Monetary Policy

Part 4: Monetary and Fiscal Interactions

Lecture 11: Fiscal Policy and the ZLB

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Outline

Part 1: Basic Macroeconomic Concepts

Part 2: Conventional Monetary Policy

Part 3: Monetary Policy at the Zero Lower Bound on Nominal Interest Rate

Part 4: Monetary and Fiscal Interactions

- Lecture 11: Fiscal Policy and the ZLB

Mock Exam

Learning Objective of Today‘s Lecture

1. Understanding how the interaction of monetary and fiscal policy affects the fiscal multiplier.

2. Understanding why in the IS-MP-PC model (and other standard models) the fiscal multiplier increases at the ZLB.

3. Understanding the impact of fiscal policy on the natural interest rate.

Literature

Lawrence Christiano, Martin Eichenbaum and Sergio Rebelo (2011). "When Is the Government Spending Multiplier Large?," Journal of Political Economy 119(1): 78-121.

12.1 Fiscal Policy in the IS-MP-PC Model

General Remarks on Fiscal Policy

Fiscal policy refers to decisions by governments about raising revenue though taxation and distributing that revenue as public expenditure.

- The fiscal authority has a variety of instruments at its disposal
  - Different kind of taxes like labor income tax, capital tax, value-added tax etc.
  - Different kind of spending like government consumption, government investment, transfers etc.
- Fiscal policy affects the burden of public debt in the economy. The European sovereign debt crisis has shown the consequences of high levels of government debt and the banking-sovereign debt nexus has threatened financial stability.
- The share of public expenditure in GDP has increased substantially over the last 100 years, in particular due to old-age and health insurance and publicly funded education programs.

General Remarks on Fiscal Policy

- One distinguishes discretionary fiscal policy and automatic stabilizers
  - Discretionary fiscal policy is used as a stabilization tool. Example: the coordinated fiscal stimulus programs in many countries during the Global Financial Crisis or the current fiscal stabilization programs to fight the adverse economic impact of the COVID-19 pandemic. Discretionary fiscal policy is often subject to decision and implementation lags.
  - Automatic stabilizers mitigate the effects of macroeconomic shocks to some extent automatically. Social security spending like spending on unemployment benefits increase automatically when more people become unemployed. Tax burdens are reduced automatically when incomes decline. There are no decision or implementation lags.

Objectives of Fiscal Policy

1. Provision of public goods
   - Production of goods that would be underprovided or directly not provided by the market
   - Examples: infrastructure, education, health, defense etc.
2. Income redistribution
   - Tax and transfer systems are usually designed to redistribute income from those with higher incomes to those with lower incomes
   - Embedded in the tax system (progressive tax) and in social security transfers such as unemployment transfers.
   - Large cross-country differences in the extent of redistribution, e.g. US vs. Europe
3. Resource (re-)allocation
   - Fiscal policy can be used to alter the market allocation of resources.
   - Subsidizing certain industries and taxing undesirable activities.
   - Used, for example, to deal with externalities
4. Stabilization
   - Use budgetary policies to stabilize the economy, i.e. dampen output gap and inflation fluctuations.
   - Ongoing debate regarding the effectiveness ranging from Keynesian to Neoclassical positions. More recently debates focus on empirical evidence regarding fiscal multipliers of different instruments and in different situations.

Monetary and Fiscal Interactions

- We will focus on discretionary demand oriented fiscal policy used for stabilization policy. It has gained relevance since monetary policy has become restricted by the ZLB.
- We will also see that at the ZLB the fiscal multiplier increases.
- There are always short-term interdependencies between fiscal and monetary policy. Both affect demand and are therefore partly substitutes and fiscal policy also affects the real interest rate.
- Some coordination is needed. Monetary and fiscal policy have different objectives, so that they might end up cancelling each other. Example: high cyclical unemployment and high inflation (adverse supply shock). Fiscal policy would be expansionary to address unemployment and monetary policy would be contractionary to address inflation. Without coordination it could result in no stabilization and a higher fiscal deficit.
- In normal times, there is no consensus on the desirability of coordination. Skeptics point out that coordination threatens central bank independence.
- Furthermore, in a monetary union with many fiscal policies, coordination might be particularly difficult. The Maastricht Treaty foresees rules binding the fiscal policies of participating Member States, but there is no rule binding the aggregate fiscal stance of the Eurozone.
- In case of a crisis, the case for coordination is more compelling. In 2014, for example, ECB president Draghi called for less contractionary aggregate fiscal policy in the euro area to mitigate the deflationary pressures at that time.

