

Monetary Policy

Part 1: Basic Macroeconomic Concepts

Exercise 4: The Short Run: The IS-MP-PC Model

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Task 1: The Phillips Curve

Task 1 (a)

What is the basic intuition behind the Phillips curve as in the equation below?

$$\pi_t = \pi_t^e + \gamma (y_t - y_t^*) + \varepsilon_t^\pi \quad , \quad \gamma > 0$$

Task 1 (a)

$$\pi_t = \pi_t^e + \gamma (y_t - y_t^*) + \varepsilon_t^\pi \quad , \quad \gamma > 0$$

In general:

- Inflation as a function of expected inflation and the output gap
- Output gap: difference between actual and potential output

Expected inflation π_t^e :

- Inflation expectations decisive for labor union's wage bargaining
- They demand a real increase in wages
- Higher expected inflation -> higher actual inflation

Task 1 (a)

$$\pi_t = \pi_t^e + \gamma (y_t - y_t^*) + \varepsilon_t^\pi \quad , \quad \gamma > 0$$

The output gap $\gamma (y_t - y_t^*)$:

- Indicator of future inflationary pressures
- $\gamma > 0$, i.e.
 - Positive output gap -> inflationary pressures
 - Negative output gap -> deflationary pressures
- γ : captures the degree to which inflation reacts to output gap

Inflationary shock ε_t^π :

- Positive shock increases inflation and vice versa
- All factors other than inflation expectations and output gap

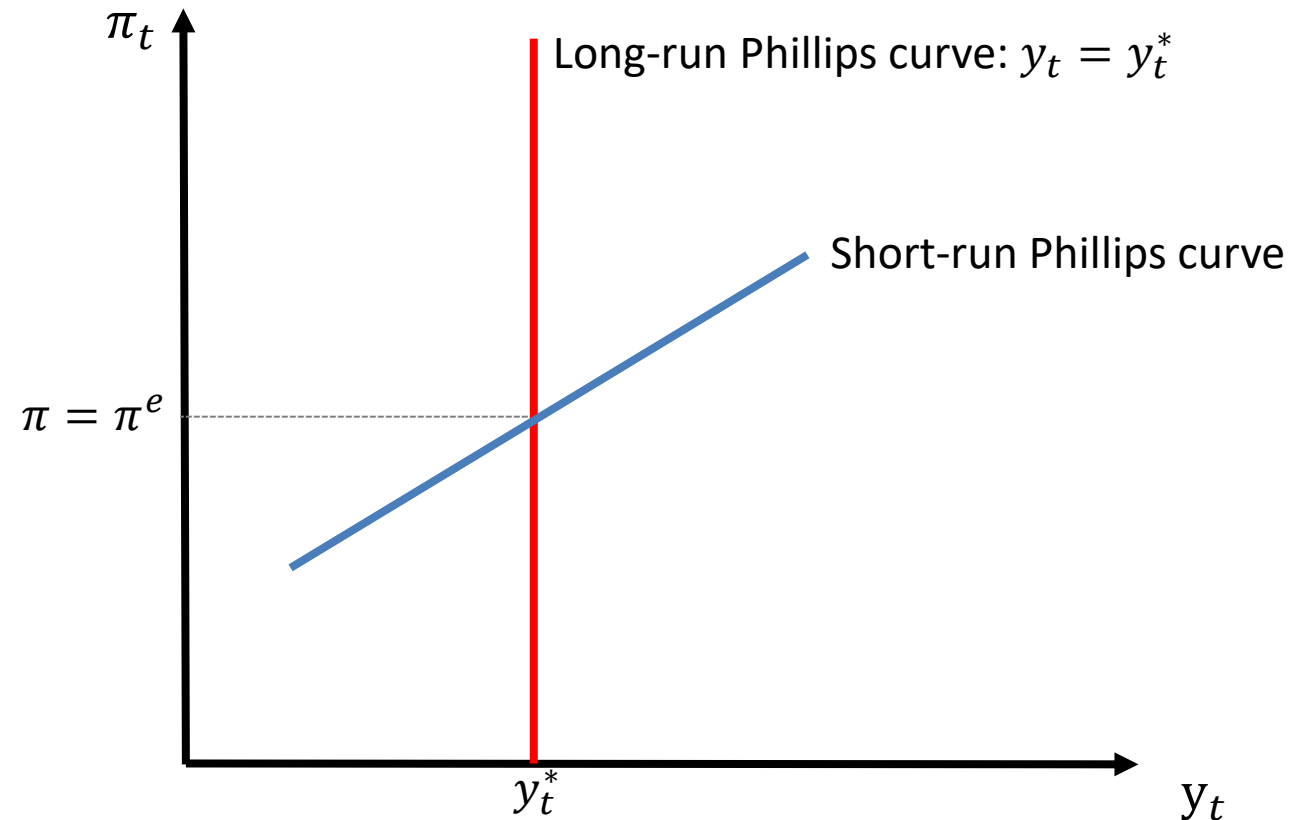
Task 1 (b)

