Introductory Macroeconomic Theory

–

Fluctuations, Policy Analysis and Trade-offs

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ILO Summer School on Macroeconomics and modelling for labour market analysis

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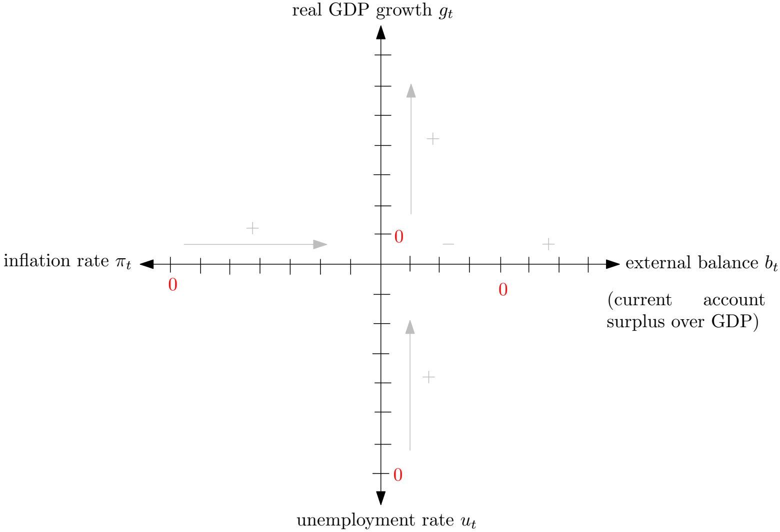
The "magic square " (Kaldor 1971)

Four main policy objectives



(current account surplus over GDP)

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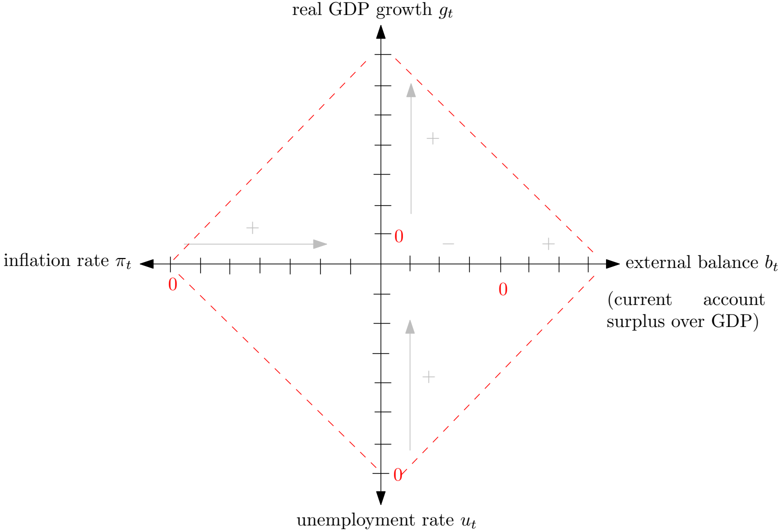

(current account surplus over GDP)

Four main policy objectives

- **Real GDP/output growth** – Growth of the inflation-adjusted values of all the goods and services produced in a country. Must be ideally positive.
- **Inflation rate** – Rate at which the general level of prices for goods and services is rising (or decreasing), and purchasing power is falling (or increasing). Must be ideally low but positive.
- **Unemployment rate** – Proportion of unemployed persons actively seeking for a job among the labour force. Must be ideally low.
- **Current account balance** – Sum of net exports $(X - I)$ of goods and services, expressed as % of GDP. Must be ideally in surplus.

Trade-off and policy debates

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- How are **unemployment** rate and **inflation** related? (Is the Phillips curve downward-sloping or vertical?
  - **What causes inflation**?: demand-driven (positively related to **output growth**) or supply-driven (negatively related to output growth) or imported (related to **current accounts**)? more
  - Is there a difference in the short and in the medium/long runs?
  - The key role of **expectations**.

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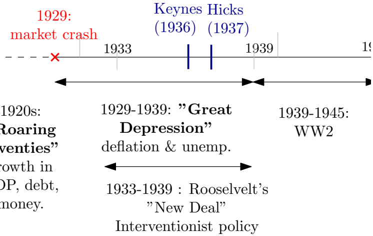
  - The key role of **expectations**.
- How do **output growth** and **inflation** affect the **current account** balance?
  - How does it depend on the **exchange rate** regime?
  - Does it depend on the production structure of the economy?

What drive business cycles? Competing theories

- Different answers to those questions lead to different explanations of the drivers of short-run economic fluctuations: different **sources** of the "**business cycles**".
- Different answers to those questions lead to different, **competing implications** in terms of policy design: **monetary** and **fiscal policies**.
- Different explanations are not mutually exclusive: answers to those questions may be **time-dependent**, **state-dependent**, may be supported by **mixed empirical evidence**.

$\Rightarrow$ In this lecture: a simple framework to discuss those issues.

A (brief) historical perspective



XIXe - 1920s: Classical theory
(e.g. Smith, Say, Mill)

No policy intervention,
competition and free trade

+ **Austrian theory**
(e.g. Von Mises, Hayek)

Monetary explanation of the Great Depression

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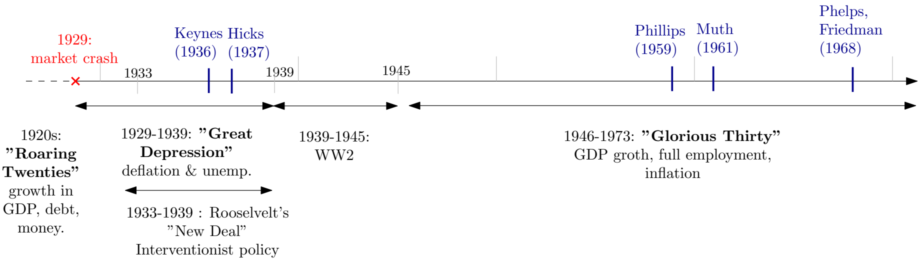

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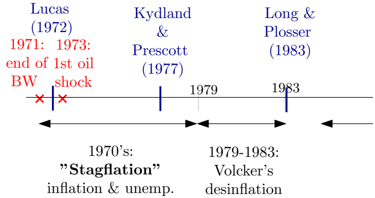
Monetary explanation of the Great Depression

1950s-1960s: Keynesian theory
(e.g. Keynes, Kaldor, Robinson)

Room for policy intervention, demand stimulus, low real interest rates, inflation/unemployment trade-off.

A (brief) historical perspective



1970s-1980s: monetarist, then neoclassical economics
(e.g. Friedman, Lucas, Sargent)

Inflation is a monetary phenomenon, policies have no real effects
(RBC models)
focus on price stability though monetary discipline

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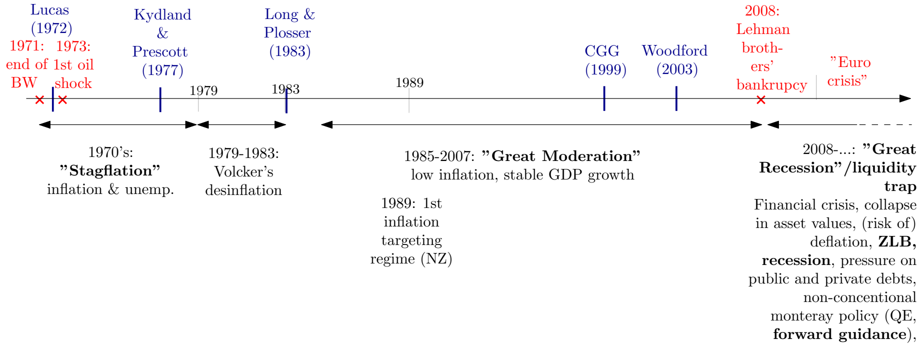

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1990s-...: New Keynesian economics (e.g. Woodford)

Nominal rigidities and demand-driven output: short-run real effects of policies, focus on price stability though adjustments of the interest rate

2000s-2010's: regain of interest for Austrian economics, Minsky financial hypothesis, Koo's deleveraging crisis:
role of credit, leverage, money/debt

Policy reactions largely inspired by historical experience, judgment and pragmatism

The Classical business cycles

Main assumptions

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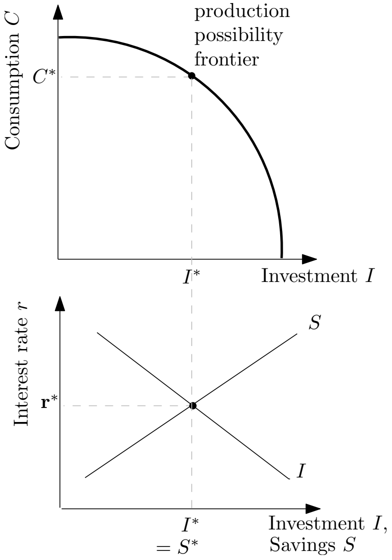
- Consumption and savings (S) are substitutes.
- **Prices/wages** are **flexible**: markets always clear, r^* such as $I = S$
- The economy always operates on the **production possibility frontier**: **equilibrium** path.
- Money is **neutral**: changes in quantity of money, prices, any nominal value (nominal shock) has no effect on output.



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Sources of fluctuations (1/2)

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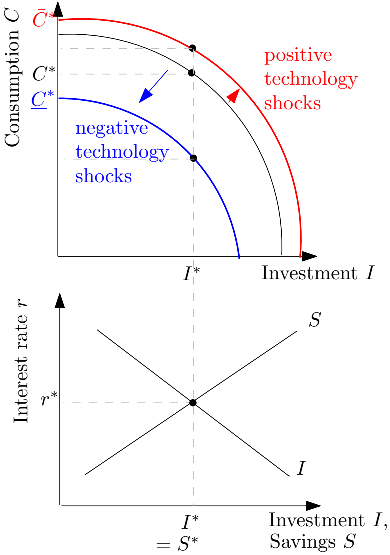
- **Permanent** effects: shift to another equilibrium.
- Example: Real Business Cycles (RBC) models à la Kydland & Prescott (1978), Long & Plosser (1983).



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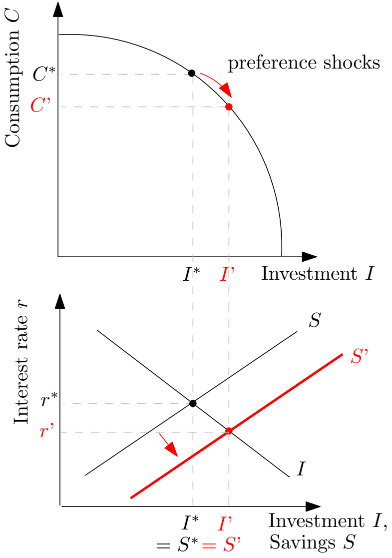
Sources of fluctuations (2/2)

- **Preferences shocks** (positive or negative) of the representative consumer such as changes in risk aversion, affect its **saving rate**, but not the production possibility frontier.
- Changes in savings/investment has **permanent effects** on productive capital accumulation and equilibrium level of per capital capital and output.
- Example: Neoclassical growth models à la Solow.

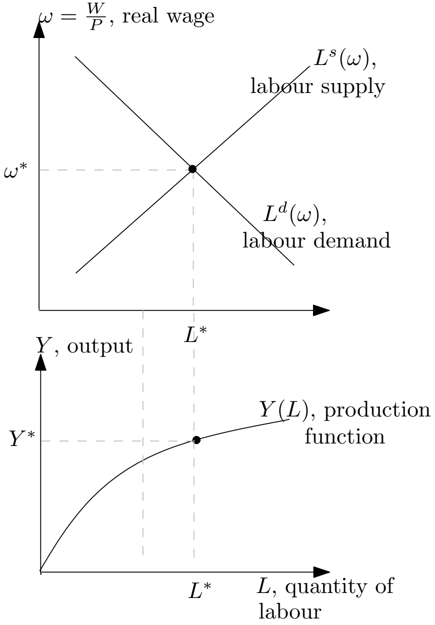


Origins of unemployment

The (neo-)classical story

- Firms' labour demand $L^d(\underset{-}{\omega})$
- Households' labour supply $L^s(\underset{+}{\omega})$

Neoclassical unemployment



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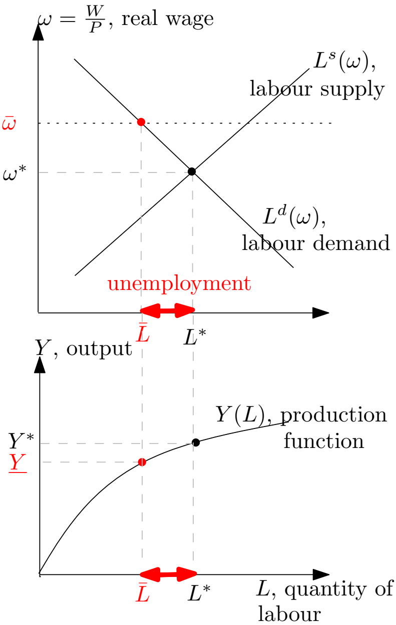

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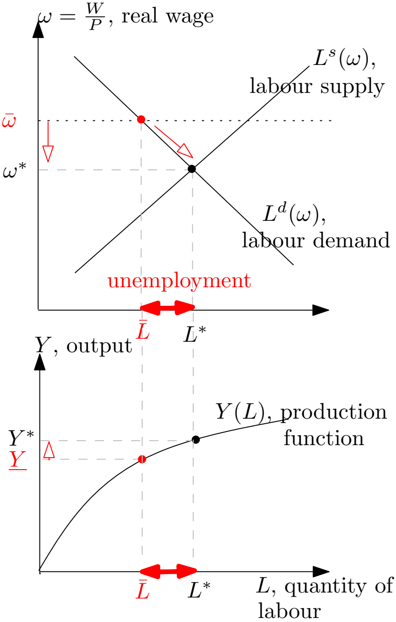
- In the long run, wage adjusts **downward** $\rightarrow$ **production increases** $\rightarrow$ and unemployment decreases.

Neoclassical unemployment



The Keynesian business cycles

Two main ingredients:

- **Nominal rigidities**: prices and wages cannot adjust immediately to clear the markets (menu costs, wage contracts).

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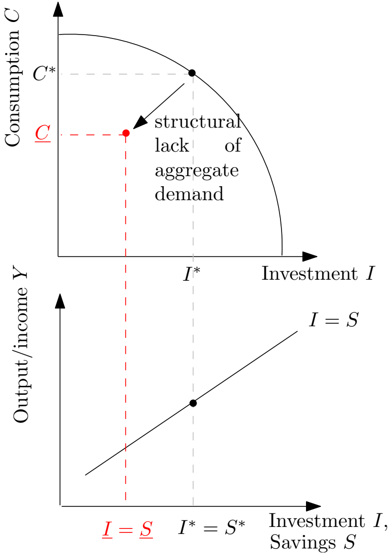
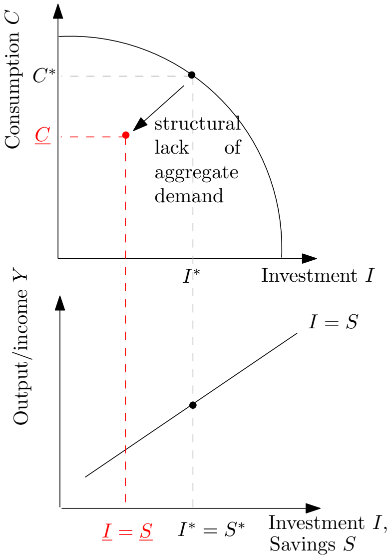
- **Nominal rigidities**: prices and wages cannot adjust immediately to clear the markets (menu costs, wage contracts).
- Structural **lack of aggregate demand** ("effective" demand, role of expectations): the economy generally does not operate on the production possibility frontier.



The Keynesian business cycles

- Investment equals savings by accounting identity (not by adjustment of r).
- Intertemporal/long-run aspects ignored, focus on short-run.



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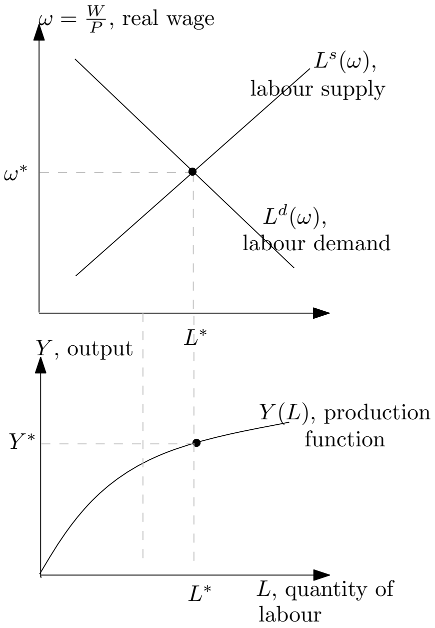

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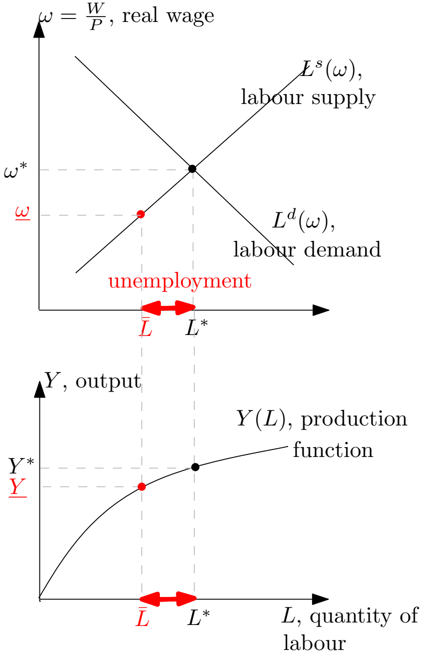

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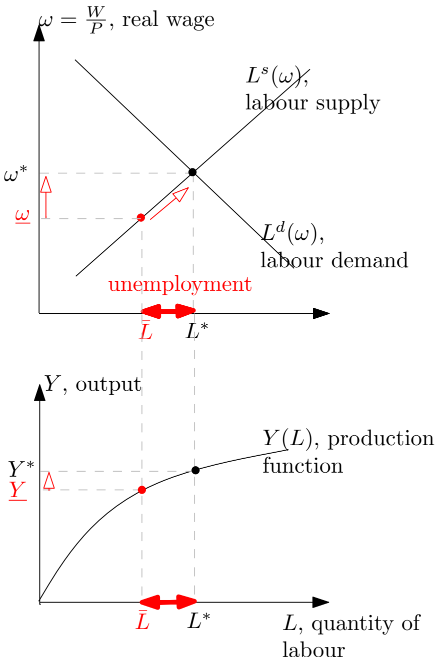
- Lack of aggregate demand $\rightarrow$ unemployment
- Increasing aggregate demand $\rightarrow$ **production increases** $\rightarrow$ wage adjusts **upwards** $\rightarrow$ and unemployment decreases.