Fiscal Policy in the IS-PC Model

Let's start with the IS-PC model with exogenous monetary policy setting r_t

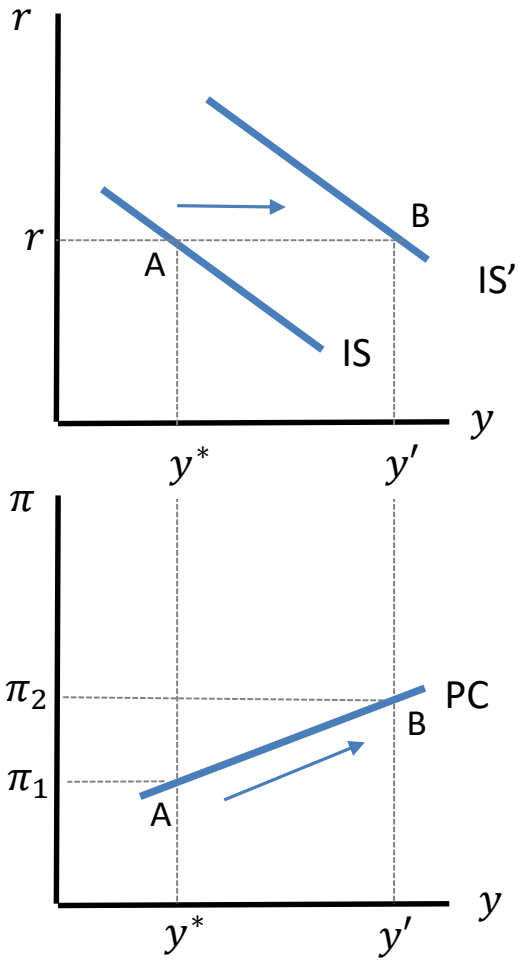
IS-curve: $y_t = y_t^* - \alpha(r_t - r^*) + \varepsilon_t^y$

PC-curve: $\pi_t = \pi_t^e + \gamma\,(y_t - y^*) + \varepsilon_t^\pi$

- We have not explicitly specified fiscal policy in this model.
- We will focus on changes in government spending or taxation that affects the demand side of the economy.
- As long as the fiscal multiplier is positive, i.e. output increases (decreases) following expansionary (contractionary) fiscal actions, we can study fiscal policy via studying the effects of demand shocks ε_t^y:
- Expansionary fiscal policy, i.e. an increase in the budget deficit (or decrease in the surplus) due to discretionary fiscal actions, is represented as $\varepsilon_t^y > 0$.
- Contractionary fiscal policy, i.e. an decrease in the budget deficit (or increase in the surplus) due to discretionary fiscal actions, is represented as $\varepsilon_t^y < 0$.

A Temporary Expansionary Fiscal Shock, $\varepsilon_t^y > 0$ without adjustment from the Central Bank