Why is the long-run Phillips curve a vertical line?

Task 1 (b)

In the long run:

- Inflation expectations are equal to actual inflation
- Output is equal to potential output
- No inflationary shocks in the long run



Task 1 (c)

Which economic principle do you see here?



Task 1(c)

Task 1 (c)

The Lucas Critique:

- „[...] optimal decision rules of economic agents vary systematically with changes in policy” (The New Palgrave Dictionary of Economics, 2008).
- Agents’ behavior adjusts to changes in policy.
- Forecasting the effects of a change in policy using historic data is flawed.
- Predictions would not be valid since policy change alters expectations in a way that changes the fundamental relationship between variables.
- The public’s expectation about a policy will influence the response to that policy.

Task 2: Aggregate Demand and the IS-Curve

Task 2 (a)

Assume a neoclassical consumption and investment demand function. How are current and future consumption as well as investment demand affected by a decrease in the nominal interest rate?

Task 2 (a)

Investment demand function:

$$I_t = I^d(\underbrace{r_t}_{-})$$

- Investment depends negatively on the real interest rate.
- The real interest rate captures the financing cost of an investment.

Decrease in the real interest rate:

- If $r_t \downarrow$, lower investment financing cost.
- Higher demand for investment.

Task 2 (a)

Neoclassical consumption (demand) function:

$$C_t = C^d(\underbrace{Y_t}_{+}, \underbrace{Y_{t+1}}_{+}, \underbrace{r_t}_{-})$$

- Consumption demand depends positively on current and (expected) future output as well as negatively on the real interest rate.

Sticky prices in the short run:

- The central bank can influence the real interest rate by setting the nominal interest rate appropriately. Short-run Fisher equation:

$$i_t = r_t + \bar{\pi}$$

Decrease in the real interest rate:

- If $r_t \downarrow$, households less inclined to save, more available income for consumption, i.e. $C_t \uparrow$.
- Less savings in t lead to less disposable income in $t + 1$, so $C_{t+1} \downarrow$.
- *Intertemporal substitution of consumption*

Task 2 (b)

What is the basic intuition behind the IS curve as in the equation below?

$$y_t = y_t^* - \alpha \underbrace{(i_t - \pi_t - r^*)}_{r_t} + \varepsilon_t^y, \quad \alpha > 0$$

Task 2 (b)

$$y_t = y_t^* - \alpha \underbrace{(i_t - \pi_t - r^*)}_{r_t} + \varepsilon_t^y, \quad \alpha > 0$$

In general:

- Output as a function of potential output and the real rate gap.
- Real rate gap: difference between the real interest rate and the natural rate of interest.

