

Instituto Universitário de Lisboa (ISCTE-IUL) - Economics Department

Course: Macroeconomics | Program: Management

Week VII: The Phillips Curve and Aggregate Supply

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October 25, 2023

These slides do not cover all the contents of the theoretical classes. They only provide a summary of the subjects which will be used in the practical exercises. This means you should attend theoretical classes as well.

The expectations-augmented Phillips curve

Short-run and long-run definitions

- **Short-run Phillips Curve:** negative relationship between the unemployment gap and inflation (taking into account agents' information expectations and the natural unemployment rate) - there is a trade-off between inflation and unemployment.

$$\pi = \pi^e - \omega(U - U_n)$$

- **Long-run Phillips Curve:** there is no trade-off between inflation and unemployment:
 - In the long run prices and wages adjust, i.e., $\pi = \pi^e$;
 - Thus, we have that unemployment is at its natural level and is independent of the inflation rate.

$$U = U_n$$

The Phillips curve with supply shocks

- Supply-side shocks affect inflation through production costs, so it is necessary to incorporate these phenomena (ρ) into the Phillips curve augmented by expectations.

$$\pi = \pi^e - \omega(U - U_n) + \rho$$

- If $\rho = 0$ we say there is no price shock;
- If $\rho > 0$ we say we have a positive price shock, that is, $\uparrow \pi$;
- If $\rho < 0$ we say we have a negative price shock, that is, $\downarrow \pi$.

Adaptive expectations (backward-looking)

- To simplify our analysis, we assume that economic agents form their expectations based on the past:

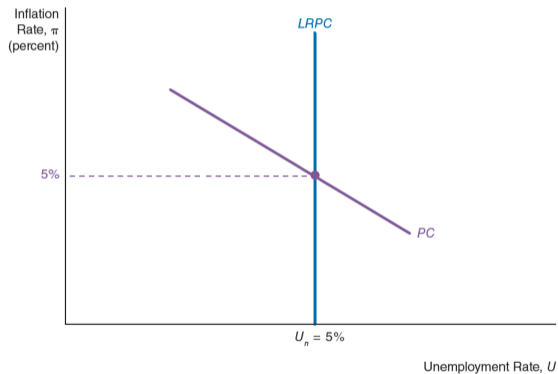
$$\pi^e = \pi_{-1}$$

- The Phillips curve considering adaptive expectations is then given by:

$$\pi = \pi_{-1} - \omega(U - U_n) + \rho$$

Short-run and long-run Phillips Curves.

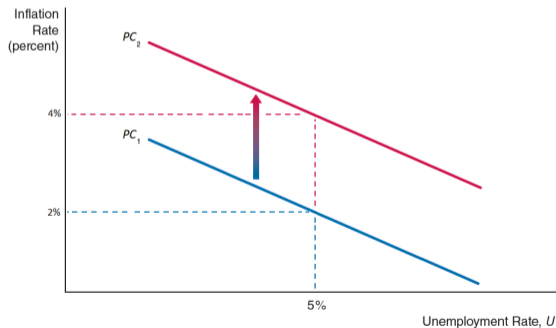
Graphical representation



Short-run and long-run Phillips Curves.

Shifts in the short-run Phillips curve

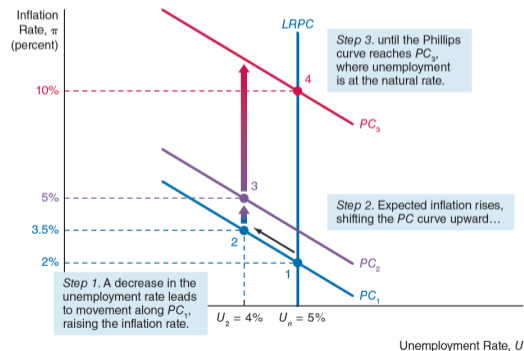
- Graphical representation of an **increase** in the expected inflation (π^e) or of a **positive shock** in prices ($\rho > 0$) in the short-run Phillips Curve:



Short-run and long-run Phillips Curves.

Shifts in the short-run Phillips curve

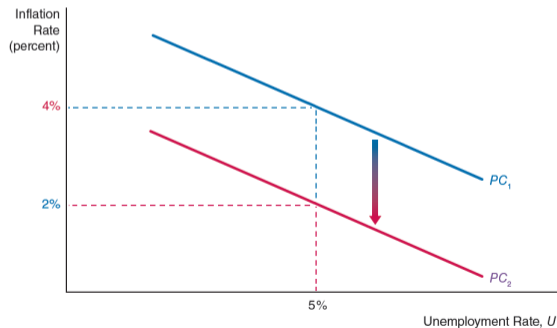
- Graphical representation of a **decrease** in the unemployment rate (U) in the short-run Phillips curve:



Short-run and long-run Phillips Curves.