Keynesian unemployment



The Austrian cycles

Low interest rates, credit bubble, malinvestment and crisis

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- Interest rate clears the savings/investment market.
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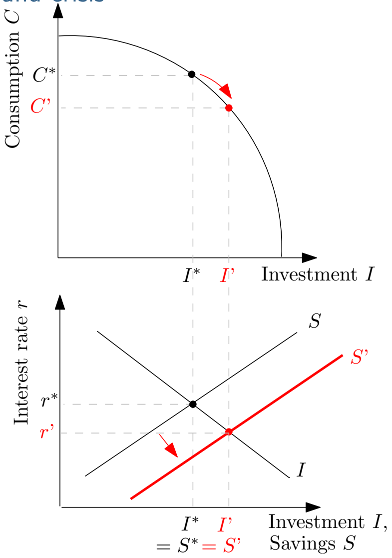

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- **Cheap credit** creates imbalances between S and I: temporary deviations from the production possibility frontier ($r < r^*$).
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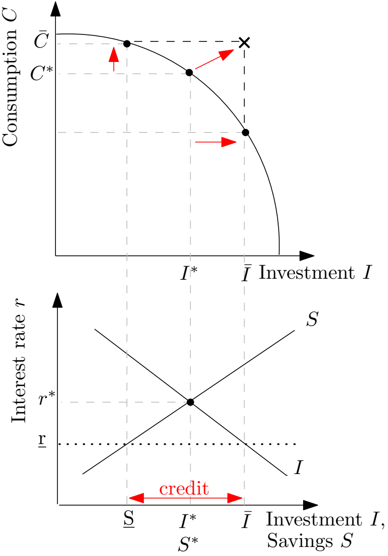
- To reequilibrate I and S, r has to rise, provoking a drop in I, profits and output.



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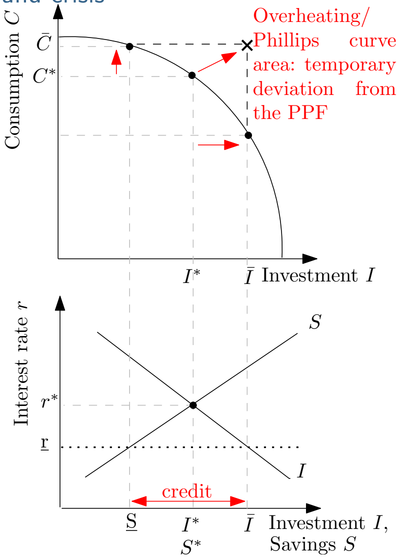

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No particular room for policy: surplus capacity accentuated in the recession $\rightarrow$ decrease in **opportunity costs** of reallocation of productive capital and innovations. skip Minsky

Financial instability hypothesis (Minsky, 1974)

Prosperous times, overconfidence, credit booms and busts

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- Starting point: an asset, purchased through debt, is **expected** to generate an income stream.
- 3 types of borrowers:
  - Hedge: the anticipated income flows cover both principal and interests.
  - Speculative: the anticipated income flows cover interests (re-borrow to pay back the principal).
  - Ponzi: based on beliefs that the asset will appreciate to refinance the debt.

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5. Collapse in asset values, borrowers bankruptcies and wave of pessimism;
6. Credit market disruption: tightening of credit availability $\rightarrow$ drop in investment and consumption $\rightarrow$ economic crisis.

Origins of the business cycles: sum-up

- **Classical** cycles: disequilibrium on the **labour** market.
- **Keynesian** cycles: disequilibrium on the **product** market.
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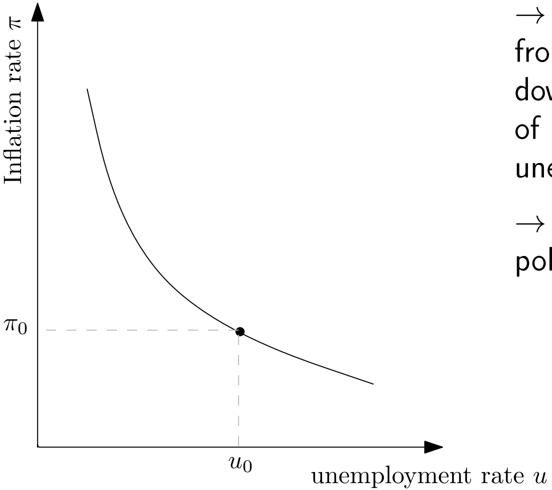
- In practice, these explanations may coexist: **market interactions**.
- In practice, **financial frictions**: imperfect transformation of savings into productive investment (e.g. credit rationing after a balance-sheet shock, imperfect substitution of money into assets, etc.)
  $\rightarrow$ have long-run effects on investment, GDP growth and level.

The Phillips curve: a trade-off?

Demand-driven inflation & the short-run trade-off



→ Phillips (1959) on UK data from 1861-1957: downward-sloping growth rate of nominal wages and unemployment.

→ Became an integral part of policy making in the 1960s:

$$\pi_t = \sum_{i \geq 1} \gamma_i \pi_{t-i} - \beta u_t \qquad (1)$$

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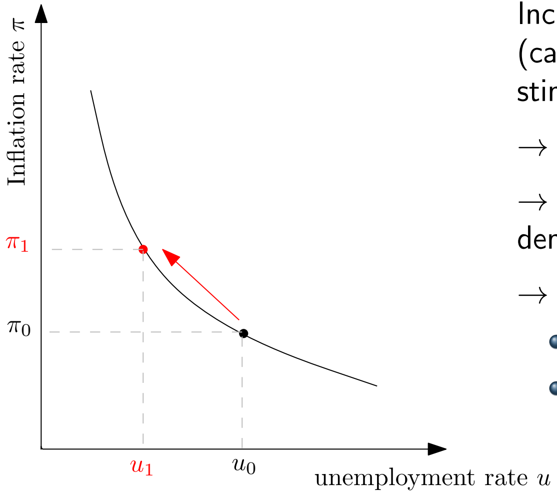


Increase in **demand** (catching-up process, policy stimulus, etc.)

$\rightarrow$ increase in *money* wage:

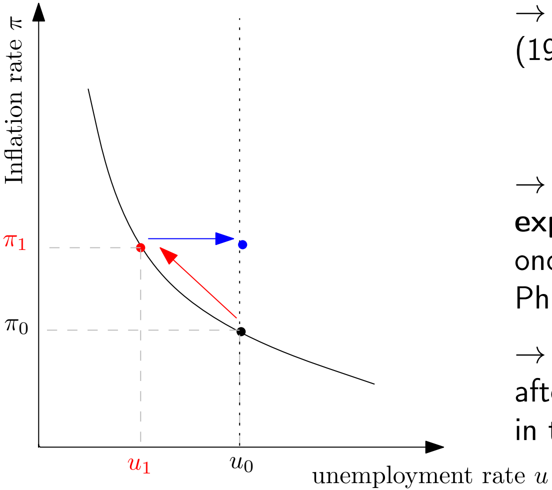
$\rightarrow$ increase in aggregate demand

$\rightarrow$

- increase in inflation
- increase in GDP/ decrease in unemployment

The Phillips curve: a trade-off?

Demand-driven inflation & adaptive expectations



→ Phelps (1968) - Friedman (1968):

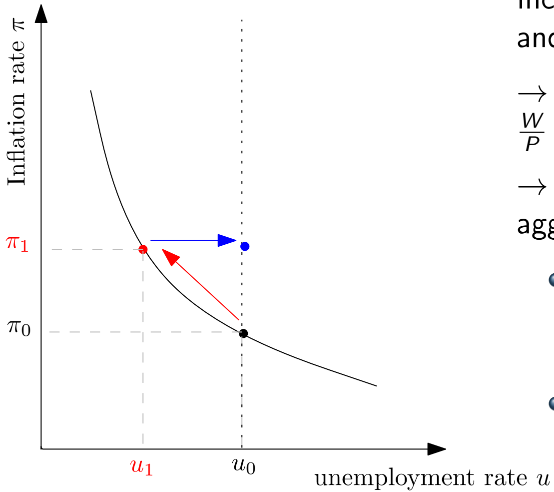
$$\pi_t = \pi_t^e - \beta u_t \qquad (2)$$

→ With **adaptive expectations** $\pi_t^e = \pi_t^e(\pi_{t-i})$, once inflation is constant, the Phillips curve breaks down.

→ Became the majority view after the hyperinflation episode in the 1970s.

The Phillips curve: a trade-off?

Demand-driven inflation & no long-run trade-off



Increase in money wages W and prices P

$\rightarrow$ purchasing power/real wage $\frac{W}{P}$ actually not increasing

$\rightarrow$ decrease in consumption/ aggregate demand:

- increase in unemployment $\rightarrow$ back to the initial level: NAIRU.
- ... but inflation is higher.

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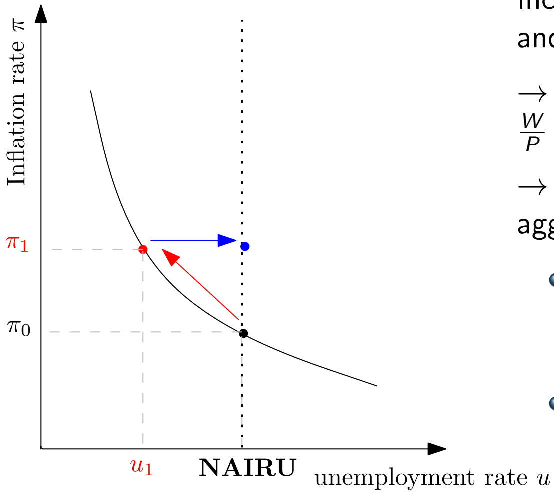

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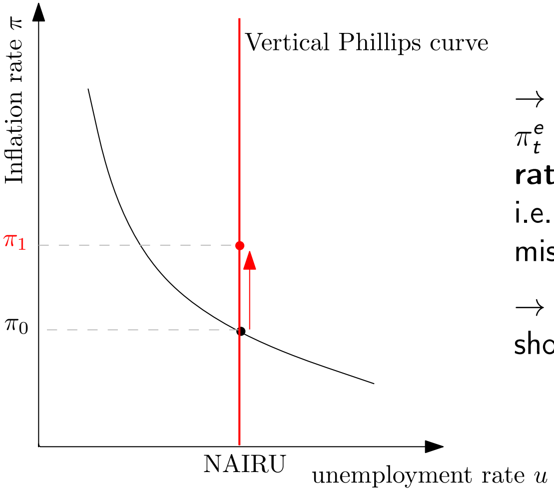

→ Sargent & Wallace (1975): π_t^e is **rational/model-consistent**, i.e. agents do not make any mistake on average: $\pi_t^e = \pi_t$.

→ No trade-off, even in the short-run.

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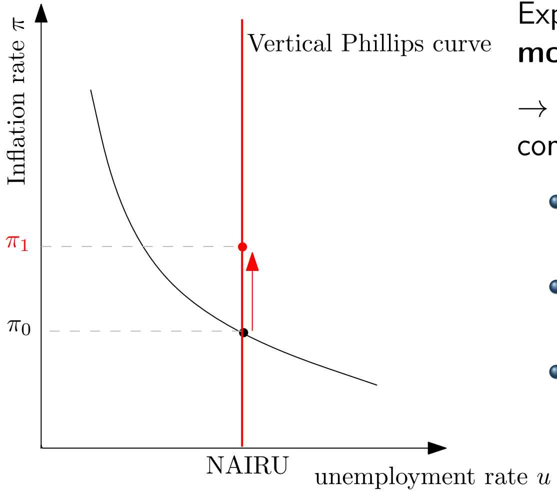
Demand-driven inflation & rational expectations



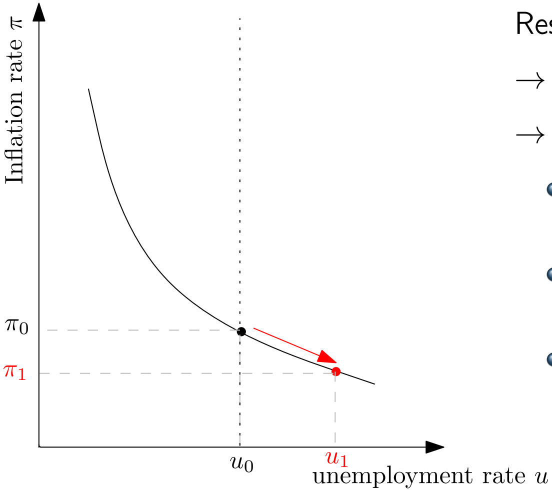
Expansionary policies but **no money illusion**

$\rightarrow$ purchasing power is kept constant:

- consumption/aggregate demand constant,
- unemployment constant at the NAIRU level
- ... but inflation is higher.

The Phillips curve: a trade-off?

An unexpected disinflation is employment-costly **in the short-run**



Restrictive policies

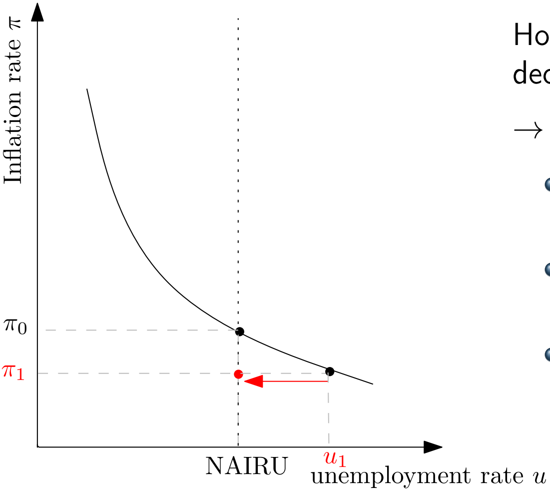
$\rightarrow$ Decrease in W (and P)

$\rightarrow$ money illusion :

- consumption/aggregate demand falls
- unemployment increases beyond the NAIRU
- ... but inflation is decreasing.

The Phillips curve: a trade-off?

... but **in the long-run**, unemployment goes back to the NAIRU



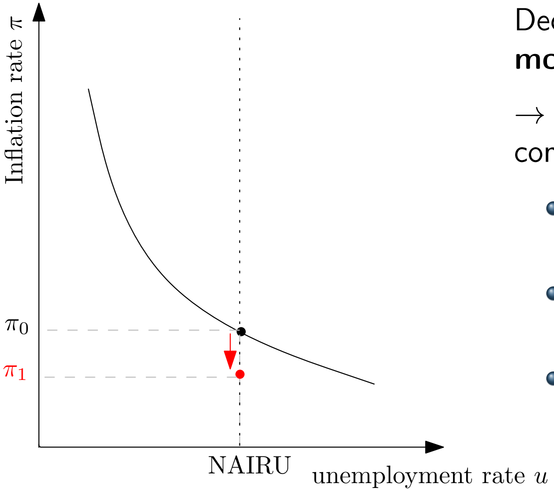
Households realize that P *also* decreased:

→ Purchasing power increased:

- consumption/aggregate demand increases
- unemployment decreases toward the NAIRU
- ... and inflation remains lower.

The Phillips curve: a trade-off?

A credible disinflation is not costly



Decrease in W (and P) but **no money illusion**

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The Phillips curve: a trade-off?

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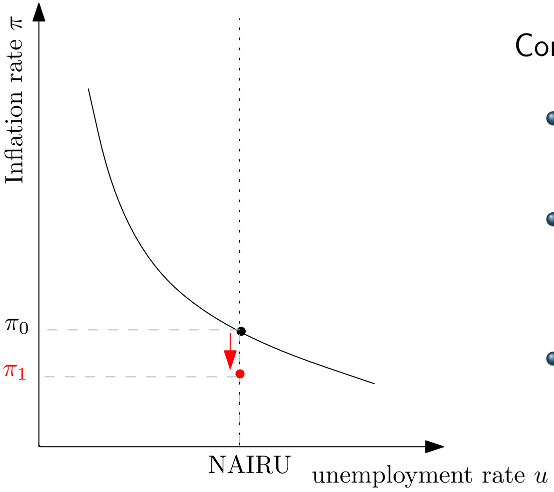

Consequently:

- no economic benefit from higher inflation;
- policy should **target a low (positive) inflation rate**...
- ...to ensure a stable economic environment.

The Phillips curve: Policy implications in a nutshell

- Volcker's desinflation in 1980's partly validates the RE view.

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- But in RBC models, no room for policy, not even in the short-run
  $\rightarrow$ regain of interests for **some** elements of the Keynesian theory.

The New Keynesian Phillips curve

- Micro-foundations with nominal rigidities (price stickiness):

$$\pi_t = \beta \pi^e_{t+1} + \kappa mc_t + (+\text{ cost-push shock}) \tag{3}$$

$\rightarrow$ β and κ are **structural** parameters, $mc \propto$ output gap is firms' marginal costs.

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$\rightarrow$ Management of expectations: **inflation targeting**.

Inflation targeting regimes

- Initiated in 1989 in New Zealand, today 23 countries, including 17 emerging and Eastern European countries (e.g. Brazil, Ghana, Guatemala, Philippines).

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- Main characteristics (Orphanides & Williams 2007):
  - Explicit inflation target and **priority** to price stabilisation in the CB's mandate (e.g. $8 \pm 2\%$ in Ghana, $4 \pm 1\%$ in Indonesia, $1 - 3\%$ in Israel, 2.5% in Norway).
  - Essential role of **expectations**: inflation forecast targeting.
  - Clear **communication** strategy with the public: **transparency** leads to accountability and predictability of monetary policy decisions: publication of minutes, press conferences, speeches, publication of forecasts, **forward guidance** though future path of interest rates.

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- Flexible inflation targeting: **secondary objective in terms of GDP** growth/unemployment.

Inflation targeting regimes: developing countries

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  $\rightarrow$ "**financial repression**" (McKinnon, 1973): keeping interest rates very low by governmental interventions to limit the costs of public financing instruments (e.g. imposing large reserve and liquidity requirements on banks, ceilings on lending rates, political pressure on state-owned banks, limiting the degree of competition on the credit market).

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- Increased **transparency, accountability, information** (e.g. data on prices and real sector developments, availability of reliable procedures for forecasting inflation).

The IS-LM framework

Motivations

- **Didactic tool**: provide a **simple** account within a **self-contained/integrated** model of results obtained in more complicated frameworks.

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- **Empirical support**, both in developed and developing countries.
- Avoid the pitfalls of more complicated models (equilibrium analysis, simulations) while sharing important aspects of state-of-the-art model (demand-driven output, nominal rigidities).

The IS-LM framework

Discussion of behavioural elements (1/2)

- **Consumption function**:
  - Keynesian theory and IS-LM model: $C(Y)$.
  - Neoclassical theory (permanent income hypothesis): $C(i)$ (consumption smoothing).

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$\rightarrow$ Also true to some extent in developed countries (limited asset market participation, rule-of-thumb consumers).

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Discussion of behavioural elements (2/2)

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$\rightarrow$ investment function is heavily dependent on the **institutional environment in the financial system** (e.g. credit rationing, financial regulation).

$\rightarrow$ effect of **political uncertainty** on investment: trading off the returns from investing now against the gains from being able to make a more informed decision in the future (e.g. Sub-Saharan Africa in the 1980s and 1990s).