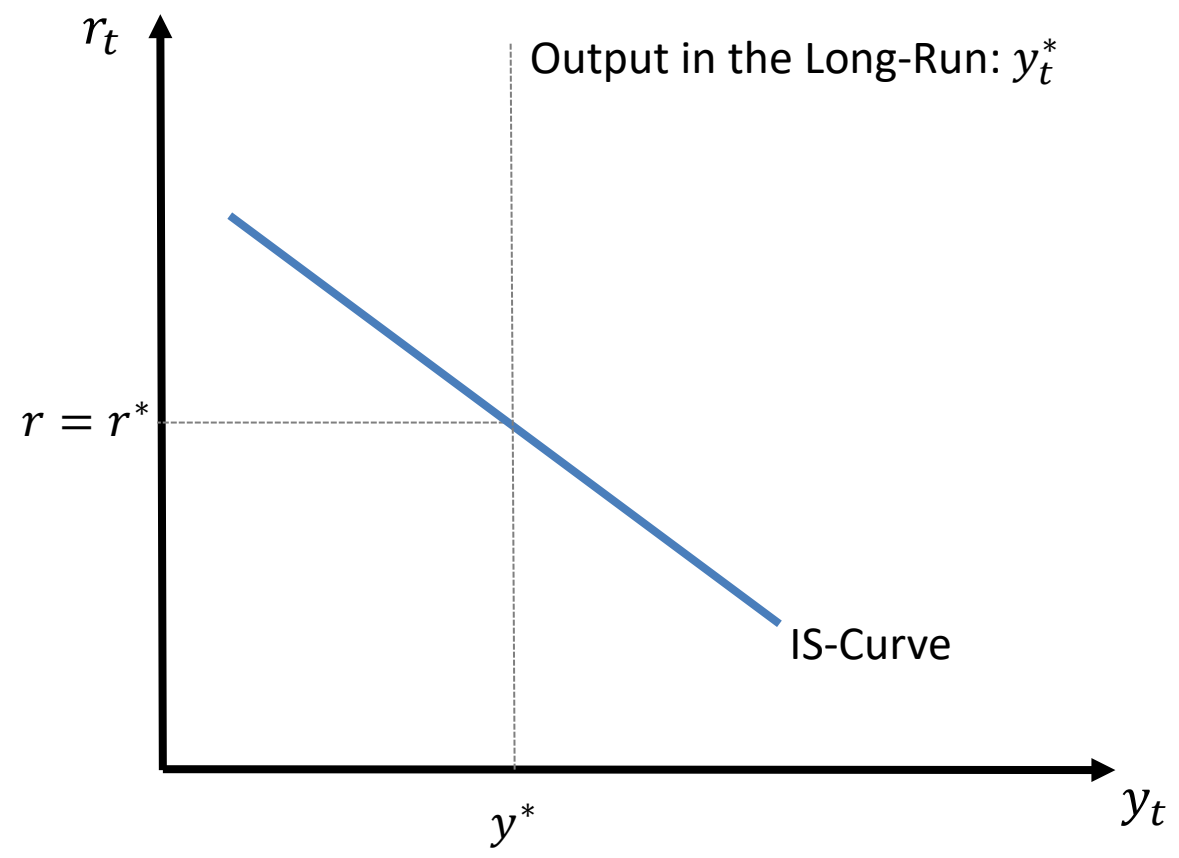
Negative impact of the real interest rate:

- Negative relationship of investment and consumption demand.

Demand shock ε_t^y :

- Captures all factors driving consumption / saving / investment decisions other than real interest rate.

IS-Curve



Task 3: Demand and Supply Shocks in the IS-PC Model

Task 3 (a)

On which assumptions does the outcome of an aggregate demand shock depend?

