Task 3 (c):

Show graphically in the example of 3b), how a deflationary spiral might arise if the negative demand shock does not fade out.

# Task 3 (b): w/ ZLB