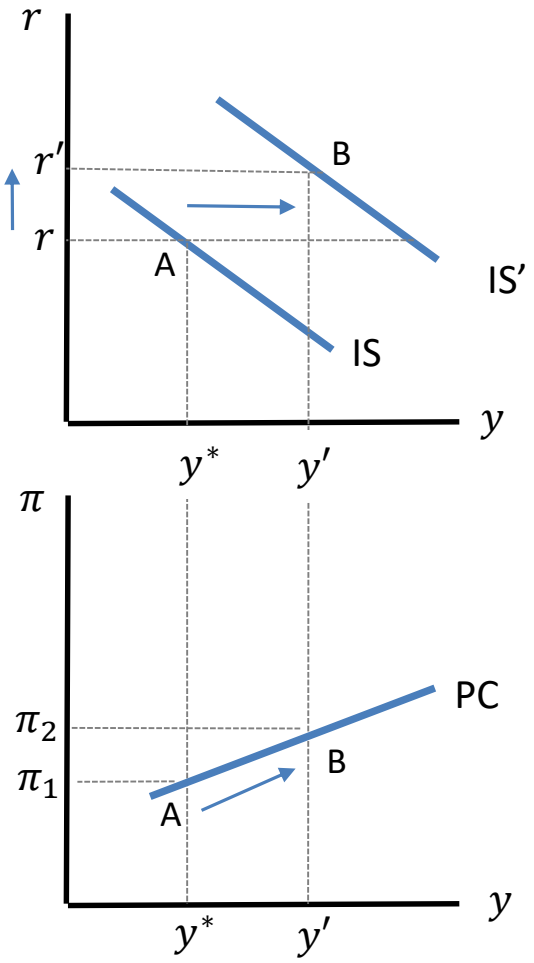
$$\pi_t = \pi_t^e + \gamma\,(y_t - y^*) + \varepsilon_t^\pi \qquad y_t = y_t^* - \alpha(r_t - r^*) + \varepsilon_t^y$$



- $\varepsilon_t^y > 0$ moves the IS-curve to the right.
- Given a fixed real interest rate, output moves above potential output.
- This leads to an increase in inflation above expected inflation ($\pi_2 > \pi_1^e$) via the Phillips curve. The economy moves from A to B in the short run.
- Effect would be even larger if the central bank would not hold constant r_t, but i_t. In this case r_t would decrease, because the increase in demand increases (expected) inflation.

A Temporary Expansionary Fiscal Shock, $\varepsilon_t^y > 0$ with adjustment from the Central Bank

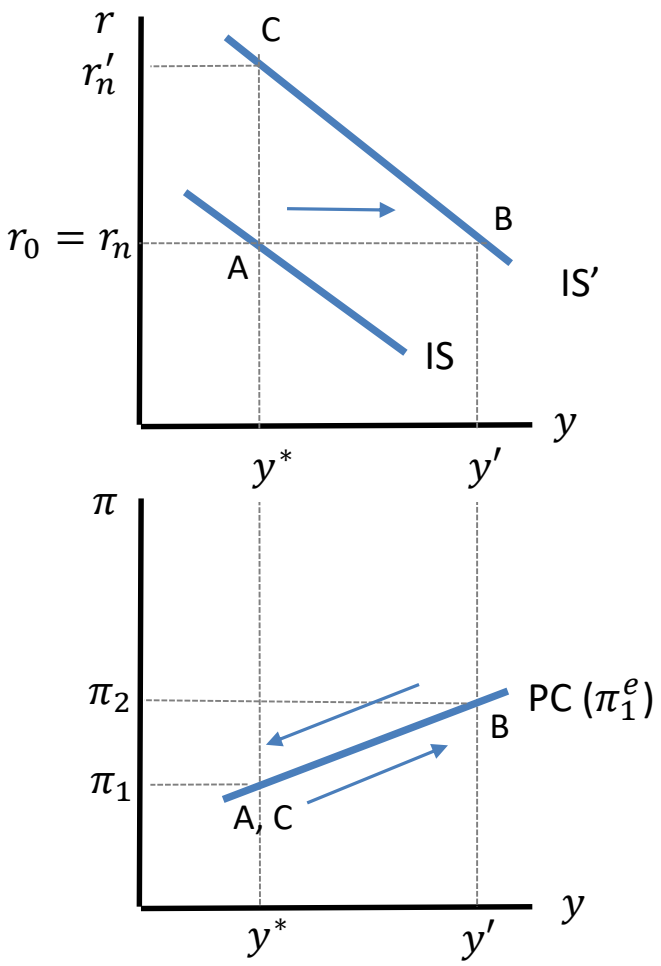
$$\pi_t = \pi_t^e + \gamma\,(y_t - y^*) + \varepsilon_t^\pi \qquad y_t = y_t^* - \alpha(r_t - r^*) + \varepsilon_t^y$$