The IS-LM framework

Limits

- **Qualitative reasoning** only, not quantitative assessment of policies.
- Analysis at the aggregate level only, no disaggregation of agents or sectors.
- The IS-LM model **is not** a vehicle to derive results of policy analysis (no forward-looking elements), only a graphical illustration of the effects.

The IS-LM framework

Main assumptions

- **Mainly** a short-run analysis, from Keynesian perspective:
  - The output is demand-driven (firms' supply of goods mechanically adjusts to households' demand for goods)
  - **Prices and wages are fixed**. more on interest rate

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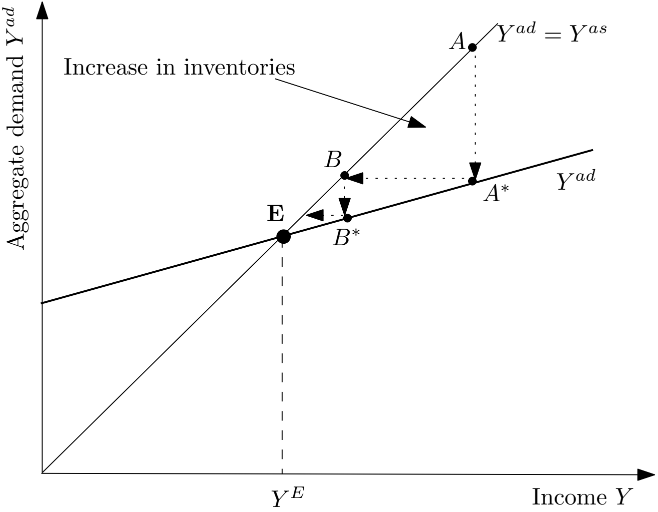
  - The output is demand-driven (firms' supply of goods mechanically adjusts to households' demand for goods)
  - **Prices and wages are fixed**. ▸ more on interest rate
- **As any model**, strong simplifications have to be made, e.g. a simplified world with two markets:
  - The goods market (one single good) $\rightarrow$ the *IS* curve.
  - The capital market (no intermediary) $\rightarrow$ the *LM* curve.
  ▸ scheme
- In the basic version, closed economy. ▸ skip if no time

The "Keynesian cross": prevalence of AD

$\rightarrow$ If supply $>$ demand:



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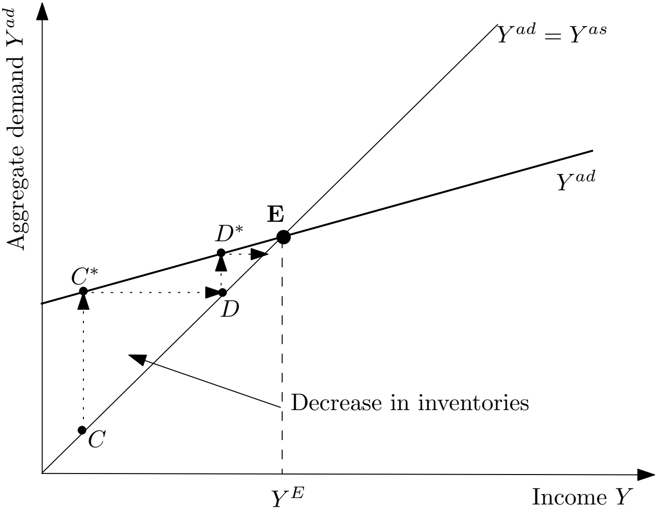

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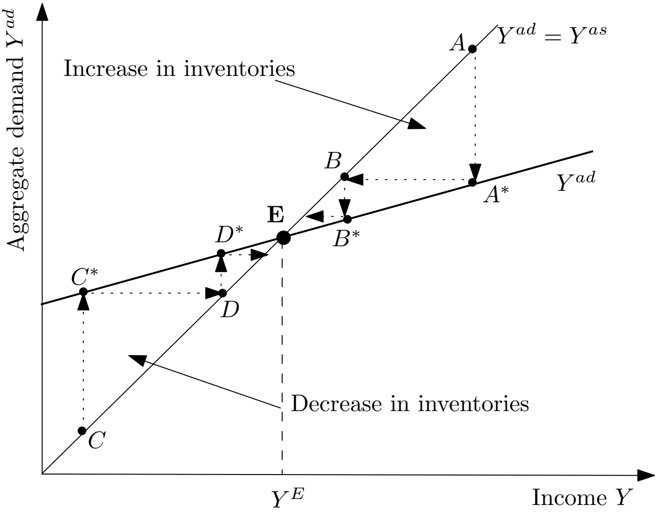


The *IS* curve

Components of aggregate demand

$$Y^{ad} = C(\underset{+}{Y - T}) + I(\underset{-}{i}) + G \tag{5}$$

- Households' consumption: $C(\underset{+}{Y - T}) = C_0 + c(Y - T)$

  where $0 < c < 1$ is the marginal propensity to consume, and the level of tax $T = tY$, $0 \leq t < 1$ being the marginal income tax rate.

- Firms' investment: $I(\underset{-}{i}) = I_0 + b \times i$

  where $b < 0$ is the sensitivity of investment to interest rate.

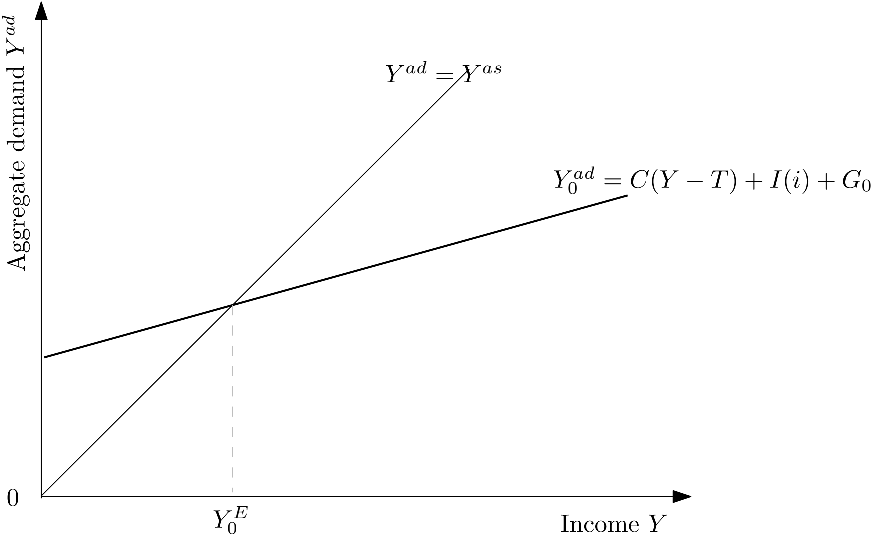
- Public expenditures : G

$\Rightarrow$ A change of any of these components affects aggregate demand.

skip if no time

The *IS* curve

Shift in public expenditures



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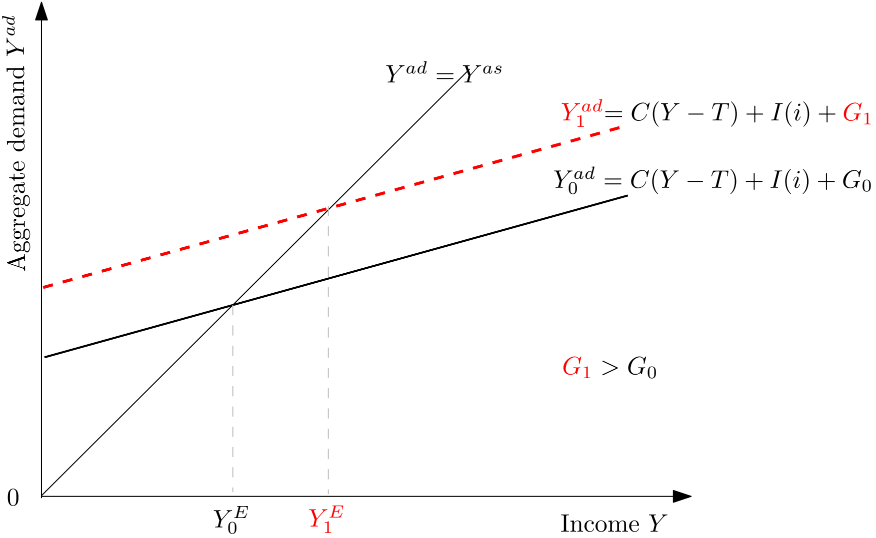

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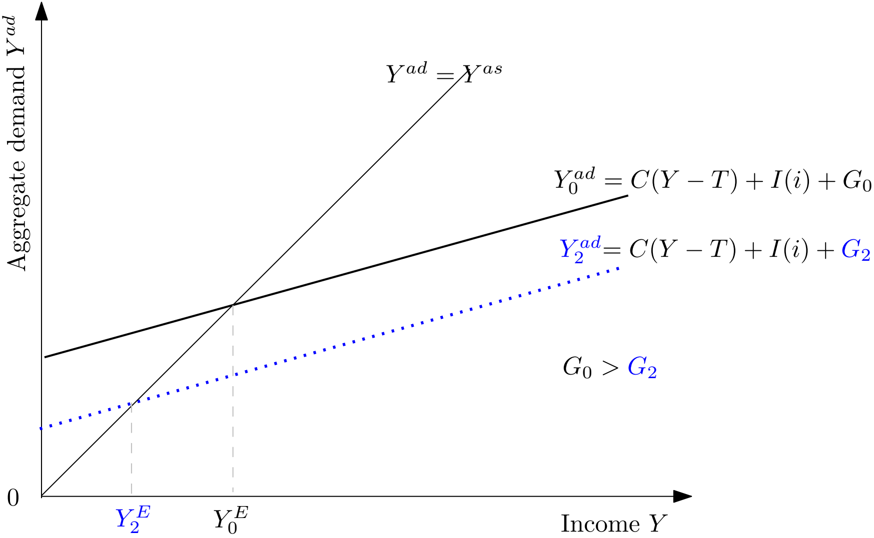
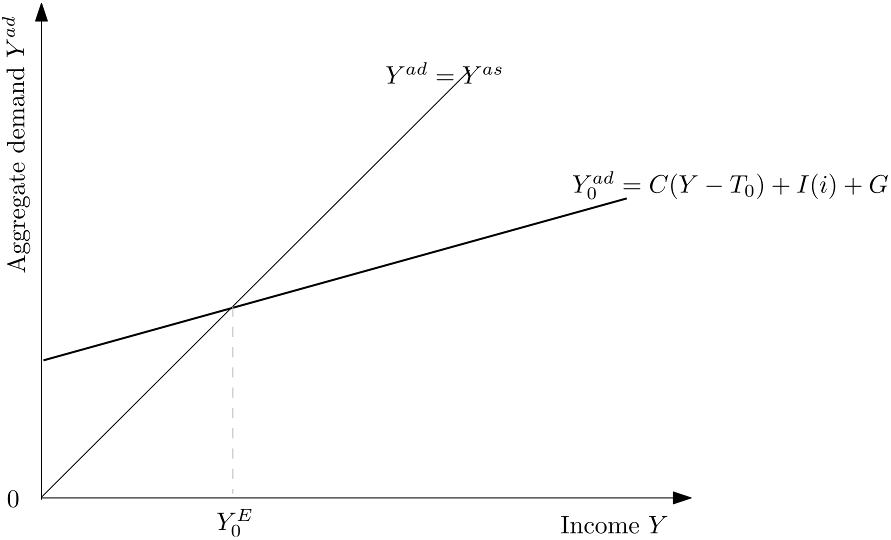


The *IS* curve

Shift in tax level



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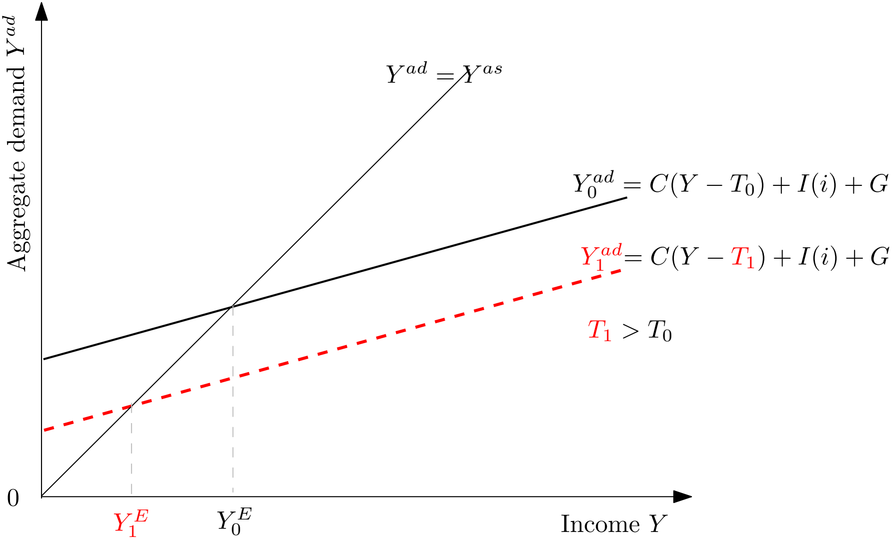

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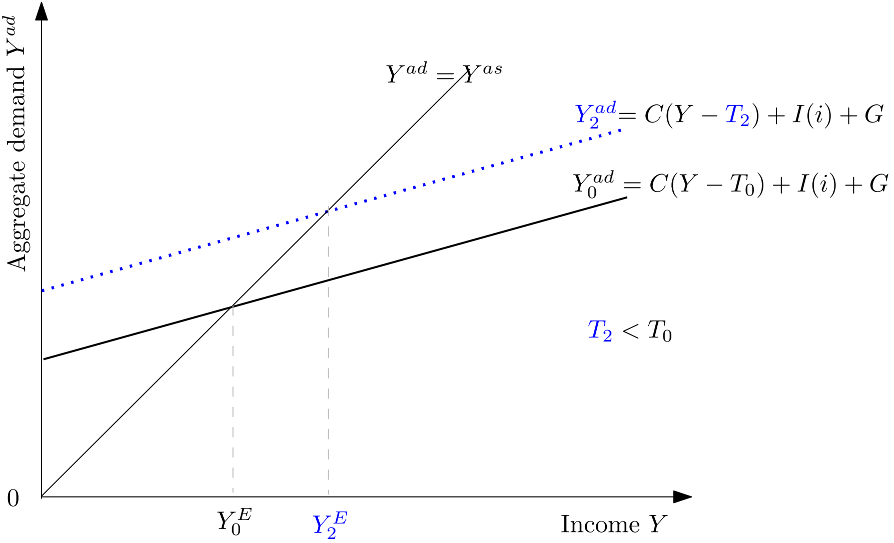
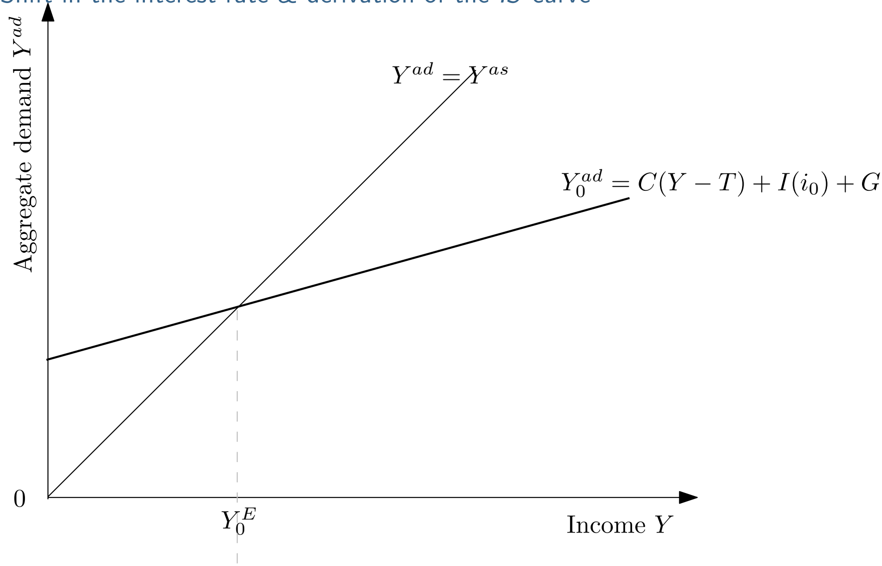


The *IS* curve

Shift in the interest rate & derivation of the *IS* curve



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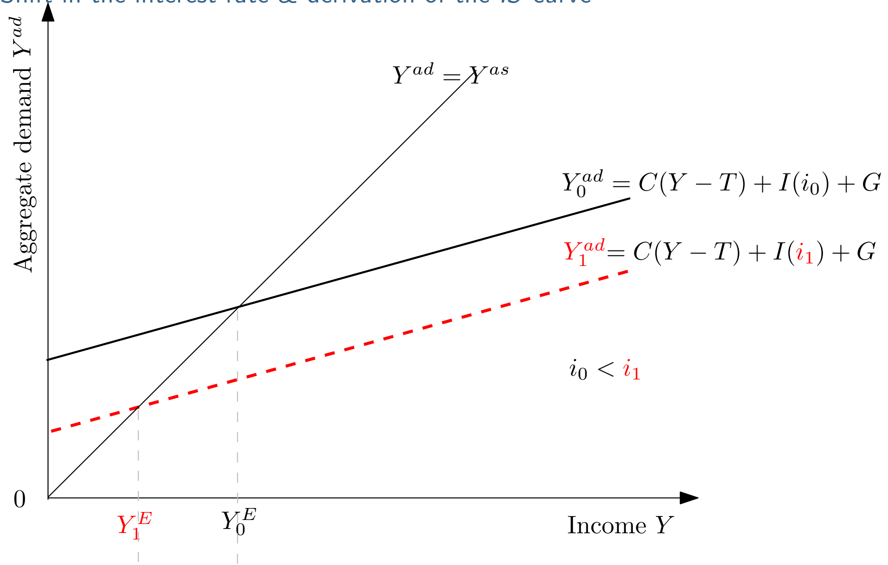

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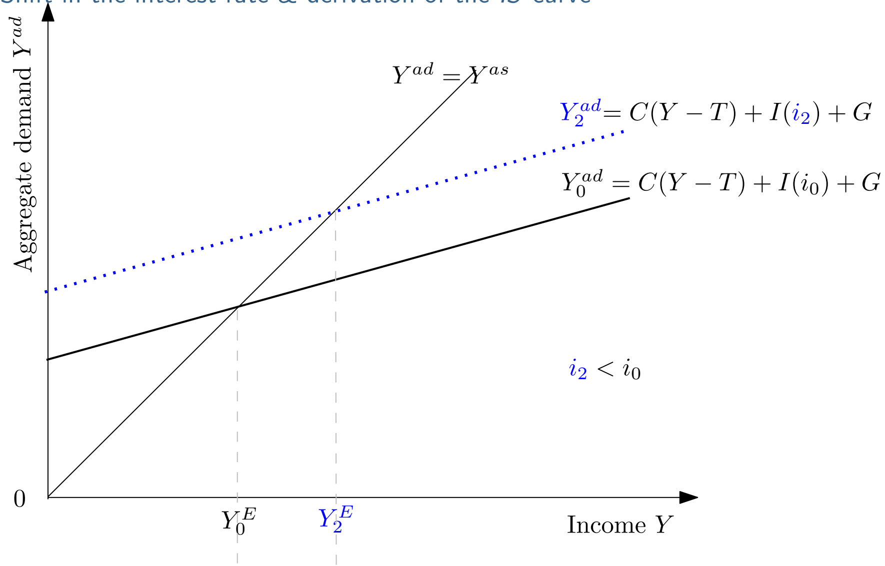

