

Lecture 23: The Zero Lower Bound (ZLB)

ECON 30020: Intermediate Macroeconomics

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Readings

GLS Ch. Appendix E

The Zero Lower Bound (ZLB)

The zero lower bound (ZLB) refers to the fact that the short-term nominal interest rate cannot go below zero (or cannot go very far below zero)

Why? Money's role as a store of value

One dollar saved today generates one dollar tomorrow. Essentially by definition, money offers a zero nominal return

The real interest rate can go negative (goods are not storable)

If a nominal asset (e.g., bond) doesn't offer more than a non-zero return, people will just hold money instead

This places a floor on the nominal interest rate on bonds

Money Demand

Recall the first-order condition underpinning the demand for money:

$$v' \left(\frac{M_t}{P_t} \right) = \frac{i_t}{1 + i_t} u_C(C_t, 1 - N_t)$$

If $i_t < 0$, would not have an interior solution

As $i_t \rightarrow 0$, demand for real balances goes to ∞

ZLB sometimes called “liquidity trap”: people hoard money (liquidity)

Negative Rates and the Effective Lower Bound

In some countries, central banks have experimented with negative short-term nominal rates

These are generally inter-bank rates, not deposit rates directly relevant for households or firms

How could rates go negative? Storage costs

- I might be willing to tolerate a slightly negative rate (essentially paying a bank to hold my cash) if it is prohibitive to store a ton of currency

So, you sometimes hear people talk about the effective lower bound (ELB) instead of the ZLB

But there is some lower bound, and the economics are the same whether it is zero or slightly negative

The ZLB and the IS-MP-AD-PC Model

The ZLB introduces a kink into the MP and therefore the AD curves

Ignoring constants:

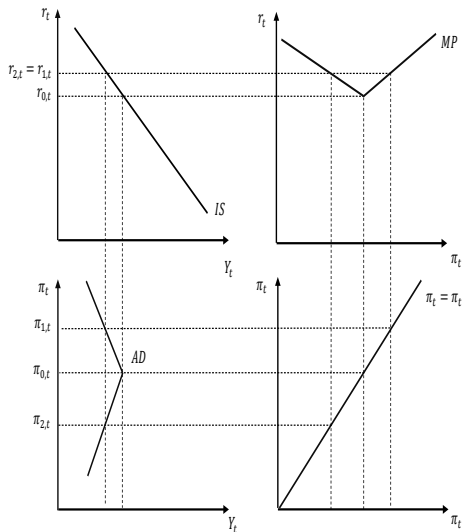
$$r_t = (\phi - 1)\pi_t \quad \text{if } i_t > 0$$

$$r_t = -\pi_t \quad \text{if } i_t \leq 0$$

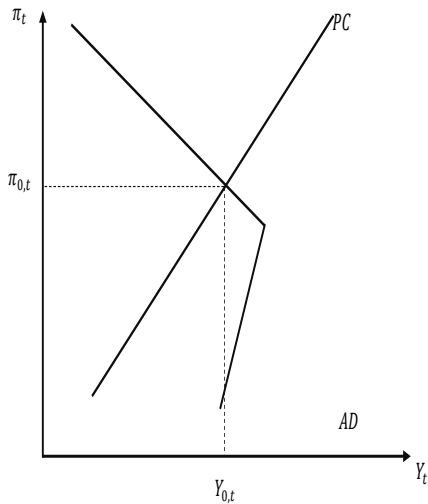
The MP curve becomes downward-sloping and the AD curve becomes upward-sloping in this region