- The size of the increase in output depends on the reaction of the central bank.
- If the central bank increases r (via increasing i), the effect will be smaller.
- An increase in r, leads to a decrease in consumption and investment. Private spending is crowded out by public spending.
- Also, the increase of inflation will be smaller the larger is the increase in r.
- Why would the central bank increase r at all, if this reduces the effects of fiscal policy?
- In general to stabilize inflation
- A permanent change in fiscal policy changes the natural interest rate, so that monetary policy must react to stabilize the economy

A Permanent Expansionary Fiscal Shock, $\varepsilon_t^y > 0$ with adjustment from the Central Bank

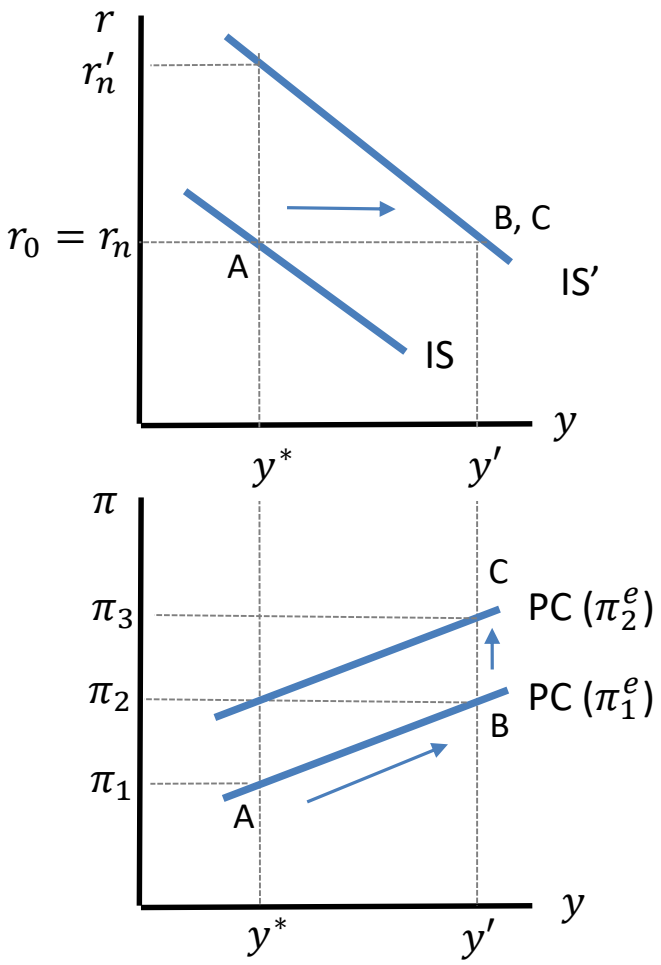
$$\pi_t = \pi_t^e + \gamma\,(y_t - y^*) + \varepsilon_t^\pi \qquad y_t = y_t^* - \alpha(r_t - r^*) + \varepsilon_t^y$$



- The economy moves in the short run from A to B.
- Since a permanent increase in demand meets constant supply, the natural interest rate increases.
- Note that we look here at pure demand shocks without any effects on y^*, i.e. a long-run multiplier of zero. We will look at more general scenarios later.
- To stabilize output and inflation, the central bank increases the interest rate to equal the natural interest rate.
- Private savings will go up and the decrease in consumption/investment demand offsets the increase in government spending.
- The economy moves to point C.
- Output is the same as before, but its composition has changed. Public demand has increased and private demand has decreased.
- Crowding out: Public spending crowds out private spending via changes in the real interest rate.
- Regarding the current expropriating of German savers by the ECB's low interest rate policy: an increase in government spending would increase interest rates.