Shifts in the short-run Phillips Curve

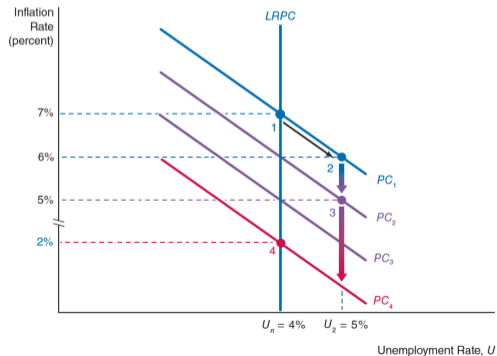
- Graphical representation of a **decrease** in the expected inflation (π^e) or of a **negative shock** of prices ($\rho < 0$) in the short-run Phillips Curve:



Short-run and long-run Phillips Curves.

Shifts in the short-run Phillips Curve

- Graphical representation of an **increase** in the unemployment rate (U) in the short-run Phillips Curve:



Short-run and long-run Phillips Curves.

Using Pluto

- ☒ Exercise 1 (Inflation versus unemployment).
- ☒ Exercise 2 (Inflationary expectations).
- ☒ Exercise 3 (Deflationary expectations).
- ☒ Exercise 4 (The US labor market is too hot).
- ☒ Exercise 5 (Is the US labor market too hot?).

The Okun's Law

Definition

- **The Okun's Law:** negative relationship between the unemployment gap and the output gap.

$$U - U_n = -\theta(Y - Y^p)$$

- Unemployment is a countercyclical variable, since (considering $0 < \theta < 1$):
 - If $Y > Y^p \Rightarrow (U - U_n) < 0 \Leftrightarrow U < U_n$
 - If $Y < Y^p \Rightarrow (U - U_n) > 0 \Leftrightarrow U > U_n$

Using Pluto

- ☒ Exercise 6 (Cyclical unemployment & the output-gap).
- ☒ Exercise 7 (The Okun's law).

The AS Curve

Short-run and long-run definitions

- **Short-run AS Curve:** positive relationship between the output gap and inflation:

$$\pi = \pi^e + \gamma(Y - Y^p) + \rho$$

- With adaptive expectations, $\pi^e = \pi_{-1}$.

- **Long-run AS Curve:** there is no trade-off between inflation and output.

- In the long-run prices and wages adjust, i.e., $\pi = \pi^e = \pi_{-1}$;
- Thus, we have that output is at its potential level and is independent of the inflation rate.

$$Y = Y^p$$

- In the long run, the output only depends on the productive factors existing in the economy:
 $Y = AF(K, L)$.

The AS Curve

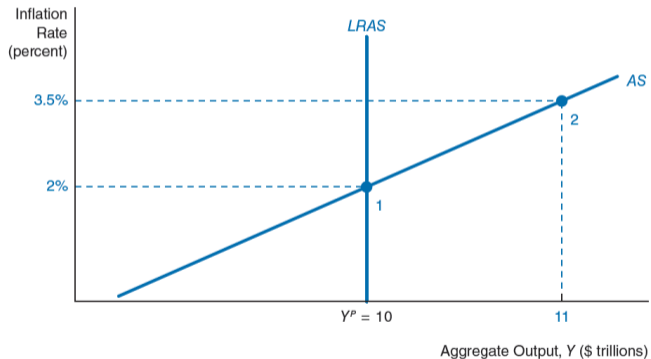
Derivation (of the short-run one)

- We replace Okun's Law in the Phillips Curve with adaptive expectations:

$$\begin{aligned}\pi &= \pi_{-1} - \omega(U - U_n) + \rho \Rightarrow \\ \Rightarrow \pi &= \pi_{-1} + \omega\theta(Y - Y^p) + \rho \Leftrightarrow \\ \Leftrightarrow \pi &= \pi_{-1} + \gamma(Y - Y^p) + \rho\end{aligned}$$