This will occur at low levels of inflation

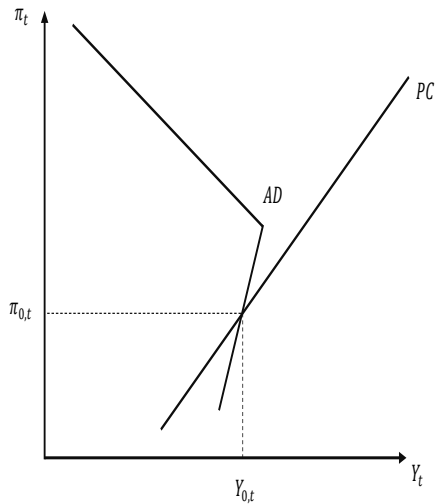
Graphical Derivation of AD with the ZLB



AD-PC Equilibrium: Non-Binding ZLB



AD-PC Equilibrium: Binding ZLB



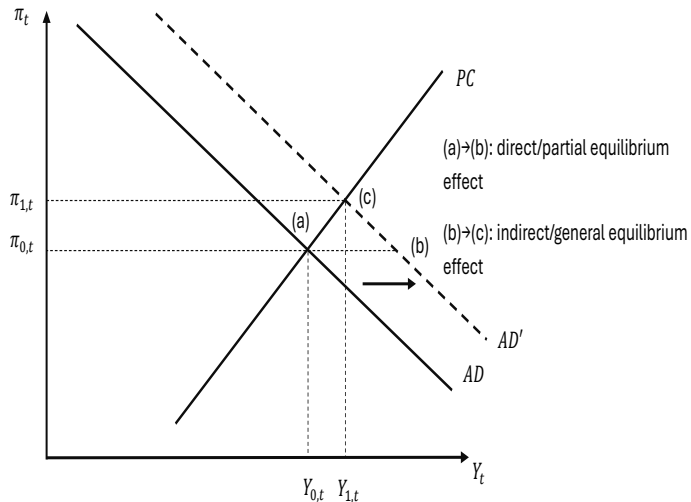
Economy at the ZLB

Assume that, when ZLB binds, PC is flatter than AD (ensures equilibrium exists)

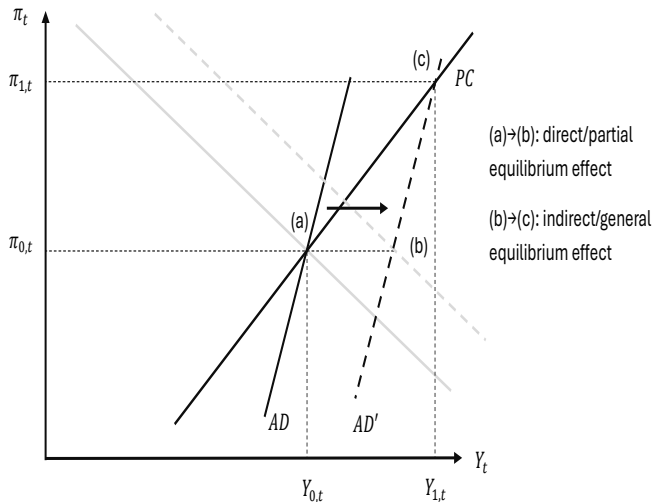
World goes topsy-turvy at the ZLB:

- ▶ Demand shocks have bigger effects: rather than being mitigated by real rate rising, positive demand shocks result in falling real rate
- ▶ Supply shocks have smaller (and opposite-signed!) effects: rather than real rate falling, positive supply shocks result in real rate rising
- ▶ The economy's "self-correcting mechanism" doesn't work