Task 3 (a)

Assumptions regarding aggr. demand shock:

- Persistence of the shock
- Active / inactive central bank
- Anchoring of inflation expectations

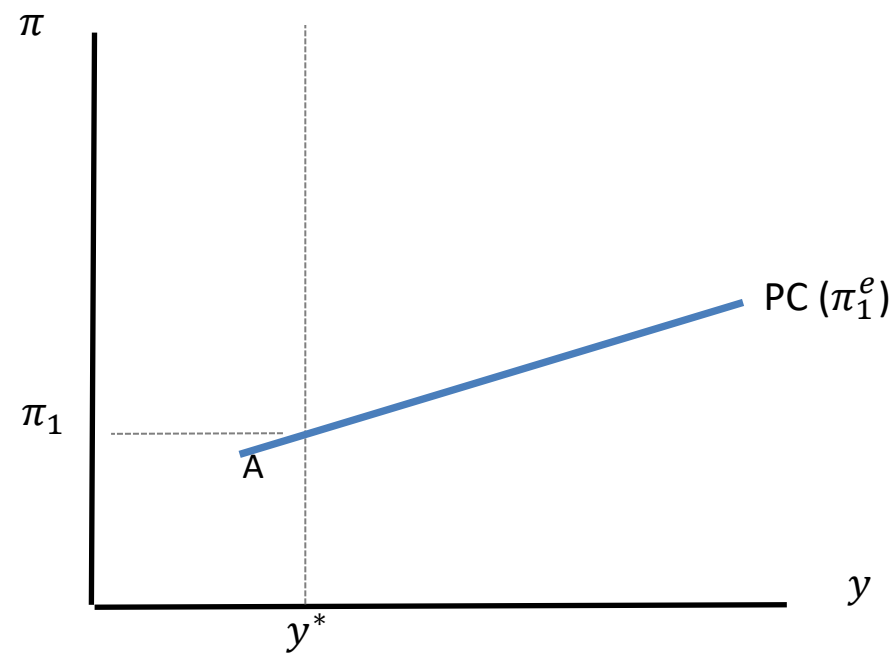
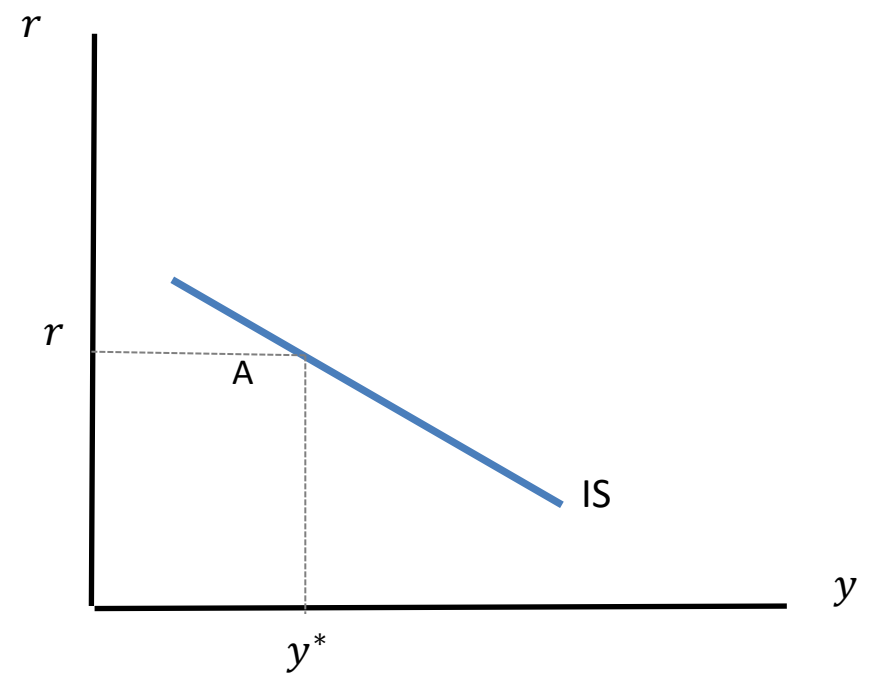
Task 3 (b)

Construct a table mapping the four possible scenarios following a positive aggregate demand shock. List the necessary behavioral assumptions, the movements of the IS and Phillips curve as well as the effect on inflation and output.