Short-run and long-run AS Curves

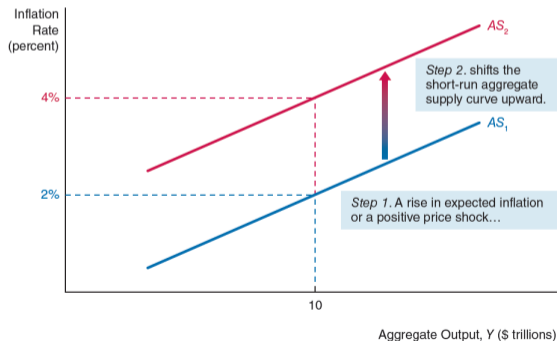
Graphical representation



Short-run and long-run AS Curves

Shifts in the short-run AS curve

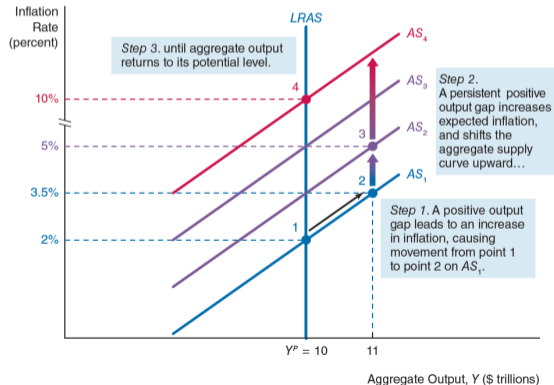
- Graphical representation of an **increase** in the expected inflation (π^e) or of a **positive shock** in prices ($\rho > 0$) in the short-run AS curve:



Short-run and long-run AS Curves

Shifts in the short-run AS curve

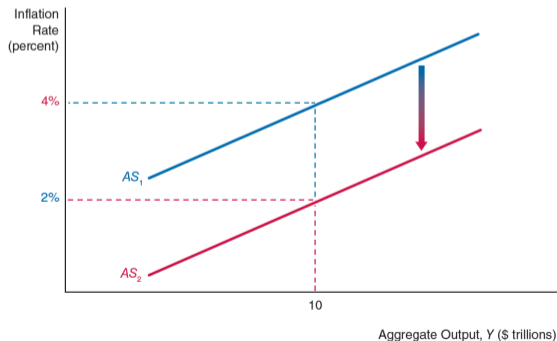
- Graphical representation of an **increase** in the output such that $Y > Y^P$ in the short-run AS function:



Short-run and long-run AS Curves

Shifts in the short-run AS curve

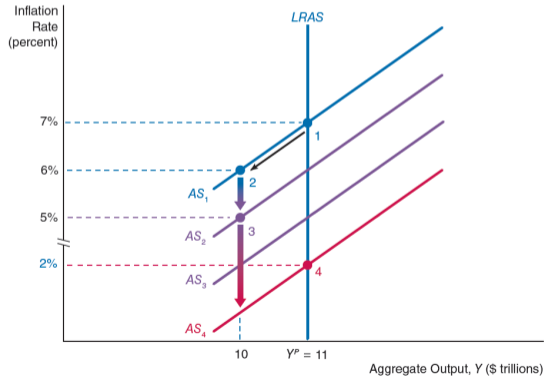
- Graphical representation of a **decrease** in the expected inflation (π^e) or of a **negative shock** in prices ($\rho < 0$) in the short-run AS function:



Short-run and long-run AS Curves

Shifts in the short-run AS curve

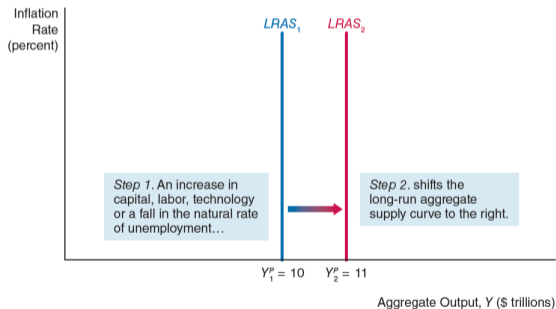
- Graphical representation of a **decrease** in the output such that $Y < Y^P$ in the short-run AS function:



Short-run and long-run AS Curves

Shifts in the long-run AS curve

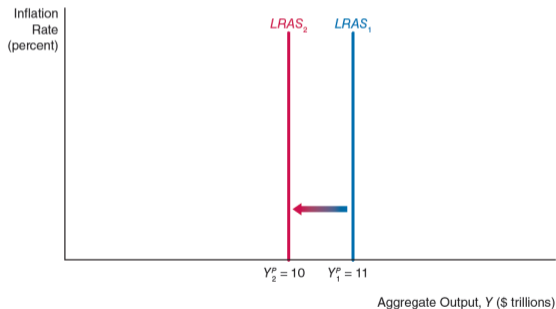
- Graphical representation of an **increase** of labour (L), capital (K) and the state of technology (A) or a decrease in the natural rate of unemployment (U_n) in the long-run AS function:



The short and long run AS curves

Shifts in the long-run AS curve

- Graphical representation of a **decrease** of work (L), capital (K) and the state of technology (A) or an **increase** in the natural rate of unemployment (U_n) in the long-run AS function:



The short and long run AS curves

Using Pluto

- ☒ Exercise 8 (The short-run AS curve).
- ☒ Exercise 9 (Oil prices and inflation).
- ☒ Exercise 10 (A comprehensive exercise).

References

- Mishkin, F. S. (2014), *Macroeconomics: Policy and Practice*, 2nd Edition, Pearson, Addison-Wesley, New York.