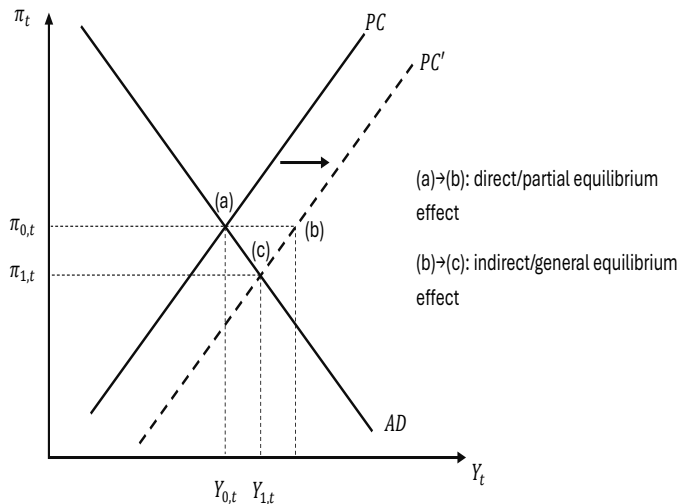
AD-PC Equilibrium: Demand Shock



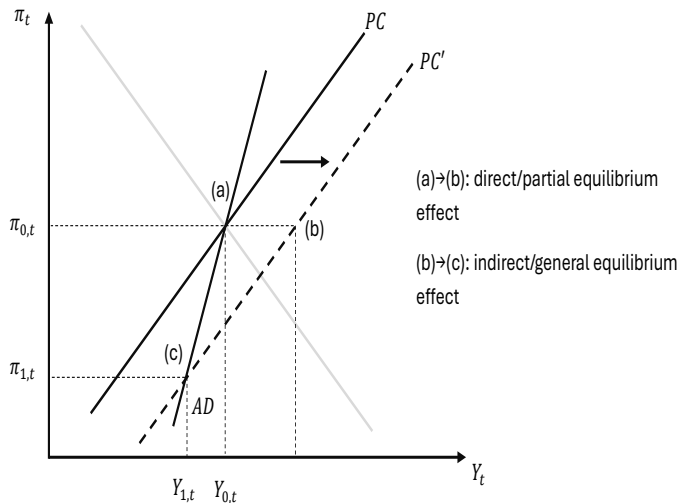
AD-PC Equilibrium: Demand Shock at ZLB



AD-PC Equilibrium: Supply Shock



AD-PC Equilibrium: Supply Shock at ZLB



Normal Times vs. ZLB

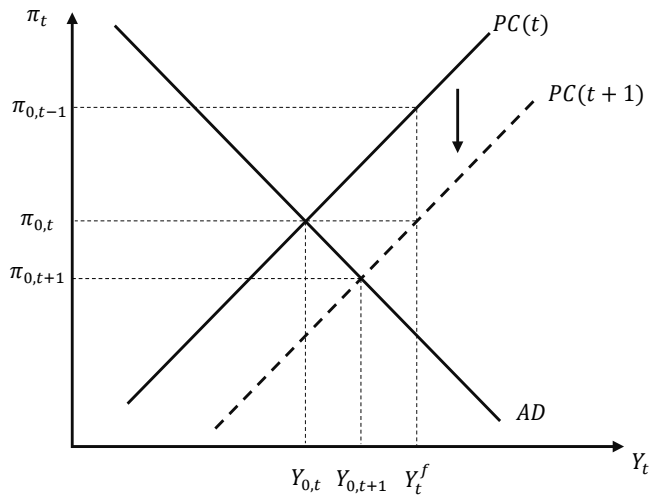
Helpful to decompose effects of shocks:

- Direct effect: hold π_t (and therefore r_t) fixed (partial equilibrium)
- Indirect effect: what happens after π_t (and therefore r_t) adjust (general equilibrium)

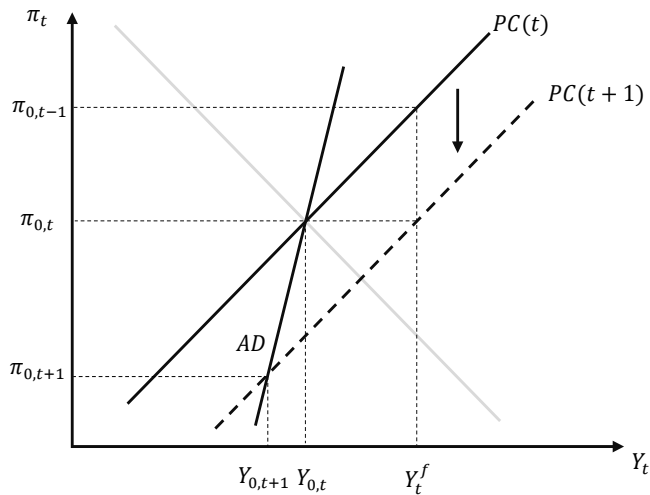
In normal times, indirect effect dampens response to demand. At ZLB, it amplifies it

Supply shock: to get Y_t to go up, r_t needs to fall. But when π_t falls, at ZLB this makes r_t increase. So an expansionary supply shock is contractionary

AD-PC Adjustment to Negative Output Gap



AD-PC Adjustment to Negative Output Gap at ZLB



Dynamic Adjustment Doesn't Work at ZLB

With a negative output gap, inflation expectations will fall. Falling inflation means lower real interest rates, which closes the output gap

But at ZLB, this works in reverse: falling inflation means higher real interest rates, exacerbating (rather than closing) the output gap

Deflationary spiral

Summing Up

The ZLB/ELB is generally viewed as bad

- Exacerbates effects of demand shocks
- Contractionary supply shocks
- Can get stuck

The ZLB and the Friedman Rule

Recall the Friedman rule: want the nominal rate at zero

That result only holds in a world with no nominal frictions where there is monetary neutrality

In a world with a non-vertical AS/PC, the ZLB can be a problem

How to avoid the ZLB? Have a higher long-run inflation target (since long-run level of nominal rate moves one-for-one with inflation)

The ZLB and the Long-Run Inflation Target

The higher the long-run inflation target, the less likely we are to hit the ZLB

- If long run $r = 2$, $\pi = 0$ means $i = 2$. Only room to cut rates two percent before ZLB binds
 - If $\pi = 2$, means $i = 4$. Have more room to cut / less likely to hit ZLB
 - If $\pi = 4$, means $i = 6$. Even more room to cut, but further from Friedman rule

But here's the tradeoff: a higher long-run inflation rate reduces incidence of ZLB (good), but moves us further away from the Friedman rule (bad)

Two percent seems to be striking a balance between these two desiderata