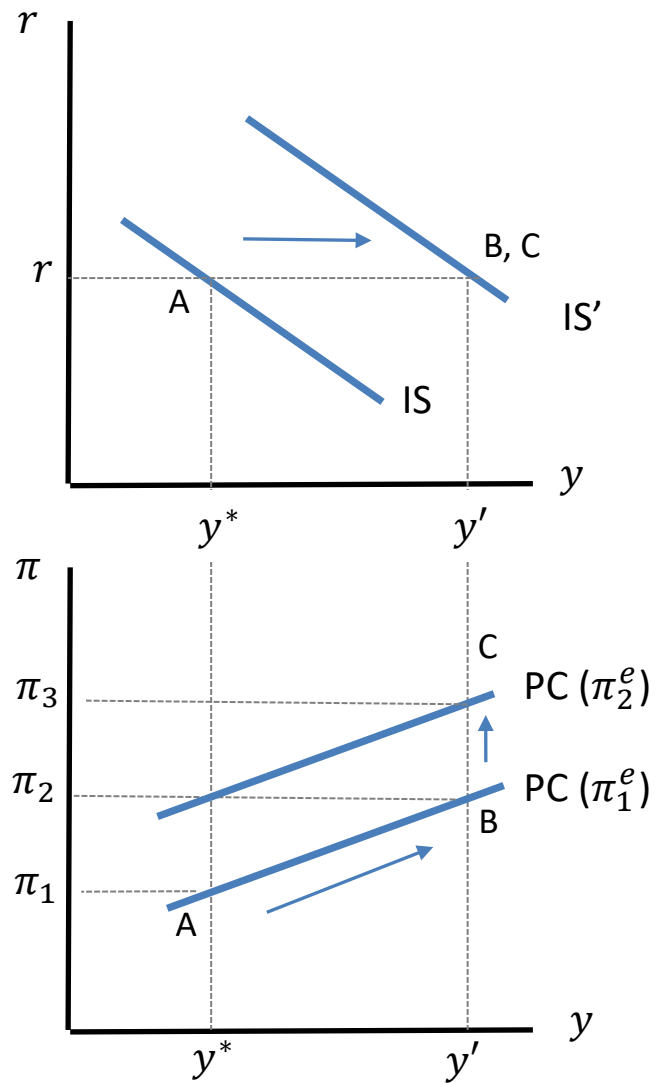
Task 3 (b)

Scenario	1	2	3	4
Shock				
Central bank				
Inflation expectations				
Movement of IS curve				
Movement of PC				
Inflation				
Output				

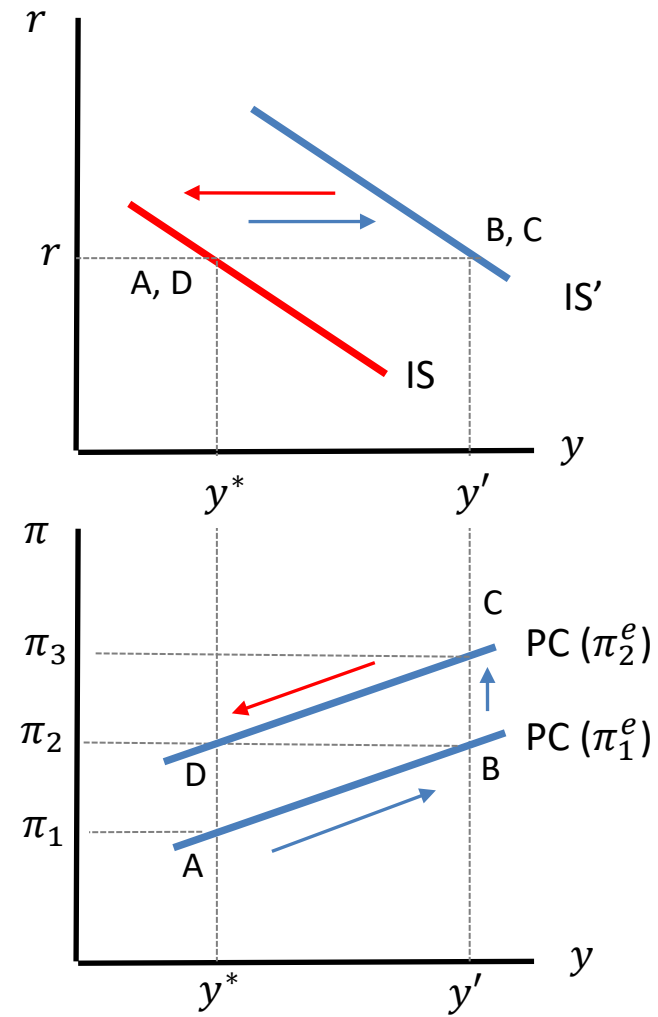
Task 3(b)