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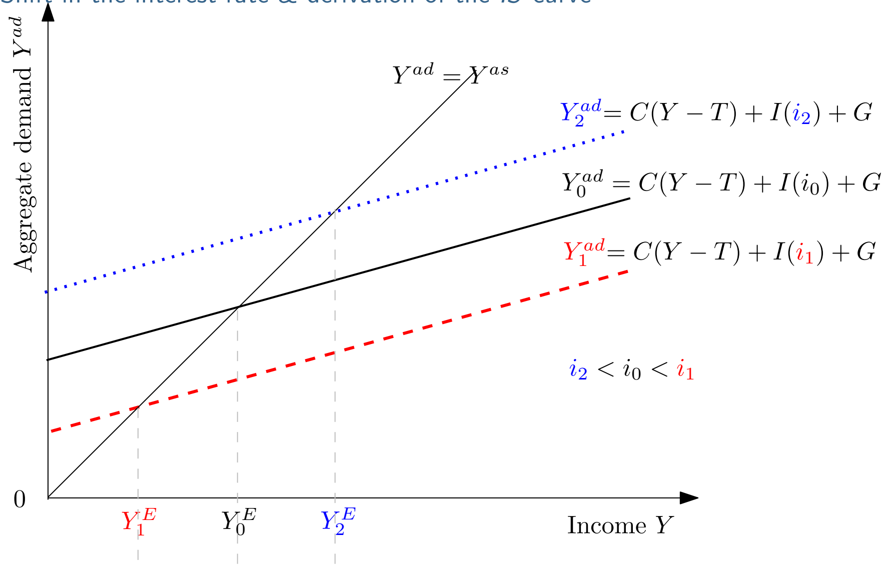
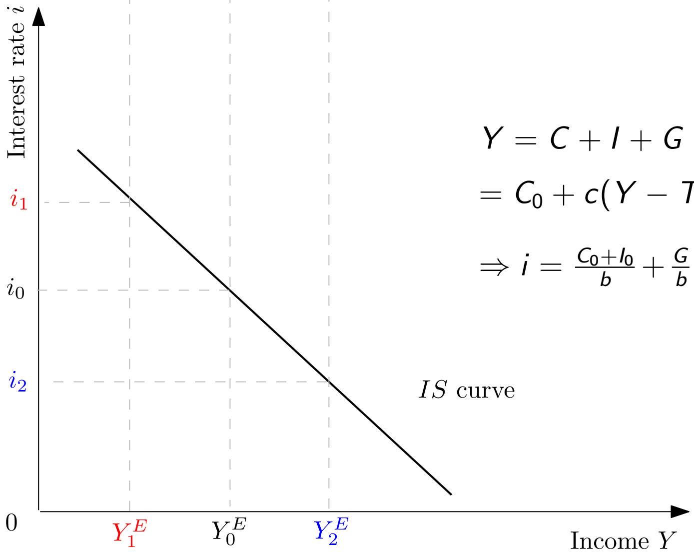


Derivation of the *IS* curve

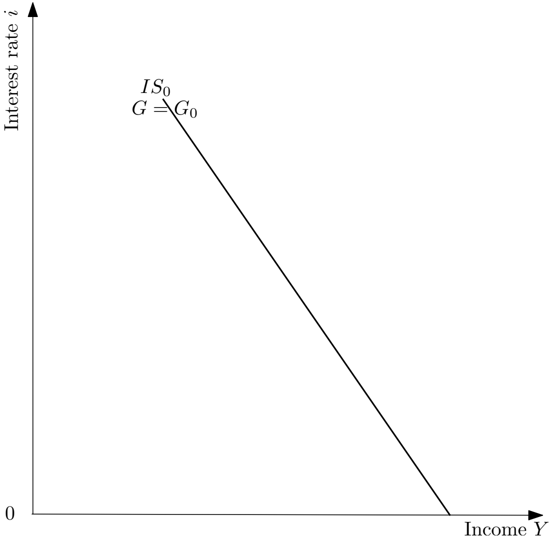
Shift in the interest rate & derivation of the *IS* curve



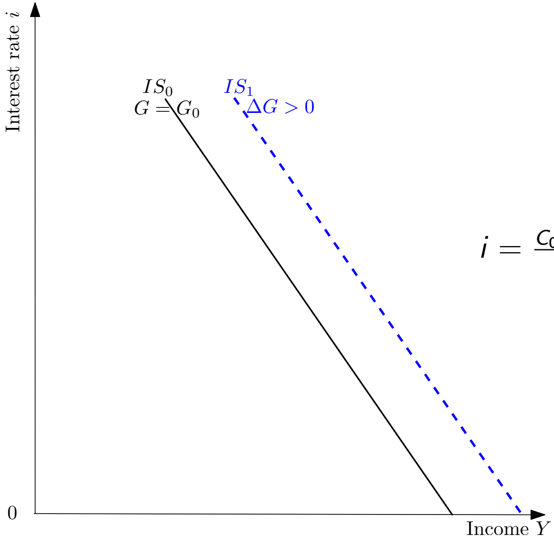
$$
\begin{aligned}
Y &= C + I + G \\
&= C_0 + c(Y - T) + I_0 - b \cdot i + G \\
\Rightarrow i &= \tfrac{C_0 + I_0}{b} + \tfrac{G}{b} - \tfrac{c}{b} T + \underbrace{\frac{(c-1)}{b}}_{<0} Y
\end{aligned}
$$

skip if no time

Shifts of the *IS* curve

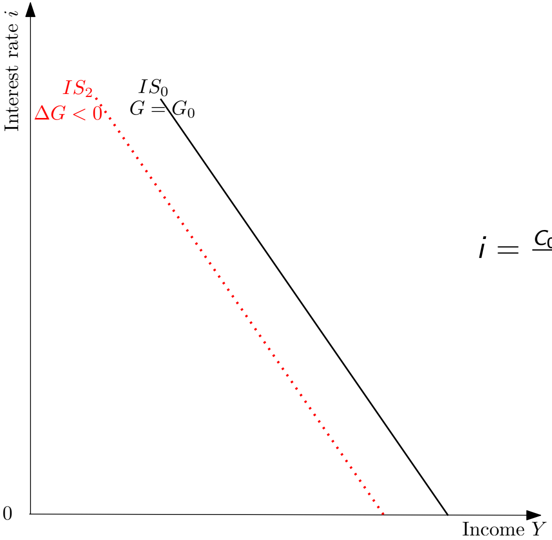


Increase in public expenditure G



$$i = \frac{C_0 + I_0}{b} + \underbrace{\frac{G}{b}}_{>0} - \frac{c}{b} T + \frac{(c-1)}{b} Y$$

Decrease in public expenditure G



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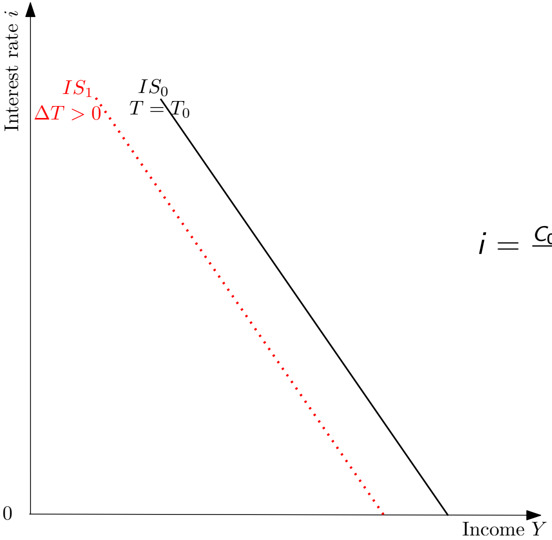
Increase in tax T



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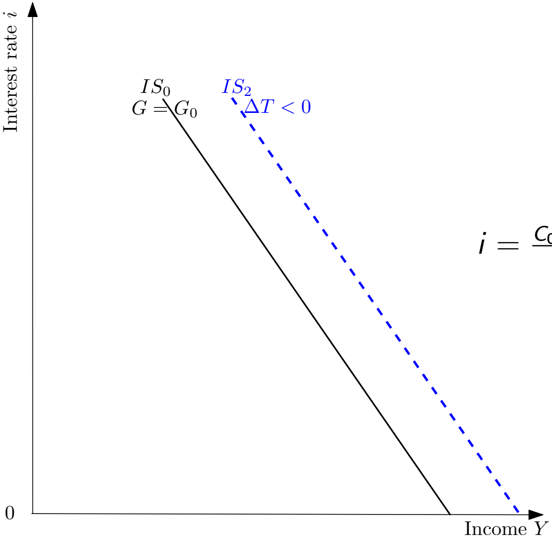

$$i = \frac{C_0 + I_0}{b} + \frac{G}{b} \underbrace{- \frac{c}{b}}_{>0} T + \frac{(c-1)}{b} Y$$

Sum-up

- Aggregate supply mechanically adjusts to aggregate demand $\rightarrow$ equilibrium in the goods market.
- All points of the *IS* curve depict an equilibrium situation in the goods market.
- For any level of the interest rate i, the *IS* curve gives the corresponding equilibrium level of output Y.
- **Fiscal policy** (G, T) can shift aggregate demand and, hence, the *IS* curve.
- IS can also be shifted by consumers' **confidence**.

$\Rightarrow$ How is the interest rate determined ? : the *LM* curve

The LM curve

Money demand and supply

Money supply – exogenously set by the central bank.

The LM curve

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Money supply – exogenously set by the central bank.

Money demand – comes from households for:

- Transaction demand for money: $L^d(\underset{+}{Y})$.
- Liquidity preference: $L^d(\underset{-}{i})$

$$L^d = l_0 + l_1 Y - l_2 i,$$

$$l_1 > 0,\ l_2 > 0.$$

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$$l_1 > 0,\ l_2 > 0.$$

$\Rightarrow$ The interest rate adjusts the demand for money to the supply through households' trade-off between money and bonds. more

skip if no time

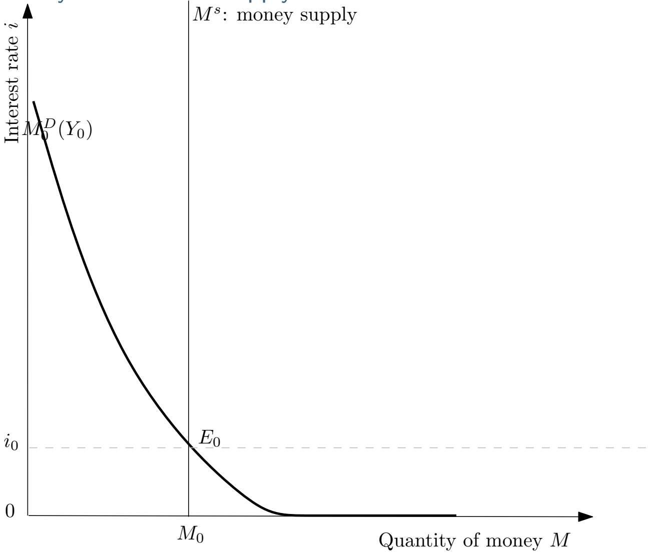
remark on monetary policy

The *LM* curve

Money demand and supply

The *LM* curve

Money demand and supply



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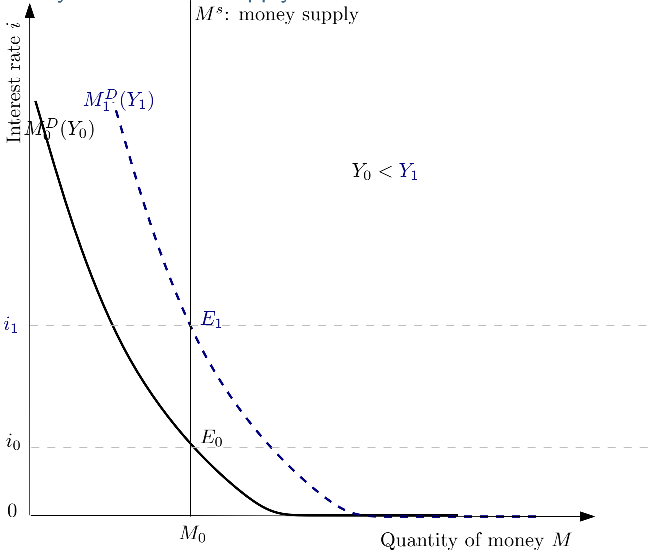
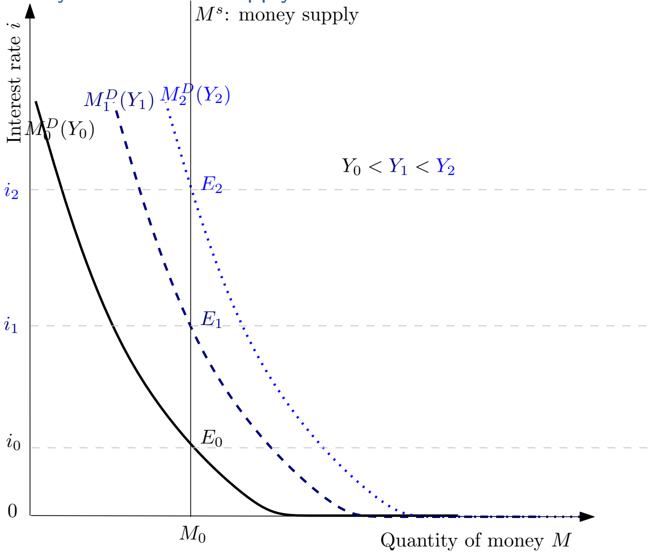
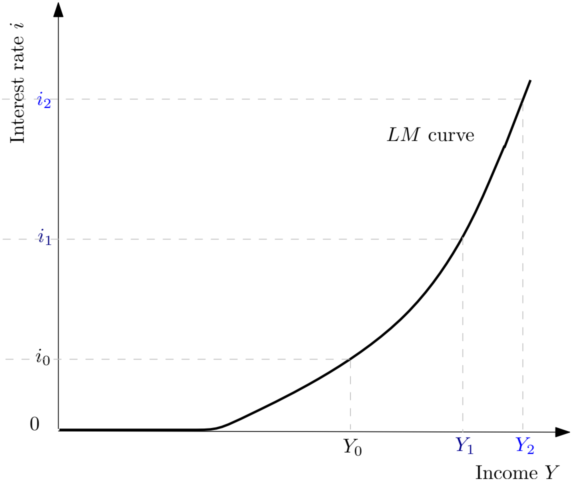


The *LM* curve

Money demand and supply



Derivation of the *LM* curve



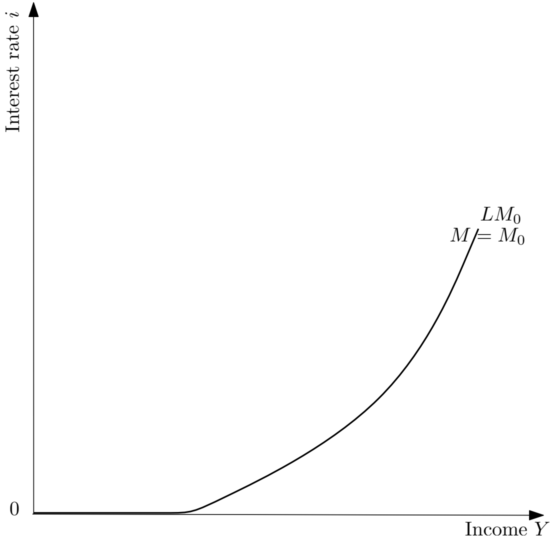
$$L^s = L^d$$

$$= l_0 + l_1 \cdot Y - l_2 \cdot i$$

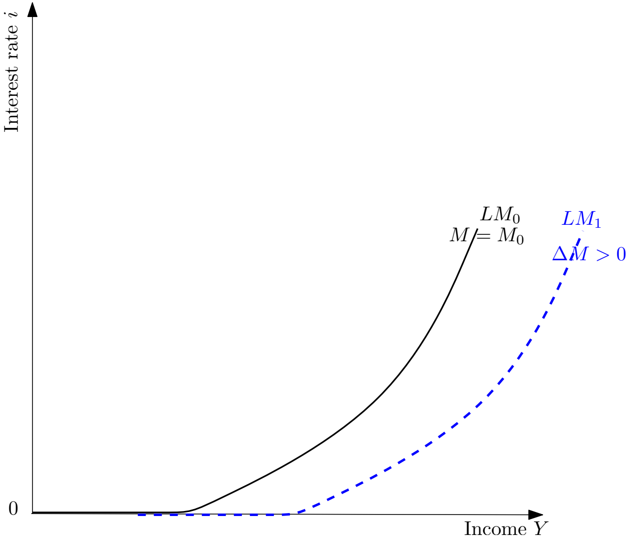
$$\Rightarrow i = \frac{l_0}{l_2} + \underbrace{\frac{l_1}{l_2}}_{>0} Y - L^s$$

skip if no time

Shifts of the *LM* curve

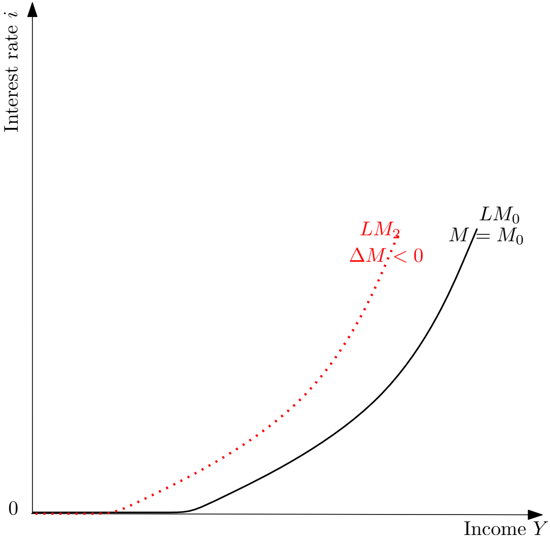


Increase in the money supply



$$i = \frac{l_0}{l_2} + \frac{l_1}{l_2} Y \underbrace{-L^s}_{<0}$$

Decrease in the money supply



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Sum-up

- The interest rate equalizes the demand for money to the exogenous money supply.
- All points of the LM curve depict an equilibrium situation in the money market.
- For any level of the income Y, the LM curve gives the corresponding equilibrium level of the interest rate i.
- **Monetary policy** (L^s) can shift the LM curve.
- The LM curve can also be shifted by changes in the demand for money (e.g. loss of confidence, bank panics).