A Permanent Expansionary Fiscal Shock, $\varepsilon_t^y > 0$ without adjustment from the Central Bank

$$\pi_t = \pi_t^e + \gamma\,(y_t - y^*) + \varepsilon_t^\pi \qquad y_t = y_t^* - \alpha(r_t - r^*) + \varepsilon_t^y$$



- Without an adjustment, the interest remains below the natural interest rate, i.e. monetary policy is permanently expansionary
- After a while, people will realize that inflation is permanently higher ($\pi_2 > \pi_1$) and will adjust inflation expectations upwards to π_2^e (example: adaptive expectations: $\pi^e = \pi_{t-1}$).
- This moves the Phillips curve upwards, further increasing inflation to π_3. The economy moves to point C.
- Without stabilization by the central bank (increase in r) or fading out of the fiscal policy shock, this will result if in further increases in π^e, further pushing up the Phillips curve, increasing π, increasing in π^e, …

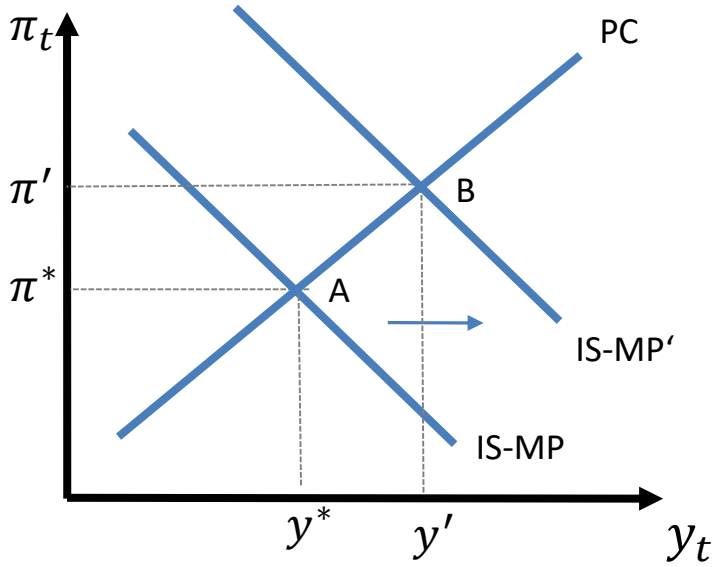
Expansionary Fiscal Policy Shock in the IS-MP-PC Model

1. The Phillips curve: $\pi_t = \pi_t^e + \gamma\,(y_t - y^*) + \varepsilon_t^\pi$
2. The IS curve: $y_t = y_t^* - \alpha(i_t - \pi_t - r^*) + \varepsilon_t^y$
3. The MP curve: $i_t = r^* + \pi^* + \beta_\pi(\pi_t - \pi^*)$

Combine 2. and 3. to the IS-MP curve:

$$y_t = y_t^* - \alpha(\beta_\pi - 1)(\pi_t - \pi^*) + \varepsilon_t^y$$

- Effects of $\varepsilon_t^y > 0$ similar to the IS-PC model.
- Difference is that via the monetary policy rule the interest rate increases automatically, so that public spending crowds out private spending.
- Further difference: central bank controls i_t rather than r_t. If the central bank holds i_t constant, r_t would decrease, because (expected) inflation increases.



Algebraic Effects of Fiscal Policy With/Without ZLB

Recall the solution for output without ZLB:

$$y_t = y_t^* - \theta\alpha(\beta_\pi - 1)(\pi_t^e - \pi^* + \varepsilon_t^\pi) + (1 - \theta\alpha\gamma(\beta_\pi - 1))\varepsilon_t^y, \text{ with } \theta = \frac{1}{1+\alpha\gamma(\beta_\pi - 1)}$$

Effect of ε_t^y on y_t is:

$$\frac{\partial y_t}{\partial \varepsilon_t^y} = \left(1 - \theta\alpha\gamma(\beta_\pi - 1)\right) = 1 - \frac{\alpha\gamma(\beta_\pi - 1)}{1+\alpha\gamma(\beta_\pi - 1)} = \frac{1+\alpha\gamma(\beta_\pi - 1) - \alpha\gamma(\beta_\pi - 1)}{1+\alpha\gamma(\beta_\pi - 1)} = \frac{1}{1+\alpha\gamma(\beta_\pi - 1)}$$

The degree of crowding out depends on $\boldsymbol{\beta_\pi}$, $\boldsymbol{\alpha}$ and $\boldsymbol{\gamma}$.

