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

Course: Macroeconomics | Program: Management

Week X: The AD-AS model with zero lower bound

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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.

Inflation targeting

- All central banks in advanced countries have an optimal value for inflation they want to achieve. This is called the inflation target: π^T.
- There are two different ways of looking at the target value:
  - π^T is a ceiling – the central bank suffers a loss if $\pi > \pi^T$: $\min(\pi - \pi^T)$.
  - π^T is a target – the central bank suffers a loss if $\pi \neq \pi^T$: $\min(\pi - \pi^T)^2$.
- If π^T is used as a ceiling, central banks will be biased to keep inflation systematically below the target.
- It may lead to ”too low inflation” or even deflation.
- The costs to the economy and society will be higher than if the target were reached.

Inflation targeting

Using Pluto

- ⊠ Exercise 1 (Inflation targeting).

Taylor's Rule

A more comprehensive rule than the standard MP studied in the previous chapters

- Taylor proposes that the Central Bank control the interest rate based on:
  - A base reference for $\bar{r}$;
  - The inflation gap $(\pi - \pi^T)$ (weighted);
  - The output gap $(Y - Y^p)$ (weighted).
- Attributing the same importance to the control of inflation and output, we have that the Taylor rule for the real interest rate is given by:

$$r = \bar{r} + 0.5(\pi - \pi^T) + 0.5(Y - Y^p)$$

- i will be given by the Fisher equation with the corresponding substitution:

$$i = r + \pi \Rightarrow i = \bar{r} + \pi + 0.5(\pi - \pi^T) + 0.5(Y - Y^p)$$

- The base reference proposed for $\bar{r}$ and for π^T is 2% in both cases, such that:
  - $r = 2 + 0.5(\pi - 2) + 0.5(Y - Y^p)$; $i = 2 + \pi + 0.5(\pi - 2) + 0.5(Y - Y^p)$.

Taylor's Rule

Using Pluto

- ⊠ Exercise 2 (The Taylor rule).

The MP curve

Definition

- The MP rule reflects the relationship between the real interest rate (r) and the inflation rate (π):

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

- The relationship between r and π is positive to avoid inflationary spirals which implies being done according to the Taylor Principle:
  - If $\downarrow \pi \Rightarrow \downarrow r$ we have $\downarrow i$ (with $\Delta i > \Delta\pi$):
- The nominal interest rate can go down to what, by definition, is its lower bound, i.e., $i = 0$ (zero lower bound).

MP curve with lower limit for the nominal interest rate

Rational

- What happens when you have already reached $i = 0$ and π goes down further?
  - Knowing that $i = 0$ we have that $r = 0 - \pi = -\pi$.
  - After this point, the Taylor Principle ($\Delta i > \Delta \pi$) is no longer verified, which means that the standard MP curve can't be applied.
- In a ZLB regime, as i cannot become negative, the monetary policy rule is defined by:

$$r = -\pi$$

- The inflation rate that corresponds to the ZLB is given by putting together the standard MP curve and the Fisher equation with $i = 0$:

$$\bar{r} + \lambda\pi = -\pi \Rightarrow \pi_{ZLB} = -\frac{\bar{r}}{1+\lambda}$$

MP and AD functions with ZLB

- The MP curve can be defined as:

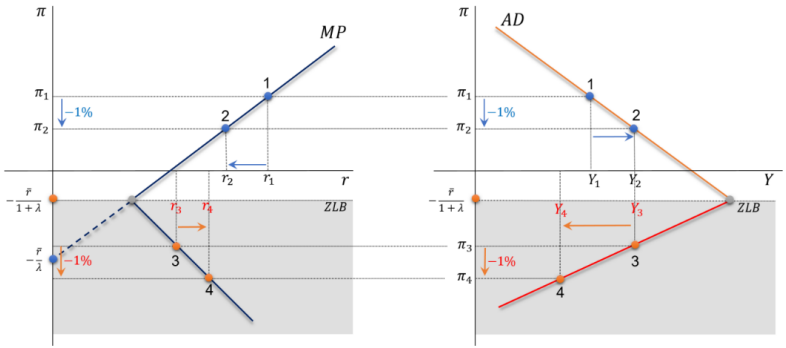
$$r = \begin{cases} \bar{r} + \lambda\pi, \text{if } \pi \geq \pi_{ZLB} = -\frac{\bar{r}}{1+\lambda} \\ -\pi, \text{otherwise} \end{cases}$$