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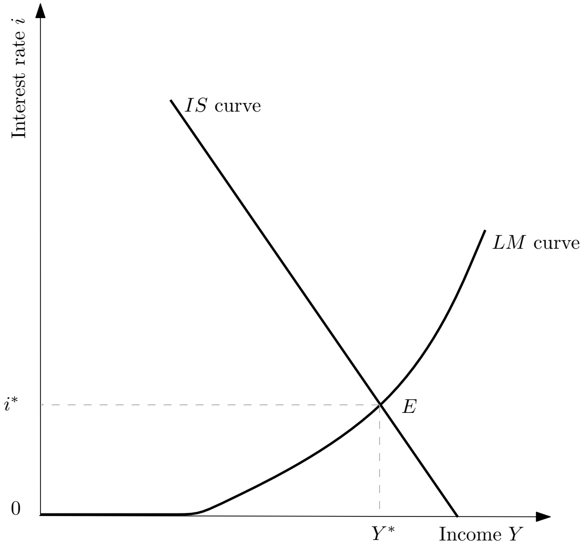
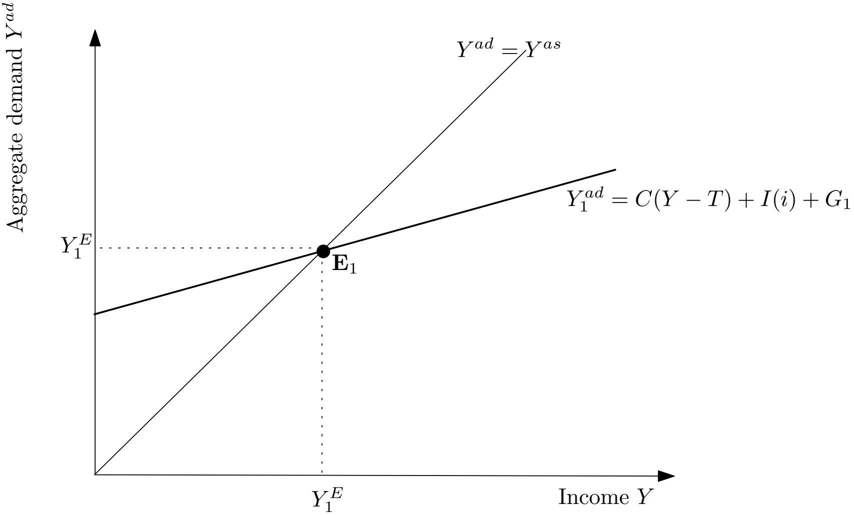
$\Rightarrow$ the *LM* curve determines i for any given income level Y ...
$\Rightarrow$ and the *IS* curve determines Y for any given income level i.

The $IS - LM$ equilibrium



Fiscal policy

The multiplier effect...



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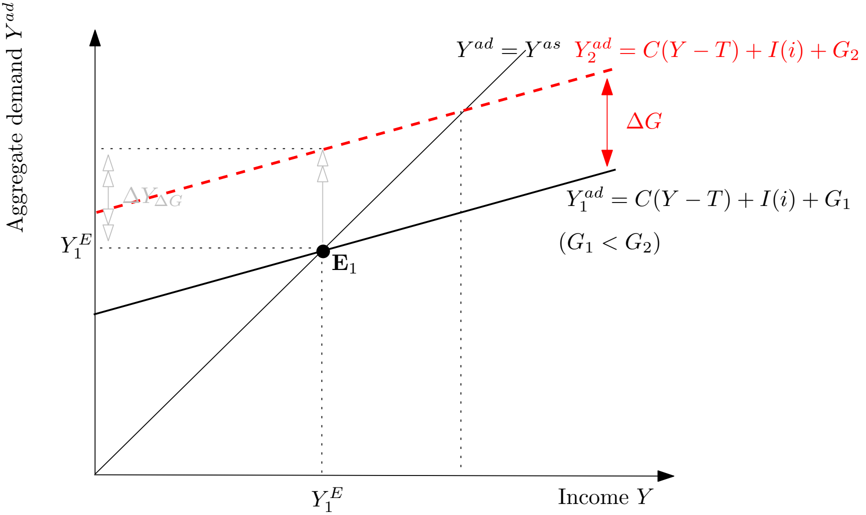

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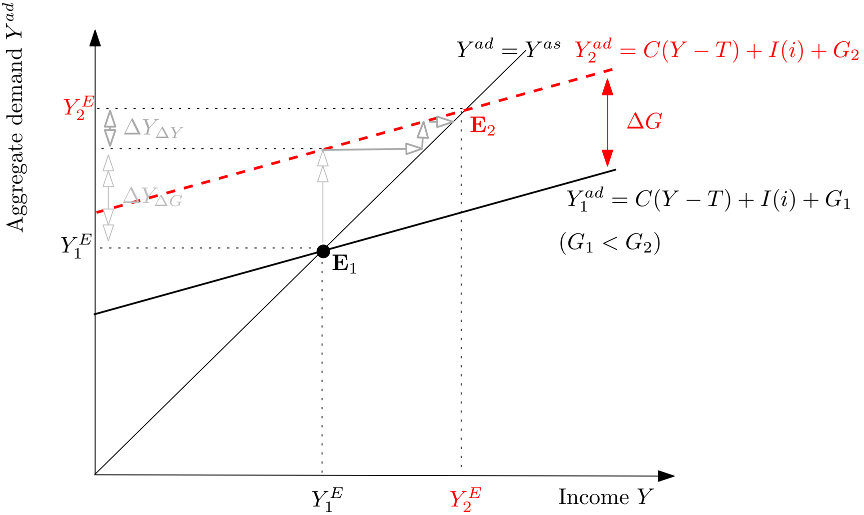

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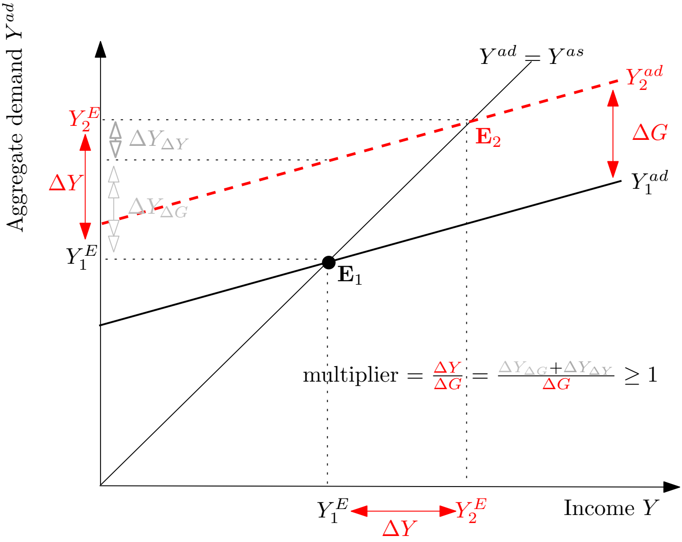

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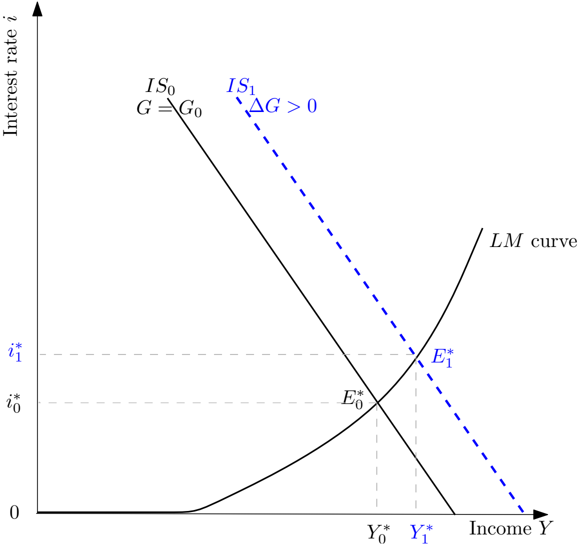

In the **very short-run**:

- Income increases
- and interest rate increases.

Fiscal policy

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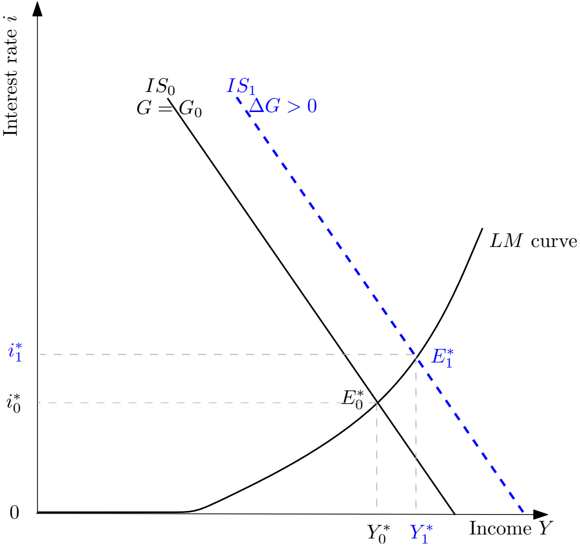

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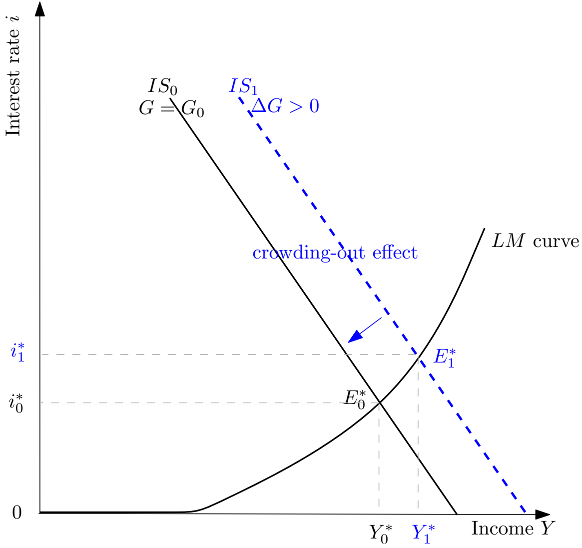
Fiscal policy

... and the crowding-out effect



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→ **Crowding-out effect.**

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Fiscal policy

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Private and **public** consumption expenditure can be viewed either as **complementary or substitutes**:

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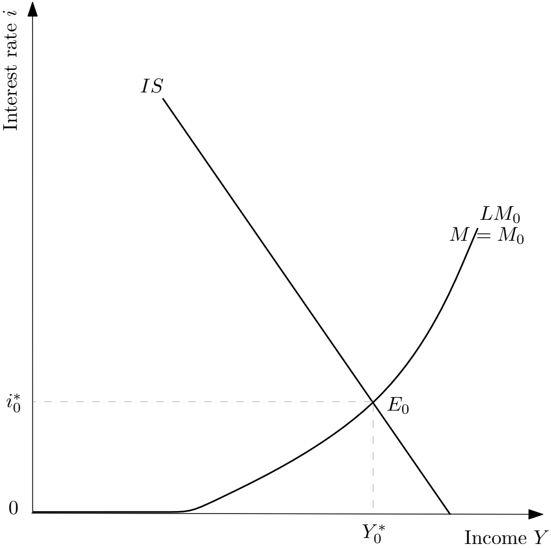
- Even then, future budget constraint may reduce public and thus private investment through this complementary effect.

Monetary policy

Monetary stimulus...



Monetary policy

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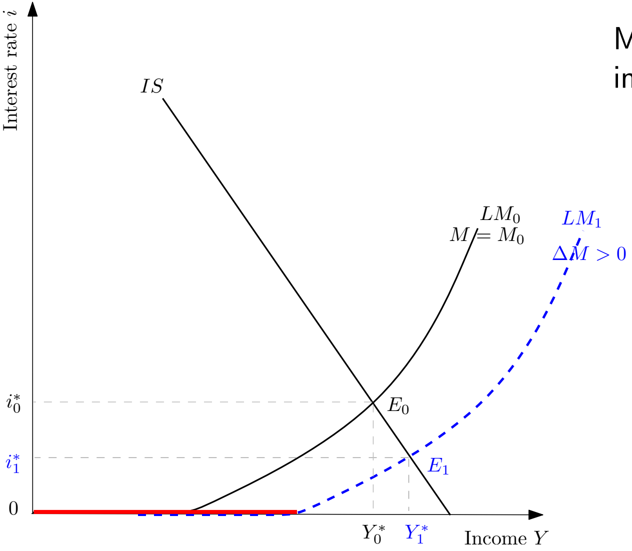
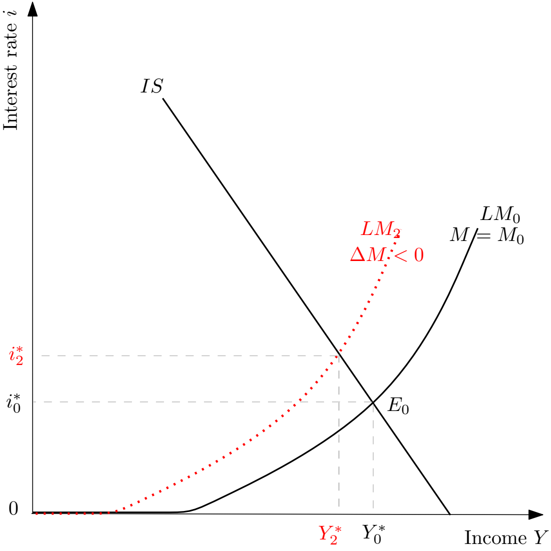


Money supply increases:

- Interest rate decreases,
- investment is stimulated
- and hence aggregate demand.

Monetary policy

... restrictive monetary policy...



Money supply decreases:

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- investment is depressed
- and hence aggregate demand.

Monetary policy

... and the liquidity trap

However, what happens in the flat part of the LM curve ?

Monetary policy

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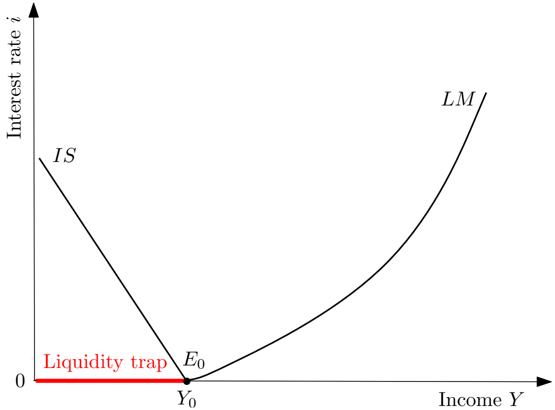
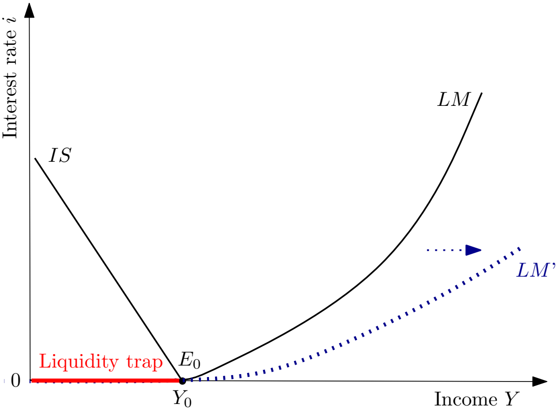
However, what happens in the flat part of the *LM* curve ?



Monetary policy

... and the liquidity trap

monetary policy is ineffective, but fiscal policy still is.



more on the flat part

Policy evaluation within the $IS - LM$ model

In a nutshell

- Short-run fluctuations away from the full-employment level are due to variations of aggregate demand.

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- Public policies have room to counteract those short-run fluctuations.

- An expansionary fiscal policy may increase aggregate demand, but may be dampened by a crowding-out effect.

- An expansionary monetary policy increases aggregate demand if it does decrease the interest rate, which is not the case in a liquidity trap.

Open economy: integrating the exchange rate

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  - Net exports: $NX \equiv X - M$,
  - Capital Inflows CI: foreign purchases of domestic assets,
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- **Foreign exchange (FX) market**: transactions of G & S involve transaction of money.

Open economy: the case of floating exchange rates

- Under floating exchange rates, **exchange rate clears the FX market**:

$$\begin{aligned} &\Leftrightarrow M + CO = X + CI \\ &\Leftrightarrow X - M = CO - CI \equiv \Leftrightarrow NX(\underset{-}{\epsilon}) = CF(\underset{-}{i}) \end{aligned} \tag{7}$$

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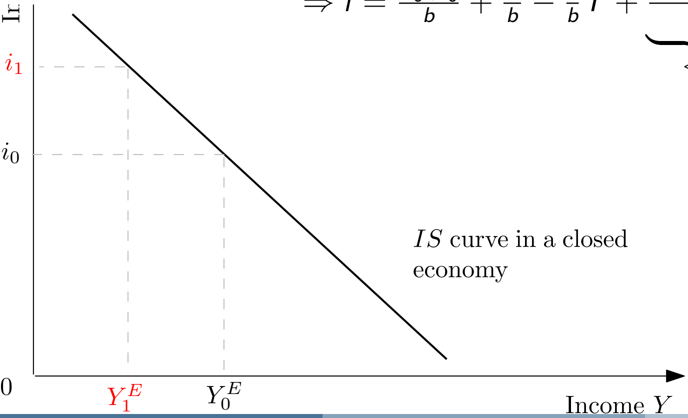
$\rightarrow$ IS is flatter in an open economy than in a closed economy.

Recall the *IS* curve in a closed economy

$$Y = C + I + G$$

$$= C_0 + c(Y - T) + I_0 - b \cdot i + G$$

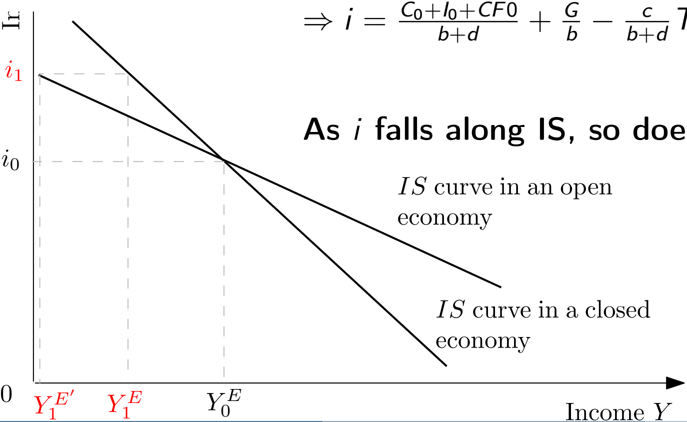
$$\Rightarrow i = \frac{C_0 + I_0}{b} + \frac{G}{b} - \frac{c}{b}T + \underbrace{\frac{(c-1)}{b}}_{<0} Y$$



The *IS* curve under floating exchange rate

$$
\begin{aligned}
Y &= C + I + G + CF \\
&= C_0 + c(Y - T) + I_0 - b \cdot i + G + CF_0 - di \\
\Rightarrow i &= \frac{C_0 + I_0 + CF0}{b+d} + \frac{G}{b} - \frac{c}{b+d} T + \underbrace{\frac{(c-1)}{b+d}}_{<0} Y
\end{aligned}
$$

As i falls along IS, so does ϵ (NX rise).