- γ determines by how much inflation increases due to the increase in demand via the PC.
- β_π determines by how much i_t (and thus r_t) increases in response to the increase in π_t via the MP.
- α determines by how much output decreases in response to the increase in r_t via the IS-curve.
- Note, however, that all these actions happen at the same time, so that they are intertwined. There is no recursive ordering as for example in the Svensson model studied in lecture 4.

Solution for output with binding ZLB:

$$y_t^{ZLB} = y_t^* + \alpha r^* + \frac{\alpha}{1-\alpha\gamma}\pi_t^e + \frac{\alpha^2\gamma}{1-\alpha\gamma}r^* + \frac{1}{1-\alpha\gamma}\varepsilon_t^y + \frac{\alpha}{1-\alpha\gamma}\varepsilon_t^\pi$$

Effect of ε_t^y on y_t is:

$$\frac{\partial y_t^{ZLB}}{\partial \varepsilon_t^y} = \frac{1}{1-\alpha\gamma}$$

Algebraic Effects of Fiscal Policy on Output With/Without ZLB

$$\frac{\partial y_t^{ZLB}}{\partial \varepsilon_t^y} = \frac{1}{1-\alpha\gamma} > \frac{1}{1+\alpha\gamma(\beta_\pi - 1)} = \frac{\partial y_t}{\partial \varepsilon_t^y} \quad \text{for} \quad \beta_\pi > 1$$

The effect of fiscal policy (demand shocks in general) is larger at the ZLB compared to the standard case.

This is good and bad news.

- Negative demand shocks have larger adverse effects at the ZLB. The reason is that monetary policy cannot accommodate these by lowering the interest rate.
- Fiscal policy is more powerful at the ZLB, i.e. the stabilization effects on output are larger.
- Note that one gets the same solution as in the ZLB case when plugging in the standard solution $\beta_\pi = 0$. The ZLB-solution is not only valid at the ZLB, but in general if the central bank does not react to inflation, i.e. accommodates demand shocks. This demonstrates the importance of the interaction of monetary and fiscal policy.

What About the Inflation Effects of Fiscal Policy?

Solution for inflation without ZLB:

$$\pi_t = \theta\pi_t^e + (1-\theta)\pi^* + \theta(\gamma\varepsilon_t^y + \varepsilon_t^\pi), \quad \text{with } \theta = \frac{1}{1+\alpha\gamma(\beta_\pi - 1)}$$

Effect of ε_t^y on π_t is:

$$\frac{\partial\pi_t}{\partial\varepsilon_t^y} = \theta\gamma = \frac{\gamma}{1+\alpha\gamma(\beta_\pi-1)}$$

Solution for inflation with binding ZLB:

$$\pi_t = \frac{1}{1-\alpha\gamma}\pi_t^e + \frac{\alpha\gamma}{1-\alpha\gamma}r^* + \frac{\gamma}{1-\alpha\gamma}\varepsilon_t^y + \frac{1}{1-\alpha\gamma}\varepsilon_t^\pi$$

Effect of ε_t^y on π_t is:

$$\frac{\partial\pi_t^{ZLB}}{\partial\varepsilon_t^y} = \frac{\gamma}{1-\alpha\gamma}$$

The effect on inflation is higher with binding ZLB than without:

$$\frac{\partial\pi_t^{ZLB}}{\partial\varepsilon_t^y} = \frac{\gamma}{1-\alpha\gamma} > \frac{\gamma}{1+\alpha\gamma(\beta_\pi-1)} = \frac{\partial\pi_t}{\partial\varepsilon_t^y} \quad \text{for } \beta_\pi > 1$$

