Macroeconomics

5. Monetary Policy and Aggregate Demand

Bachelor's Degrees in Management and in Finance and Accounting

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The monetary policy rule

Rationale

- The Central Bank (CB) controls inflation by changing the short-term nominal interest rate, as follows:
  - According to the Fisher equation, by changing the nominal interest rate, the Central Bank affects the real interest rate:

$$r = i - \pi$$

  - Changes in the real interest rate affect firms and households, as we recall from the components of the IS curve:

$$C = \bar{C} + cY_D - br;\ I = \bar{I} - d(r + \bar{f});\ NX = N\bar{X} - xr$$

  - Therefore:

$$\uparrow r \Rightarrow \downarrow Y \Rightarrow \downarrow \pi \text{ and } \downarrow r \Rightarrow \uparrow Y \Rightarrow \uparrow \pi$$

The monetary policy rule

Definition

- The necessary changes in r depend on the type of shock affecting the economy.
- The Central Bank formulates a systematic policy/rule of response that allows it to decide how r should respond.
- This policy (that is, the choice of r) depends on 2 main factors (ignoring the output gap for simplicity):
  - The natural real interest rate: $\bar{r}$ (not related to the level of the inflation rate when inflation is stable, or to any other variable in the model).
  - The inflation rate itself: π.
- The monetary policy rule reflects the relationship between the real interest rate (r) and the inflation rate (π) for a given autonomous real interest rate $(\bar{r})$:

$$r = \bar{r} + \lambda\pi$$

The monetary policy rule

Definition

- The relationship between r and π is positive in order to avoid inflationary spirals:

$$\uparrow \pi \Rightarrow \downarrow r \Rightarrow \uparrow Y \Rightarrow \uparrow \pi$$

- This implies that when the CB adjusts i, it follows the Taylor Principle, according to which $\Delta i > \Delta \pi$.
  - Example with $\Delta i = +1.5 > \Delta \pi = +1$, avoiding inflationary spirals:

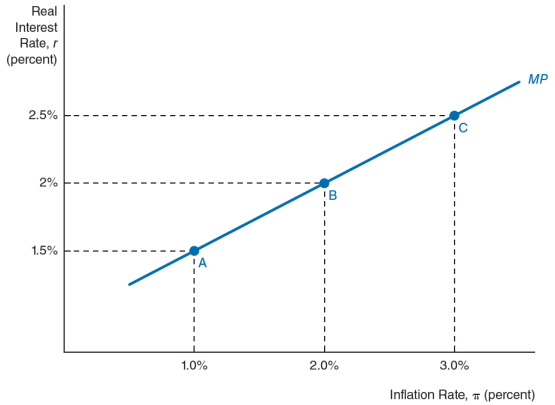
$$\Delta r = \Delta i - \Delta \pi = 1.5 - 1 = +0.5 pp$$

  - Example with $\Delta i = +1 < \Delta \pi = +1.5$, creating an inflationary spiral:

$$\Delta r = \Delta i - \Delta \pi = 1 - 1.5 = -0.5 pp$$

The monetary policy rule

Graphical representation (Same as in the textbook, different from Professor Mendes' slides. You should consider the former for study and assessment purposes.)



The monetary policy rule

Movements along the curve

- Movements along the curve:
  - The normal response of the CB (an endogenous response) is to increase the interest rate when inflation rises (in a stable way).
  - A movement along the MP curve is the increase in the interest rate as inflation rises, representing an automatic response of the CB to a change in inflation.
- Practical example:

$$r = 1 + 0.5\pi$$

  - Starting with $\pi = 2$, we have $r = 1 + 0.5 \times 2 = 2$
  - If $\pi = 3$, we have $r = 1 + 0.5 \times 3 = 2.5$
  - If $\pi = 1.5$, we have $r = 1 + 0.5 \times 1.5 = 1.75$

The monetary policy rule

Shifts of the curve

- What can cause shifts of the curve (examples):
  - More restrictive monetary policy (the curve shifts upward): when inflationary pressures exist and the previous rule is no longer able to accommodate the increase in inflation, central banks may decide to increase $\bar{r}$.
  - Less restrictive monetary policy (the curve shifts downward): when inflation is stable and output needs to be stimulated, $\bar{r}$ is reduced.
- Practical example (a more restrictive MP with an increase in $\bar{r}$ from 1 to 2):

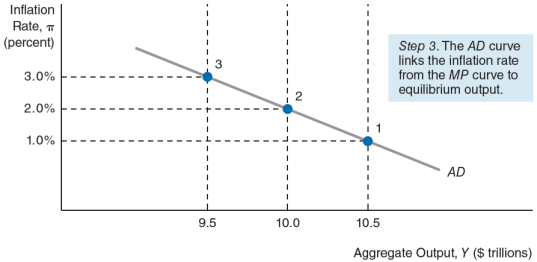
$$r = 2 + 0.5\pi$$

  - Starting with $\pi = 2$, we have $r = 2 + 0.5 \times 2 = 3$
  - If $\pi = 3$, we have $r = 2 + 0.5 \times 3 = 3.5$
  - If $\pi = 1.5$, we have $r = 2 + 0.5 \times 1.5 = 2.75$

The aggregate demand curve

Definition and graphical representation

- **Aggregate demand curve**: the relationship between aggregate output (Y) and the inflation rate (π), for a given level of autonomous demand $(\bar{A})$ and autonomous real interest rate $(\bar{r})$.



The aggregate demand curve

Derivation and formula

- By substituting the MP expression into the IS expression:

$$Y = \frac{1}{1-c}\bar{A} - \frac{(b+d+x)}{1-c}r \Rightarrow$$
$$\Rightarrow Y = \frac{1}{1-c}\bar{A} - \frac{(b+d+x)}{1-c}(\bar{r} + \lambda\pi)$$

- Thus:

$$Y = m \times \bar{A} - m \times \phi \times (\bar{r} + \lambda\pi),$$

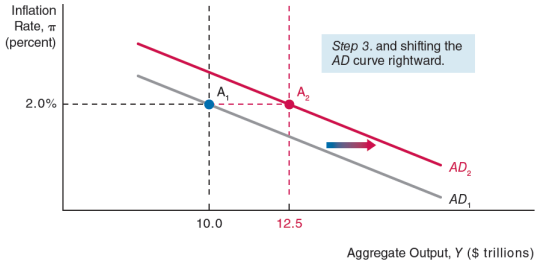
where

$$m = \frac{1}{1-c},\ \bar{A} = (\bar{C} + \bar{I} - c\bar{T} - d\bar{f} + \bar{G} + N\bar{X}) \text{ and } \phi = b + d + x$$

The aggregate demand curve

Shifts of the curve

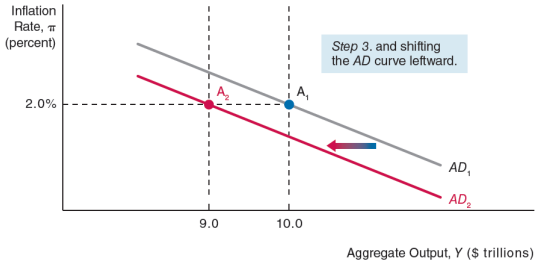
- Graphical representation of an **increase** in autonomous demand $(\bar{A})$ or a **decrease** in the autonomous real interest rate $(\bar{r})$ in the AD curve:



The aggregate demand curve

Shifts of the curve

- Graphical representation of a **decrease** in autonomous demand $(\bar{A})$ or an **increase** in the autonomous real interest rate $(\bar{r})$ in the AD curve:



References

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