Scenario 1



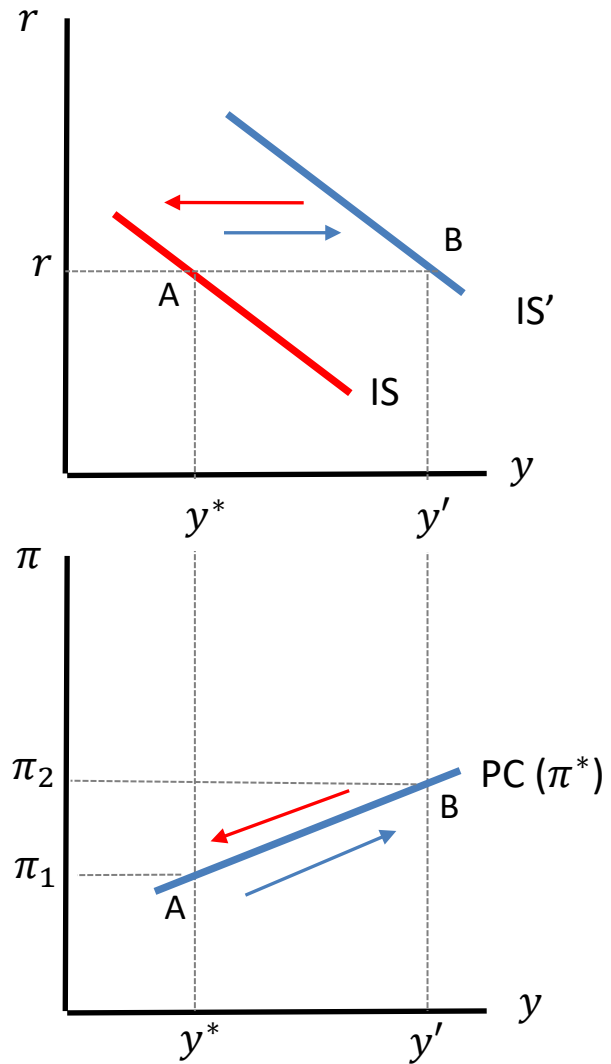
Scenario 2



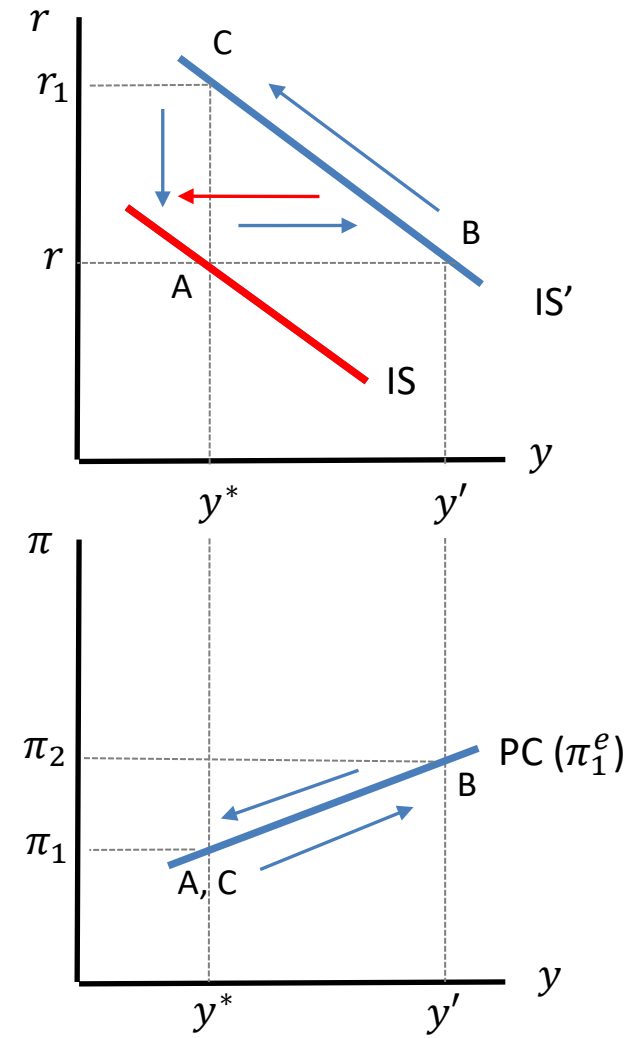
Task 3 (b)