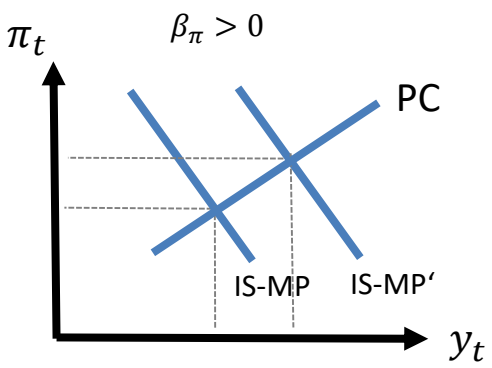
Note again that one gets the same solution as in the ZLB case when plugging in the standard solution $\beta_\pi = 0$. The effect on inflation is larger when monetary policy accommodates demand shocks.

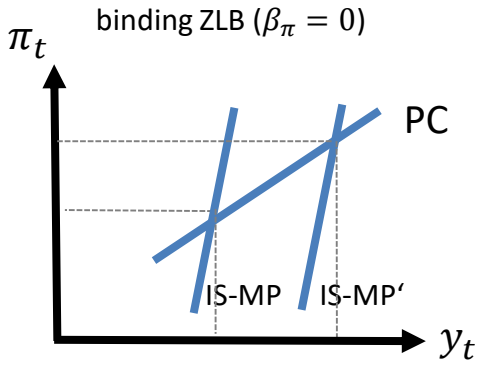
Dependence of Fiscal Policy Effect on ZLB and PC Slope

- γ determines demand effects on inflation via the PC: $\pi_t = \pi_t^e + \gamma\,(y_t - y^*) + \varepsilon_t^\pi$
- β_π and α determine jointly the slope of the IS-MP curve:

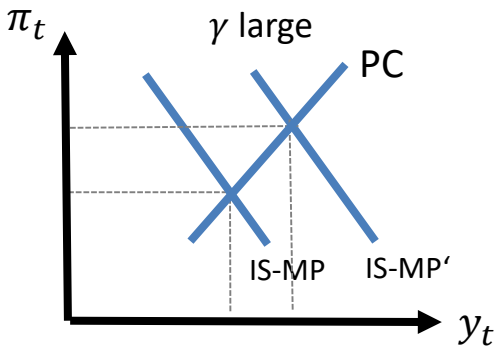
$$y_t = \begin{cases} y_t^* - \alpha(\beta_\pi - 1)(\pi_t - \pi^*) + \varepsilon_t^y & if\ \pi_t > \pi^{ZLB} \\ y_t^* + \alpha r^* + \alpha\pi_t + \varepsilon_t^y & if\ \pi_t \le \pi^{ZLB} \end{cases}$$

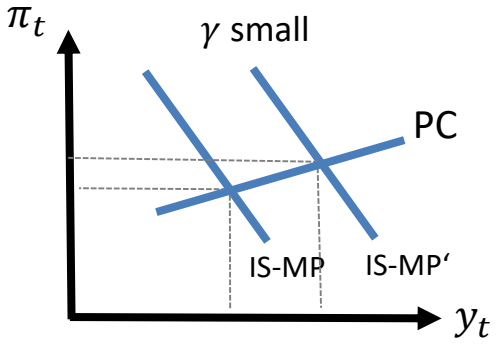
Effects with different β_π: With monetary accommodation the effects on output and inflation are larger





Effects with steep and flat PC (without ZLB):With a flatter PC the output effects are larger and the inflation effects are smaller. Larger stimulus is needed to stabilize inflation.





Summary

- Permanent change in fiscal spending changes the natural interest rate
- Fiscal spending has larger effects at the ZLB or when the central bank reacts little to inflation (accommodates fiscal policy). But recall that (adverse) demand shocks also have larger effects at the ZLB