- The AD curve is obtained by substituting the MP curve in the IS curve:

$$Y = \begin{cases} m \times \bar{A} - m \times \phi \times (\bar{r} + \lambda\pi), \text{if } \pi \geq \pi_{ZLB} = -\frac{\bar{r}}{1+\lambda} \\ m \times \bar{A} + m \times \phi \times \pi, \text{otherwise} \end{cases}$$

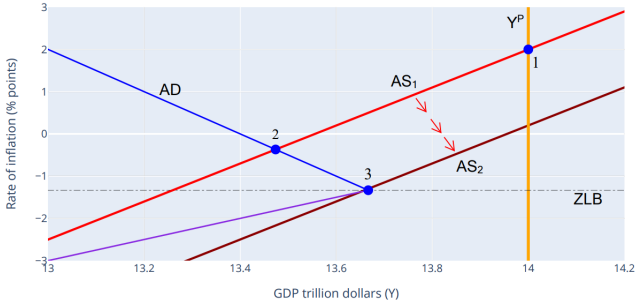
MP and AD functions with ZLB

Graphical representation



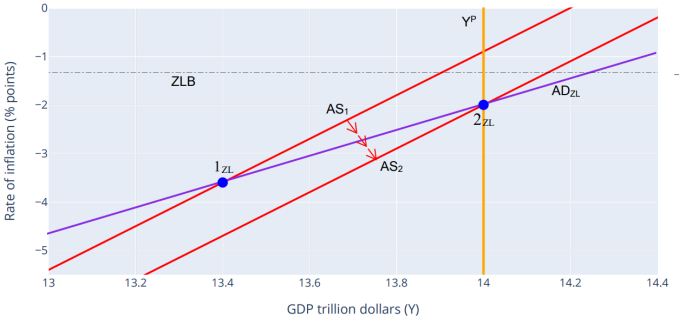
Secular stagnation with ZLB

- If the AD suffers a huge shock such that it moves from the economy from point 1 to 2, this will end up at point 3, where demand is insufficient to match supply at a higher GDP level.
- GDP is stuck at a level that is permanently lower than what the economy can produce.



Deflation trap with ZLB

- If the AS suffers a large shock such that the economy moves to point 1^{zl}, the long run equilibrium will be at point 2^{zl} (a bad one).

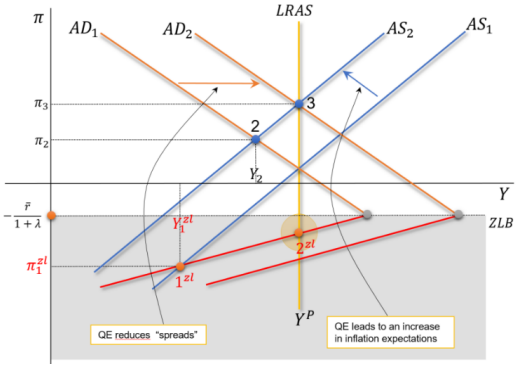


Unconventional Monetary Policy: Quantitative Easing

- When the nominal interest rate is so low but is not enough to stimulate the economy, unconventional monetary can add to the stimulus already coming from conventional policy.
- One way to do so is through Quantitative Easing, which:
  - Reduce financial risk and "spreads" ($\downarrow \bar{f}$);
  - Create expectations in the economy of higher inflation ($\uparrow \pi^e$);
  - Provide forward guidance (convince private economic agents, that the Fed will do everything it takes to get the economy out of the ZLB).

Escaping ZLB through Quantitative Easing

- Through QE, it is possible to escape the ZLB.



Escaping ZLB through Quantitative Easing

Using Pluto

- ⊠ Exercise 3 (The trouble with inflation).
- ⊠ Exercise 4 (Inflation and the Scariest Opinion of 2022).
- ⊠ Exercise 5 (Abenomics and Japanese deflation).
- ⊠ Exercise 6 (The Zero Lower Bound).
- ⊠ Exercise 7 (A negative demand shock).
- ⊠ Exercise 8 (Stuck in deflation).
- ⊠ Exercise 9 (Secular stagnation).
- ⊠ Exercise 10 (Normalizing things in Japan?).

References

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