Scenario	1	2	3	4
Shock	persistent	temporary		
Central bank	Inactive	inactive		
Inflation expectations	not anchored	not anchored		
Movement of IS curve	shift right	shift right and back		
Movement of PC	upwards	none		
Inflation	higher and higher	higher		
Output	higher	Increase and then back to potential		

Scenario 3



Scenario 4



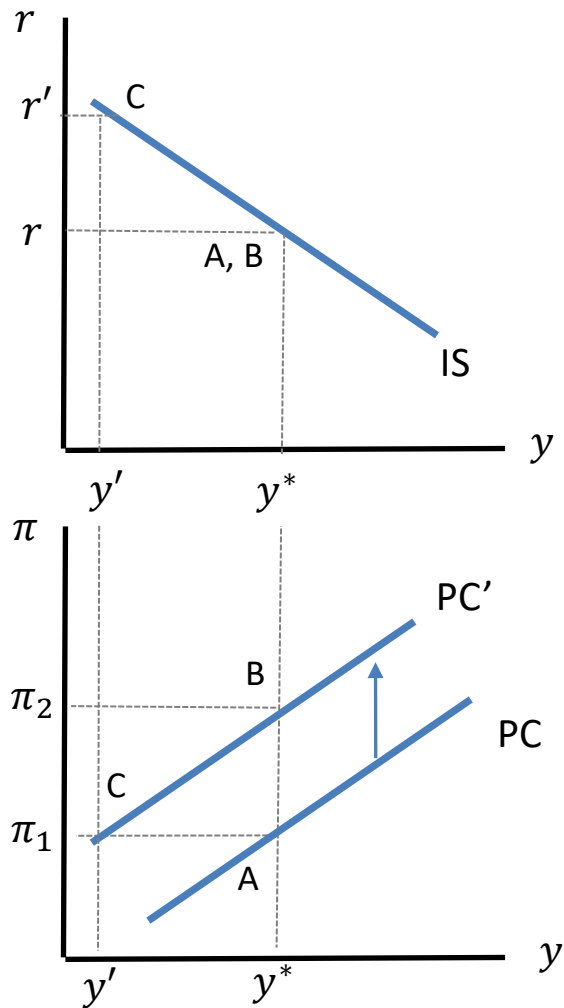
Task 3 (b)

Scenario	1	2	3	4
Shock	persistent	temporary	temporary	temporary
Central bank	inactive	inactive	inactive	active
Inflation expectations	not anchored	not anchored	anchored	not anchored
Movement of IS curve	shift right	shift right and back	shift right and back	shift right and back
Movement of PC	upwards	upwards	none	none
Inflation	higher and higher	higher	Short increase and returning	Short increase and returning
Output	higher	Increase and then back to potential	Increase and then back to potential	Increase and then back to potential

Task 3 (c)

What trade-off does the central bank face when responding to an aggregate supply shock?

Task 3 (c)



Trade-off for central bank:

- In case of supply shock
- Inflation stabilization vs. output stabilization