Open economy: the case of floating exchange rates

- A **public spending shock** (increase in G):
  - Multiplier effect on Y and risk of crowding-out effect of investment via i (as in a closed economy).
  - But decrease in $CF(\underset{-}{i})$ = decrease in $NX(\underset{-}{\epsilon}) \rightarrow$ additional risk of crowding-out of net export (rise in exchange rate).

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- **Exchange rate shock** $\rightarrow$ **devaluation** by the home country:
  - Exports cheaper $\rightarrow$ stimulate domestic production and $Y \rightarrow$ positive effect (shift IS to the right),
  - but imports cheaper $\rightarrow$ inflation $\rightarrow$ negative effect.

Open economy: the case of fixed exchange rates

- Fixed or *pegged* exchange rate: the currency fixed against either a **single foreign currency** or alternative **baskets of currencies**.
- The peg can be fixed, more flexible, or adjusted in a discretionary way or at fixed time intervals, or an announced band.
- The base money stock is backed by official foreign reserves.

Open economy: the case of fixed exchange rates

- **Almost no truly floating exchange rate in developing countries**: **Pegged exchange rates remain dominant**

  in e.g. some parts of Sub-Saharan Africa (the 14 member countries of the CFA Franc Zone, which maintained a fixed parity against the French franc since 1948, and against the Euro since 1999), or in small, highly open Caribbean islands.

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- **Why?**
  - Strength of the **"pass-through" effect** from exchange-rate changes to prices,
  - **Macroeconomic volatility** due to the **greater degree of openness to trade** in goods and service, **supply-side and external shocks** in developing countries,
  - "**disciplining mechanism**" to convey credibility to low inflation.

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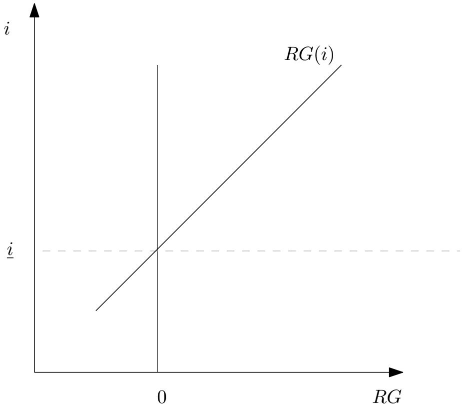
- The **reserve gain** RG is the difference between total sales to foreigners (G & S and assets) and the total purchases from foreigners:

$$CF \equiv PCF(\underset{-}{i})+RG \equiv NX(\underset{-}{\epsilon}) \Leftrightarrow RG(\underset{-}{\epsilon},(\underset{-}{i})) = NX(\underset{-}{\epsilon})-PCF(\underset{-}{i})$$

If RG < 0, the CB is loosing reserves; if $RG > 0$, the CB is accumulating reserves, $RG(\underline{i}) = 0$.

Equilibrium with a fixed exchange rate

Reserves and interest rate



Open economy: the case of fixed exchange rates

- We can rearrange the AD equation as:

$$Y^{ad} = C(Y \underset{+}{-} T) + I(\underset{-}{i}) + G + NX(\bar{\epsilon}) \tag{9}$$

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  Ex: "flight to quality" and the peg CHF/EUR at 1.2 from 2011-2015 (reserves went up to 70% of Swiss GDP).

Open economy: the case of fixed exchange rates

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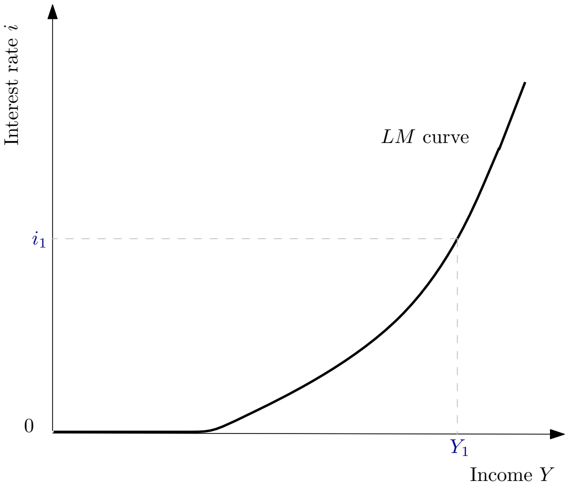
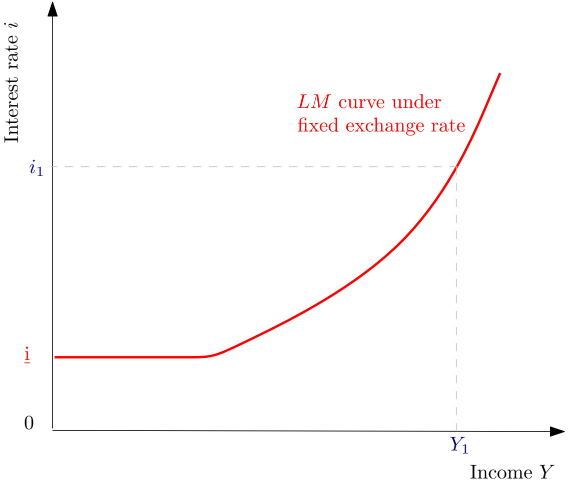
- However, at some point, $RG(\underset{-}{\epsilon}, \underset{+}{i})$ are exhausted, and i cannot fall further (say $RG = 0$ for $i = \underline{i}$)
  $\rightarrow$ **Monetary policy is constrained on the expansionary side.**

Recall the *LM* curve in a closed economy



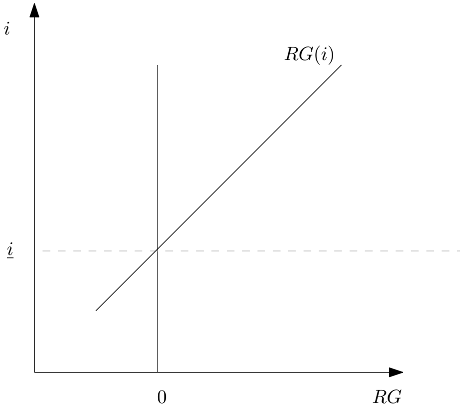
The *LM* curve under a fixed exchange rate regime



→ Similar constraint as the ZLB, but at a higher interest rate ($\underline{i} \simeq 0$).

Equilibrium with a fixed exchange rate

Reserves and interest rate



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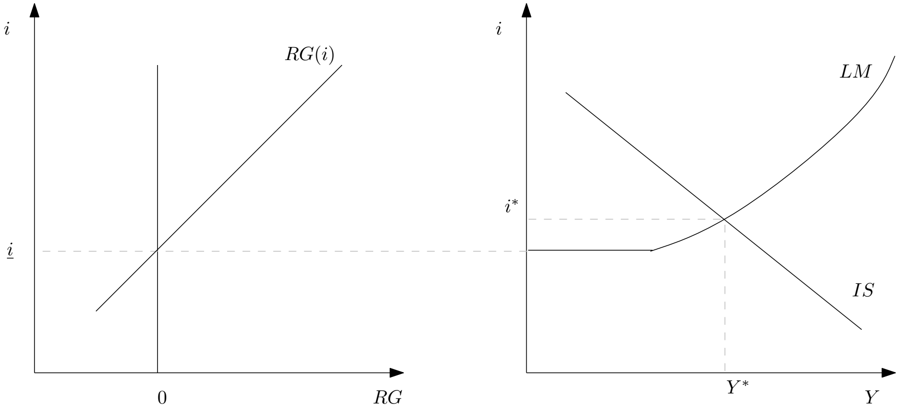
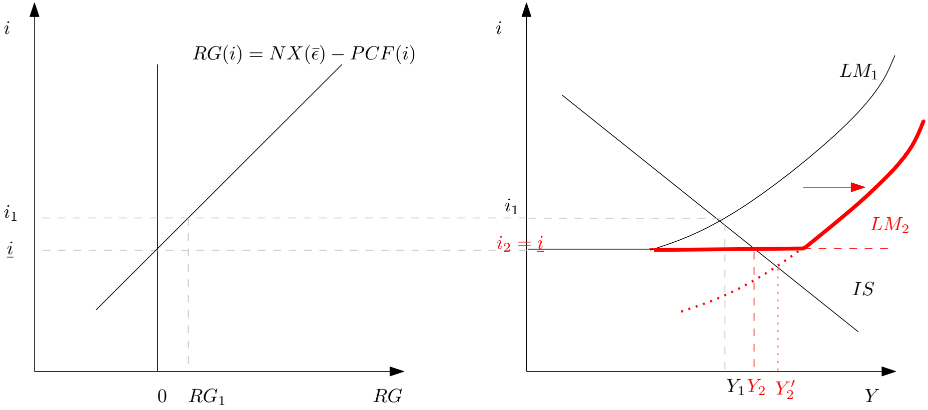


Equilibrium with a fixed exchange rate

Constrained expansionary monetary policy



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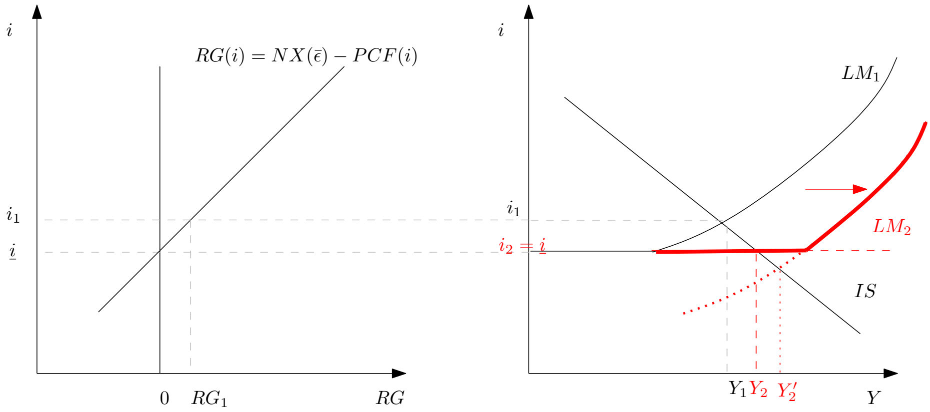
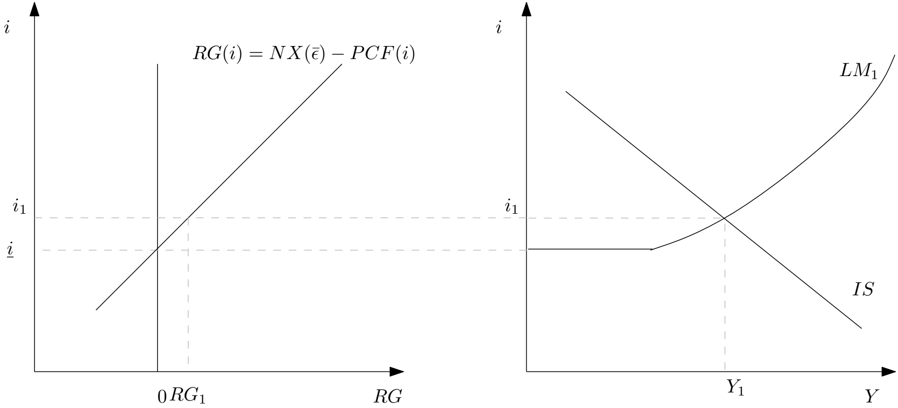


$\rightarrow$ an expansionary monetary policy is constrained: i cannot fall below $\underline{i}$ $\rightarrow$ Y_2' is not a reachable equilibrium.

Restrictive monetary policy shock: illustration



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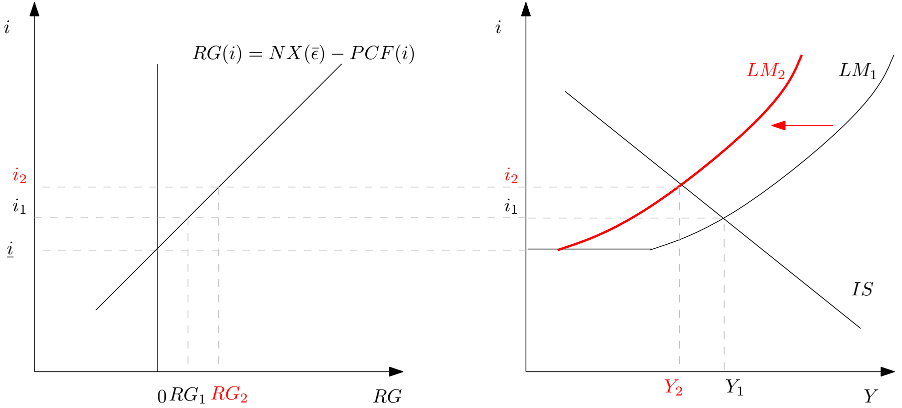

Open economy: the case of fixed exchange rates

- A **public spending shock** (increase in G): **AS IN CLOSED ECONOMIES**
  - Multiplier effect on Y and risk of crowding-out effect of I via i (as in a closed economy).

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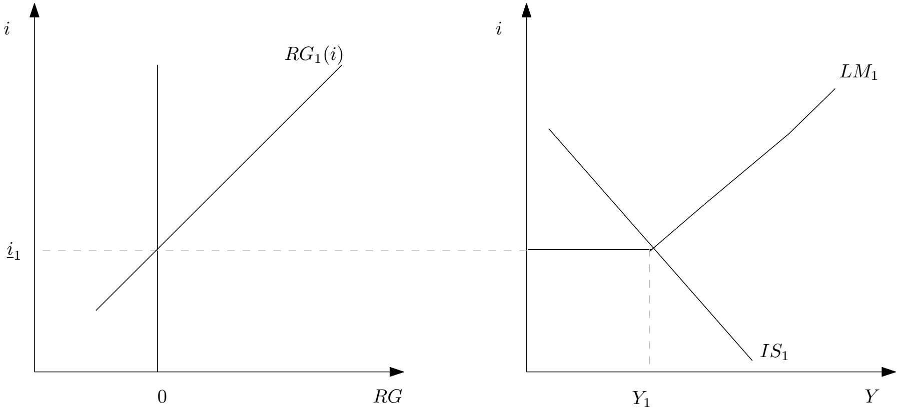
  But: political considerations, microeconomic distortions, etc.

Trade policy shock: restrictions on imports



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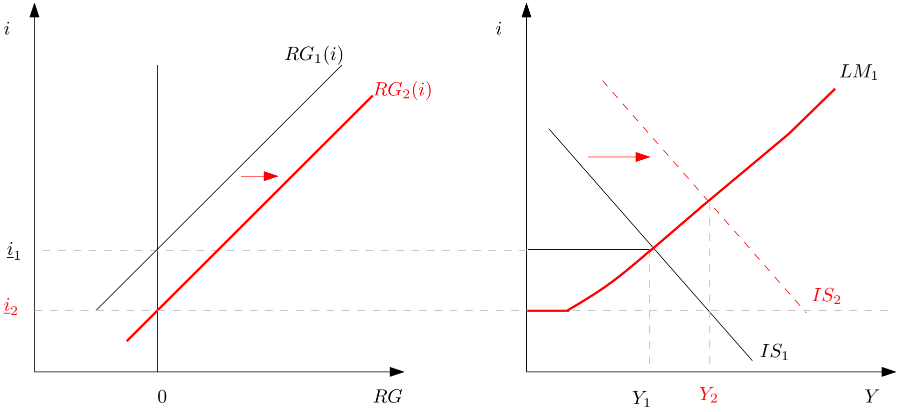

Fixed exchange rate: a fall in export demand

- Many developing countries are vulnerable to changes in demand for exports: e.g. oil in Venezuela, tin in Bolivia, Nigeria (energy up to 80% of all gvt. revenue, $> 90\%$ of X).

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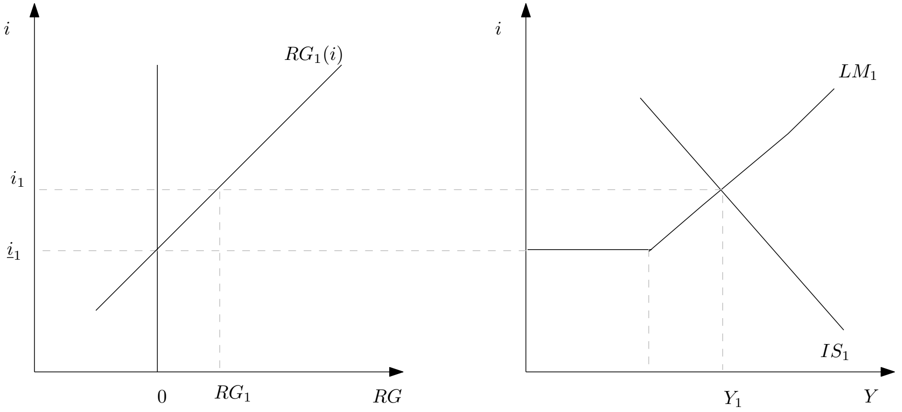
  Or:
  - let ϵ depreciates (by decreasing i): stimulus vs. inflation.

Effect of a fall in export demand



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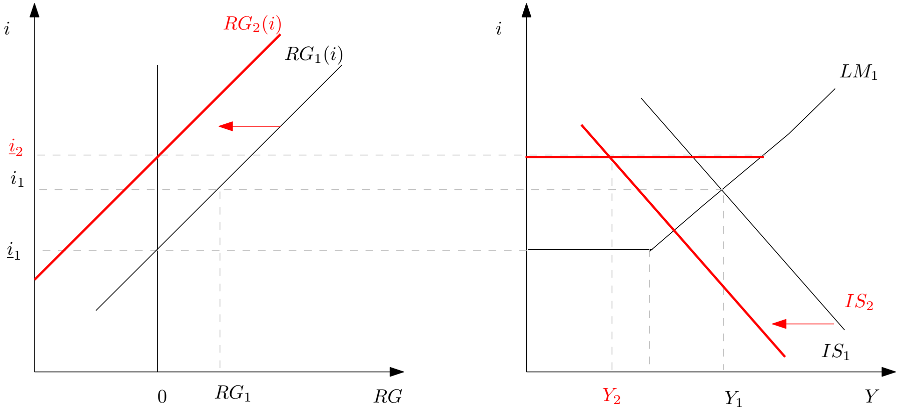

Example: the case of the recent drop in oil prices

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- **Canada**: ZLB and strong depreciation of the Canadian dollar versus USD.

Fixed exchange rate: effect of a devaluation

- Decrease in $\bar{\epsilon} \rightarrow$ rise in $NX(\bar{\epsilon}) \rightarrow$ IS shifts to the right $\rightarrow RG$ increases, and $\underline{i}$ decreases (constraint is eased).

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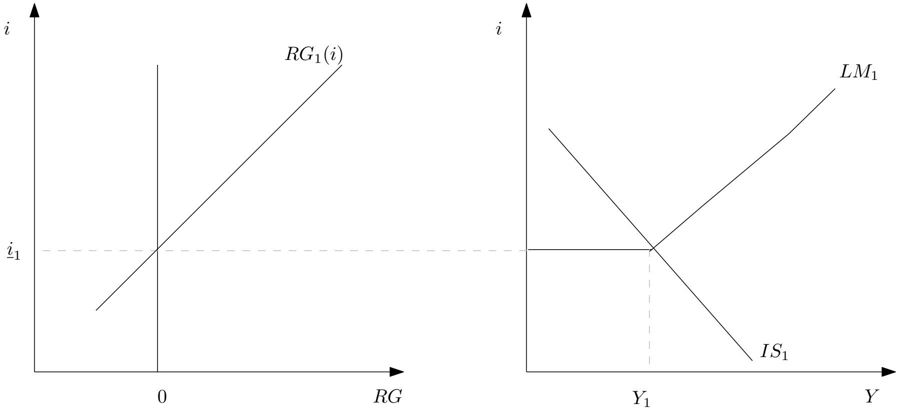
- Devaluation still works at the ZLB.

Fixed exchange rate: effect of a devaluation

- However, limitations of a devaluation:
  - Impossible in a **currency union** (e.g. Greece, also relevant for African countries),
    $\rightarrow$ common in developing countries.
  - **"Pass-though" effect**: risk on rising prices of imports $\rightarrow$ imported inflation and decrease in standard of living, ultimately may erode external competitiveness.
  - Must have a strong export sector.
  - Exchange rate stability is a strong factor in trade flows and foreign investment.
  - **Credibility loss** of the CB.

Fixed exchange rate: effect of a devaluation



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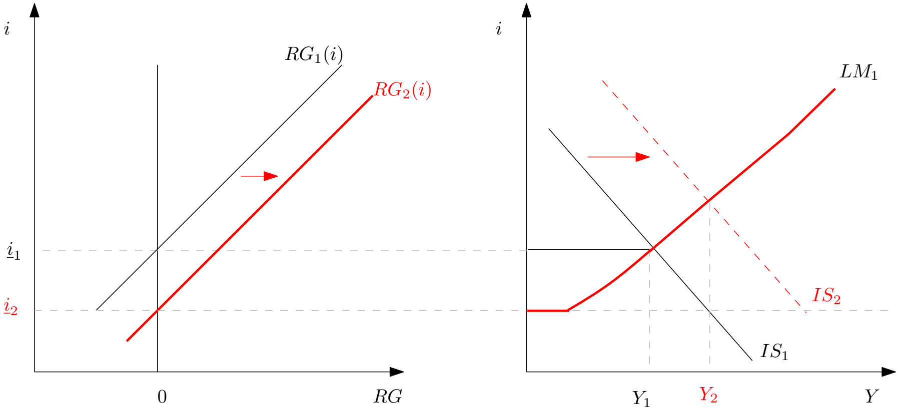

Example of extensions

Risk of default and investors' confidence

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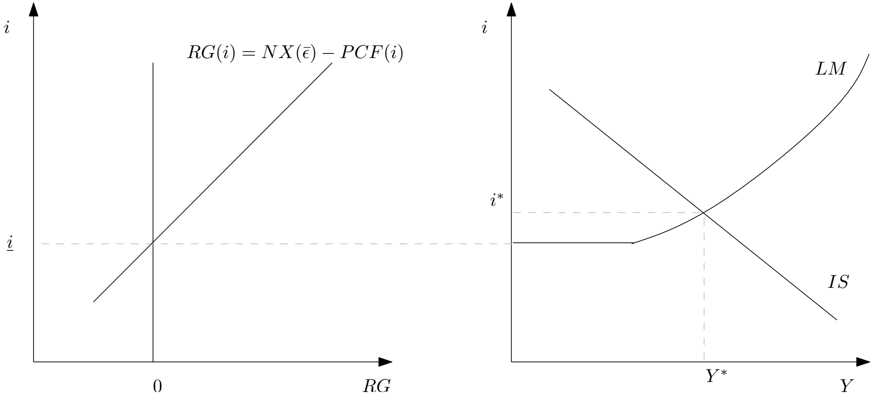
  - **With fixed exchange rate**: both a positive and negative effect.

Restrictive fiscal policy with risk of default



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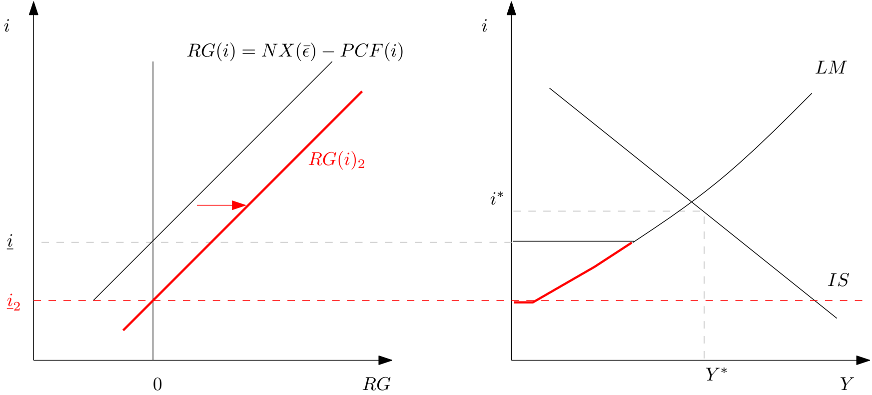

decrease in $G \rightarrow$ decrease in $G - T \rightarrow$ decrease in $PCF(\underset{-}{i}, \underset{+}{G - T})$ $\rightarrow$ shift RG to the right.

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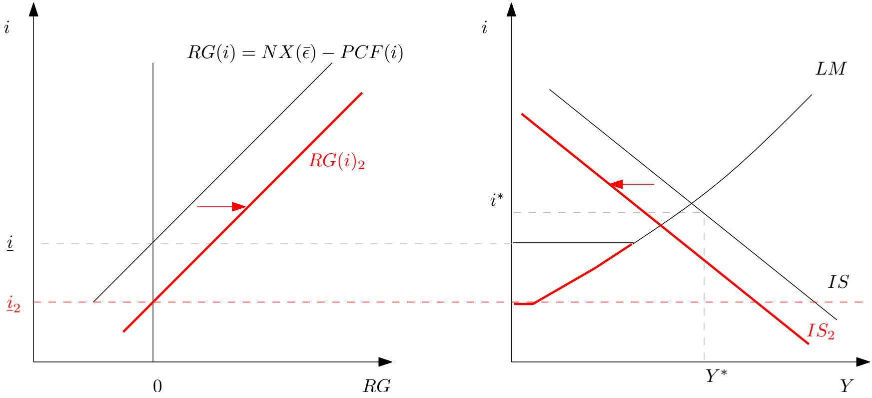

$\rightarrow$ but a decrease in G $\rightarrow$ decrease in Y $\rightarrow$ shift IS to the left.

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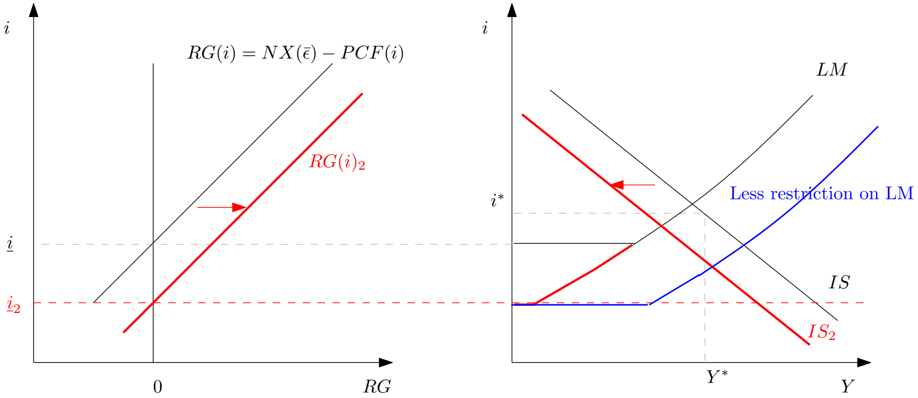

$\rightarrow$ Monetary policy is less constrained but negative demand effect.

Example of extensions

Effect of large inflow episodes

- **Challenge**: greater integration with international financial markets $\rightarrow$ significant rise in private capital flows to developing countries (foreign direct investment and portfolio flows) $\rightarrow$ risk of abrupt reversals in capital flows $\rightarrow$ macroeconomic volatility.

Example of extensions

Effect of large inflow episodes

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- **Causes**:
  - "Pull factors": the assets issued by developing- country debtors are made more attractive (e.g. improvement in the risk-return characteristics due to change in regulation) → e.g. ZLB in developed countries.
  - "Push factors": by reducing the attractiveness of lending to industrial-country debtors → e.g. increase from the ZLB in developed countries.

Example of extensions

Effect of large inflow episodes

- **Effects with fixed exchange rate**:

  Decrease in $PCF \rightarrow$ increase in RG to keep the nominal exchange rate from appreciating $\rightarrow$ growth in monetary aggregates $\rightarrow$ inflationary pressures $\rightarrow$ appreciation of the real exchange rate or increase in interest rate.

  $\rightarrow$ overheating, inflation and appreciation of the real exchange rate.

Example of extensions

Effect of large inflow episodes

- **Policies**:
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  - Widening of the exchange rate band $\rightarrow$ stability/credibility?
  - Nominal exchange-rate appreciation to avoid accumulating reserves $\rightarrow$ consequences on competitiveness?
  - Limiting the effects of reserve accumulation on inflation, e.g. increases in reserve requirements, quantitative credit restrictions, fiscal contraction $\rightarrow$ consequences on AD?

Overview of the current economic situation

Application: The policy mix as a response to the Great Recession

This application aims at tracing through the expected effects of the policies that have been implemented as a reaction to the current economic crisis.

1. Describe in a nutshell the economic situation and the policies that have been implemented as a reaction (taking the U.S. as an example) documents
2. Starting from a given equilibrium situation $E_1 = (Y_1, i_1)$, represent the effects of the crisis (the new equilibrium is denoted by $E_2 = (Y_2, i_2)$).
3. Starting from the crisis equilibrium E_2, discuss the effect of the implemented policies within the $IS - LM$ model (E_3) and the expected state of the economy (E_4) for 2016.

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1. **Financial crisis** in the US: fall in house prices $\rightarrow$ large strains on financial institutions, bank bankruptcies (Lehman Brothers) $\rightarrow$ collapse in confidence $\rightarrow$ credit market disruptions.
   $\Rightarrow$ very large drop in consumption and investment $\rightarrow$ large drop in aggregate demand and output $\rightarrow$ **economic crisis**.

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   $\Rightarrow$ crowding-out effect vs. **liquidity trap**.

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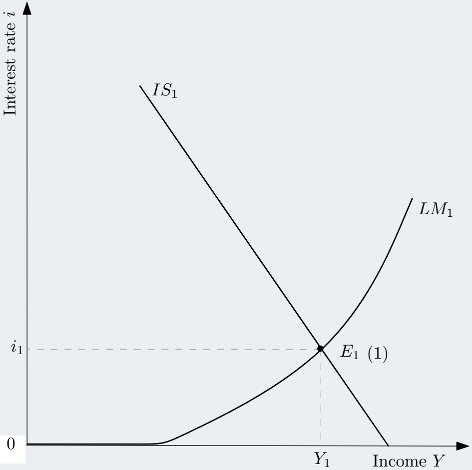
2. From a financial to an economic crisis (from E_1 to E_2)



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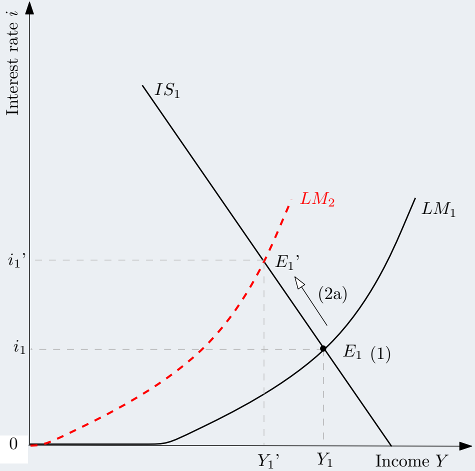

Collapse in confidence:

(2a) assets liquidation → increase in money demand and interest rate...

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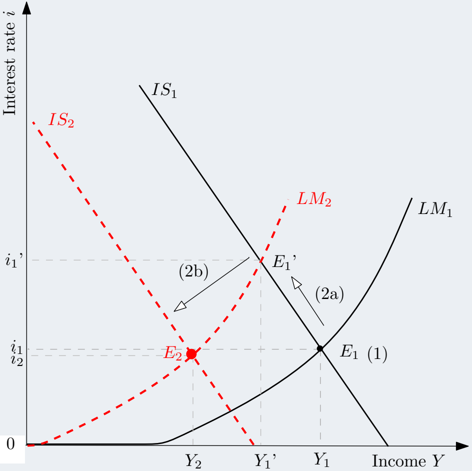

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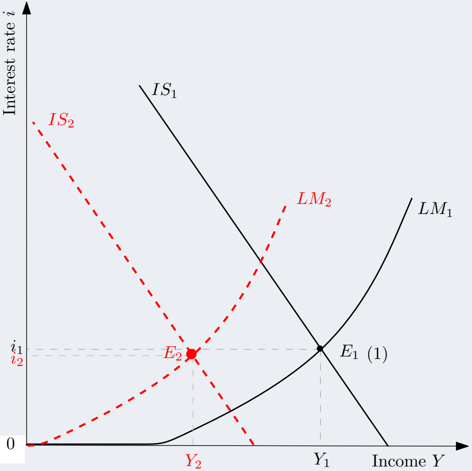

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Overview of the current economic situation

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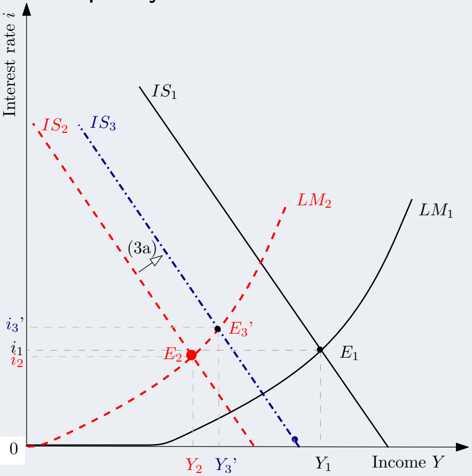

Policy mix:

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Overview of the current economic situation

Application: The policy mix as a response to the Great Recession

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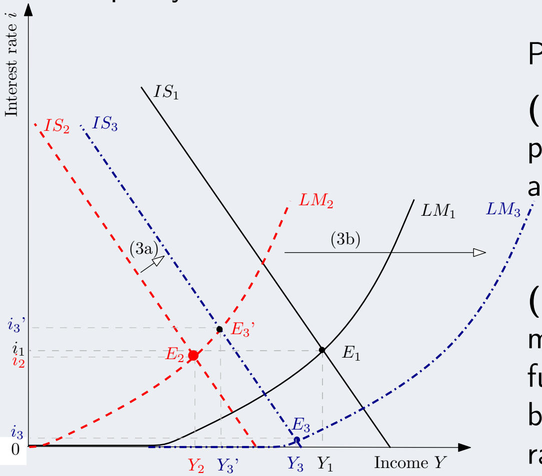


Policy mix:

(3a) expansionary fiscal policy → increase in income and interest rate...

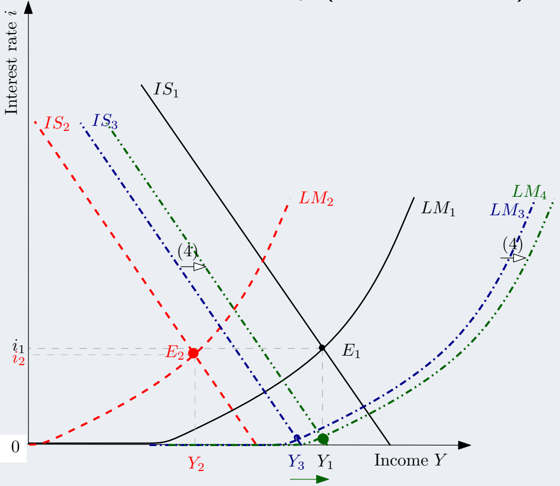
(3b) ...huge expansionary monetary policy (QE) → further increase in income but decrease in interest rate ... ≃ liquidity trap.

Overview of the current economic situation

Application: The policy mix as a response to the Great Recession

Skip Euro area

4. Toward the recovery (from E_3 to E_4)



Toward a recovery to the pre-crisis level of output:

(4) : economic improvements along with extended expansionary monetary policy.

... until when will monetary policy remain accommodative?

Managing inflation expectations

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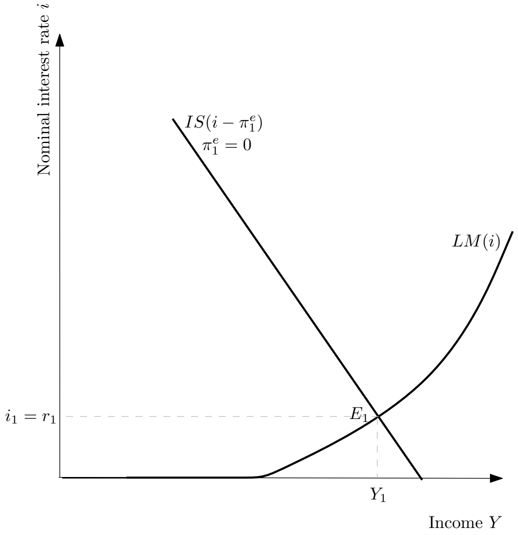
- ..but the CB only controls **directly** the nominal interest rate i (that clears the money market).
- The CB has to *manage* inflation expectations π^e to affect the relevant rate r.

"*Not only do expectations about policy matter, but very little else matters*" (Woodord 2005, p. 3).

$\rightarrow$ **Management of inflation expectations** becomes an entire part of monetary policy, **especially at the ZLB** : $r = i - \pi^e = -\pi^e$.

Effect of inflation expectations in the IS-LM model



$\rightarrow$ if inflation expectations equal zero ($\pi^e = 0$, or consistent with the CB's target).

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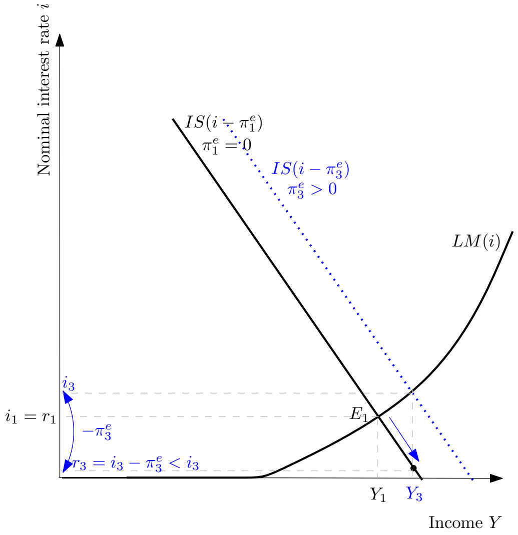
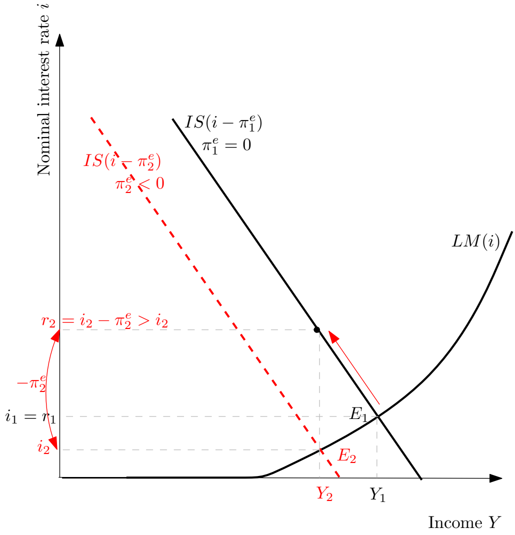


→ if inflation expectations are positive ($\pi^e > 0$):

This creates a monetary stimulus despite the ZLB.

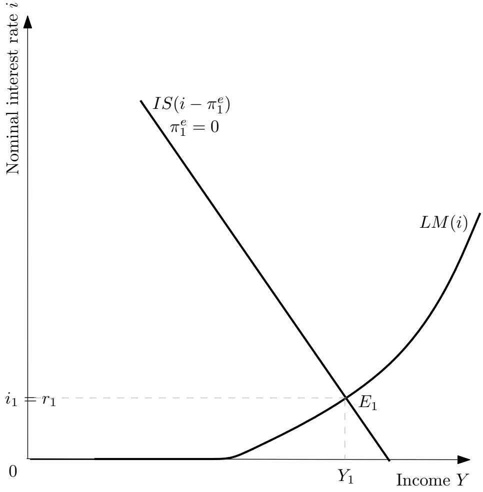
Effect of inflation expectations in the IS-LM model



→ if inflation expectations are negative ($\pi^e < 0$, or below the CB's target):

This creates an additional negative shock on AD.

A deflationary spiral the IS-LM model



→ Initially the economy is at the equilibrium E1, π^e is consistent with the CB's inflation target (assume $\pi^e = \pi^T = 0$ without loss of generality).

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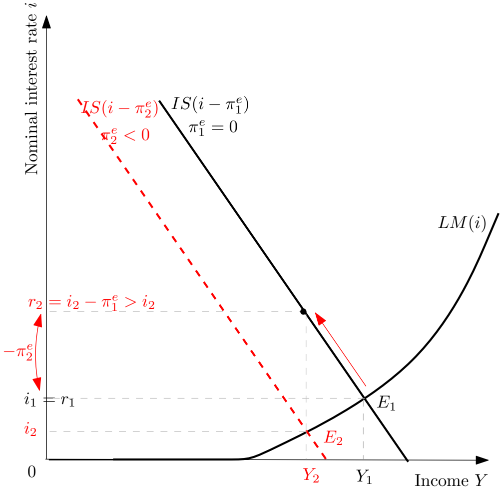
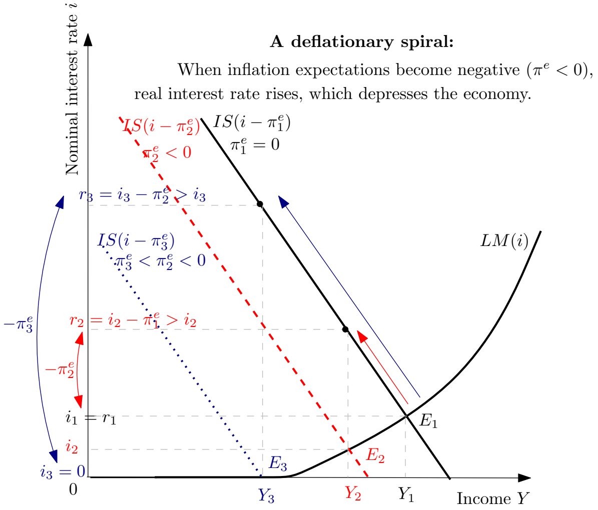


$\rightarrow$ A drop in π^e increases $r = i - \pi^e$ $\rightarrow$ drop in Y $\rightarrow$ drop in money demand and i but $r_2 > r_1$ $\rightarrow$ shift along IS to the left.

A deflationary spiral the IS-LM model



$\rightarrow$ If drop in π^e is strong enough to reach the ZLB, π^e is the only driver of r, but π^e is **self-fulfilling**!

Managing inflation expectations

$\rightarrow$ but how to influence inflation expectations?

Managing inflation expectations

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→ the need for **credible commitment to deliver future higher inflation**.

- Increasing the money supply but liquidity trap.
- Decreasing longer-run interest rate.
- **Forward guidance** (statement delivering about future policy).
- Institutional frameworks (inflation targeting).
- Changing monetary policy objectives.

Lowering interest rate differentials in a liquidity trap

- In practice, households' **deposits rate** i_M and on **firms' loans** rate i_c differ. ▸ Illustration

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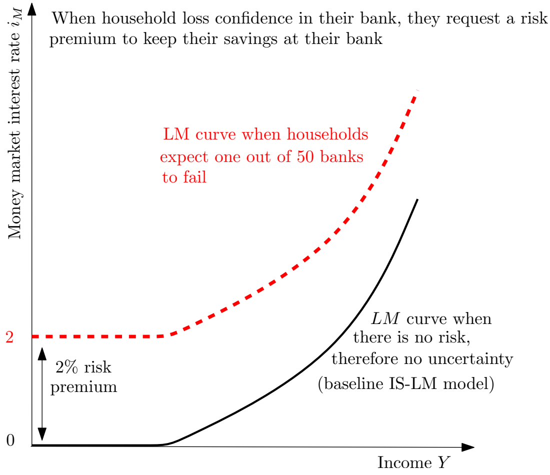
- A **financial crisis** affects the agents' **confidence** and **risk perception** in the money and capital markets: households may loose confidence in banks' solvency, and banks may loose confidence in firms' ability to pay back loans.
- Because of **risk** (and horizon) of the loan, deposit and lending rates may remain positive, even in a liquidity trap: **risk premium**:
  assuming $i_M < i_c$, $d \equiv i_c - i_M = d(\underset{-}{Y}, \text{investors'} \underset{-}{\text{confidence}})$

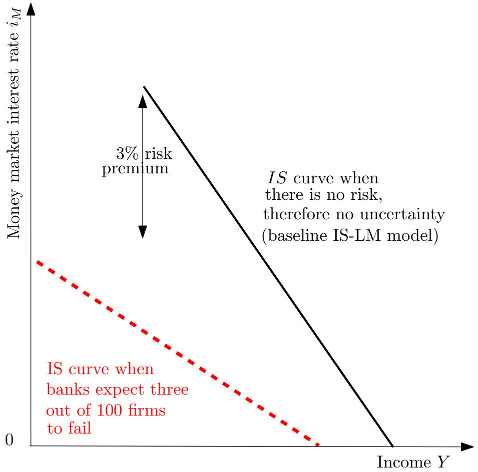
$\rightarrow$ **Financial accelerator** and credit market disruption: $IS(\underset{-}{i_c})$ is flatter.

Loss of confidence on the money market



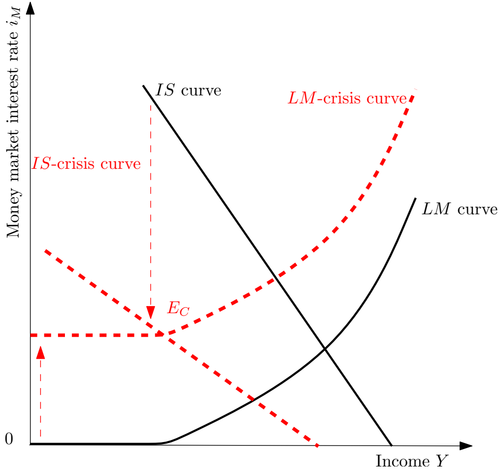
$\rightarrow M = L(Y, i_M - RP_M)$, with RP_M a risk premium that households demand to deposit their money, ex. with 2%.

Loss of confidence on the credit market



$\rightarrow Y = C(Y) + I(i_M + RP_C) + G$, with RP_C a risk premium that banks charge on firms' loans.

The IS-LM model during a financial crisis



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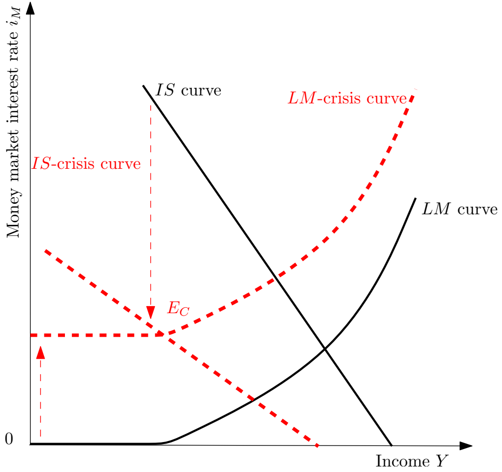

→ A liquidity trap can arise at strictly positive interest rates.

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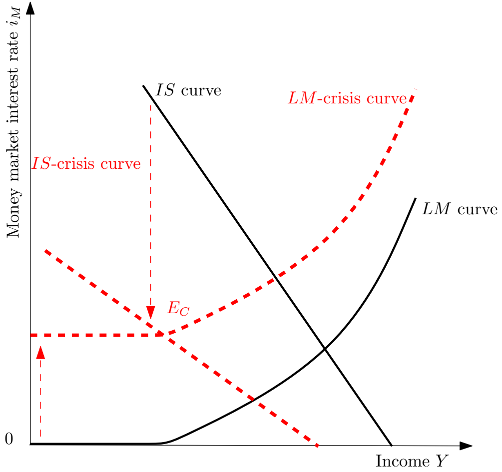
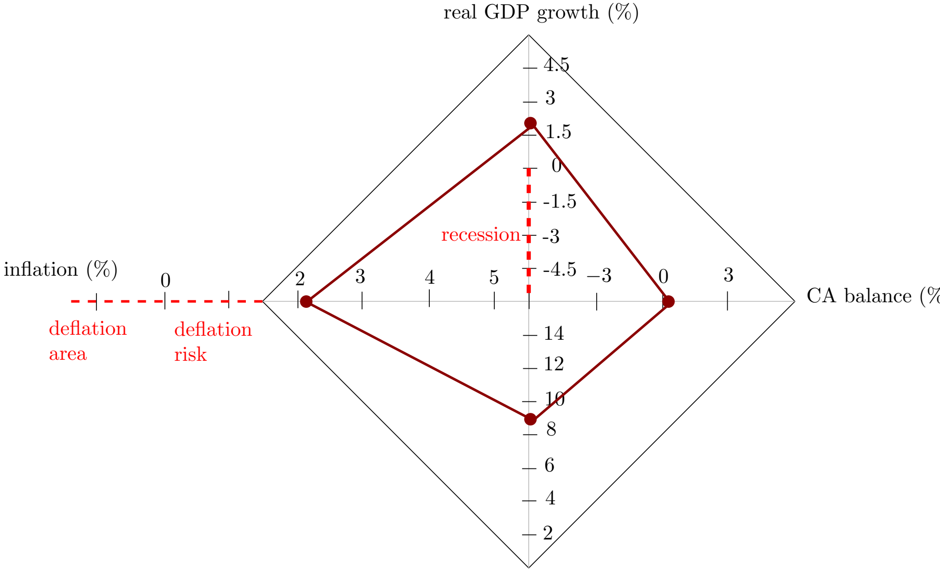


→ A liquidity trap can arise at strictly positive interest rates.

→ The same type of policy analysis can be conducted.

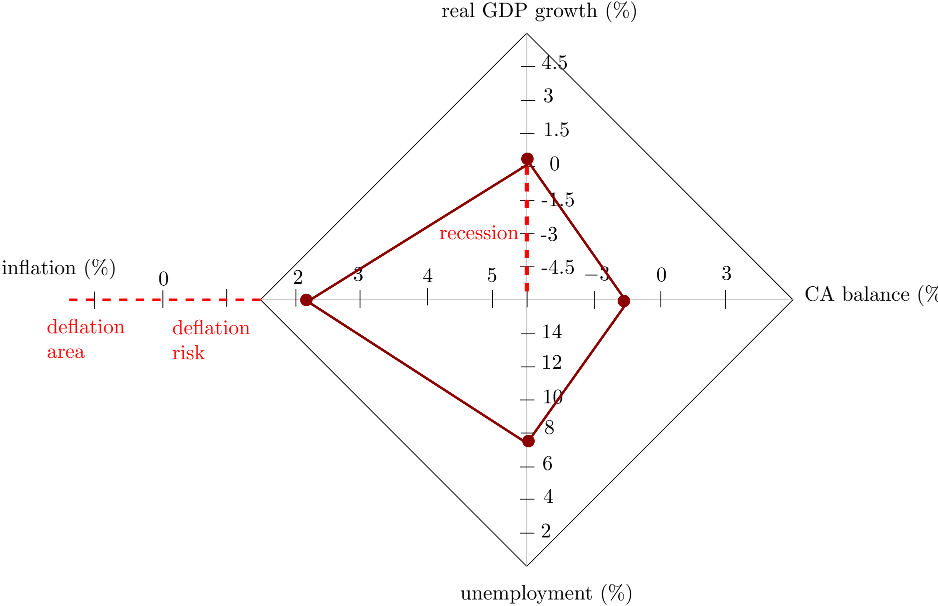
Economic situation, Euro area

Before the Great Recession – 2006



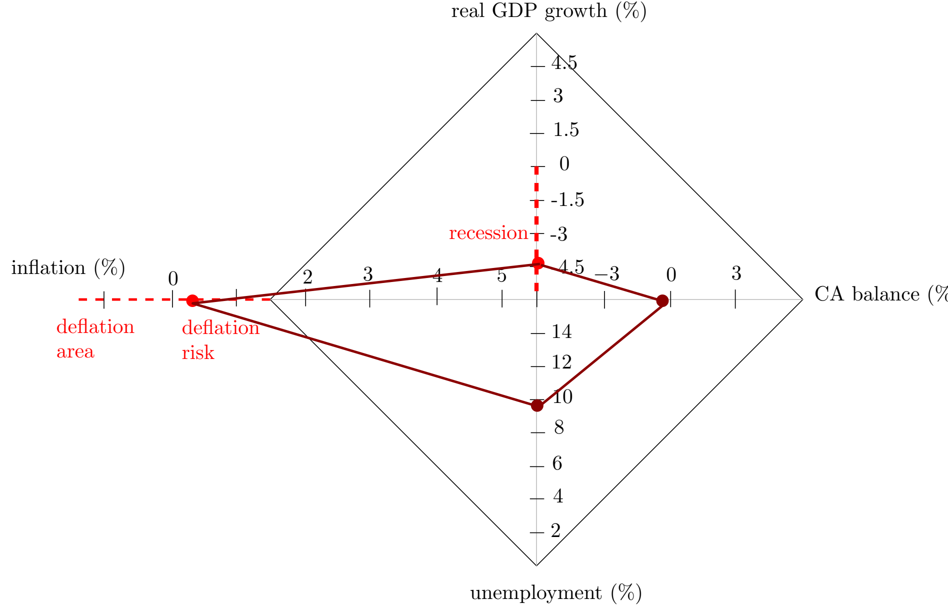
Economic situation, Euro area

Beginning of the Great Recession – 2008



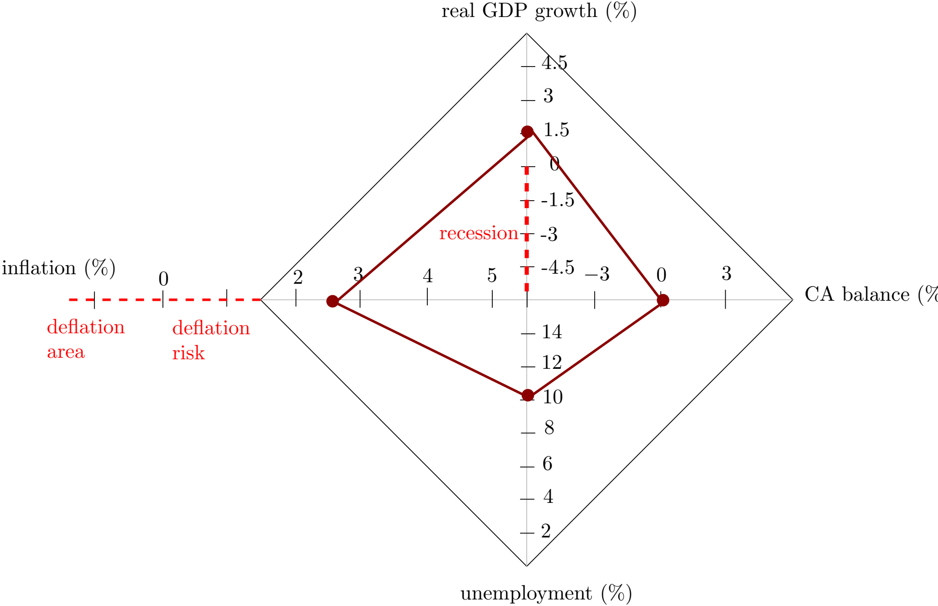
Economic situation, Euro area

Peak of the Great Recession – 2009



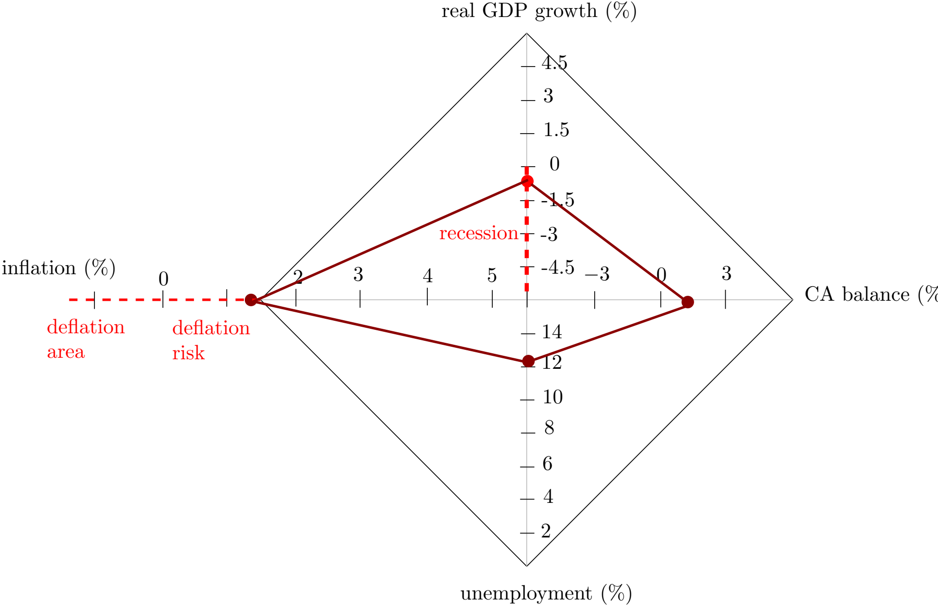
Economic situation, Euro area

Tentative recovery from the Great Recession – 2011



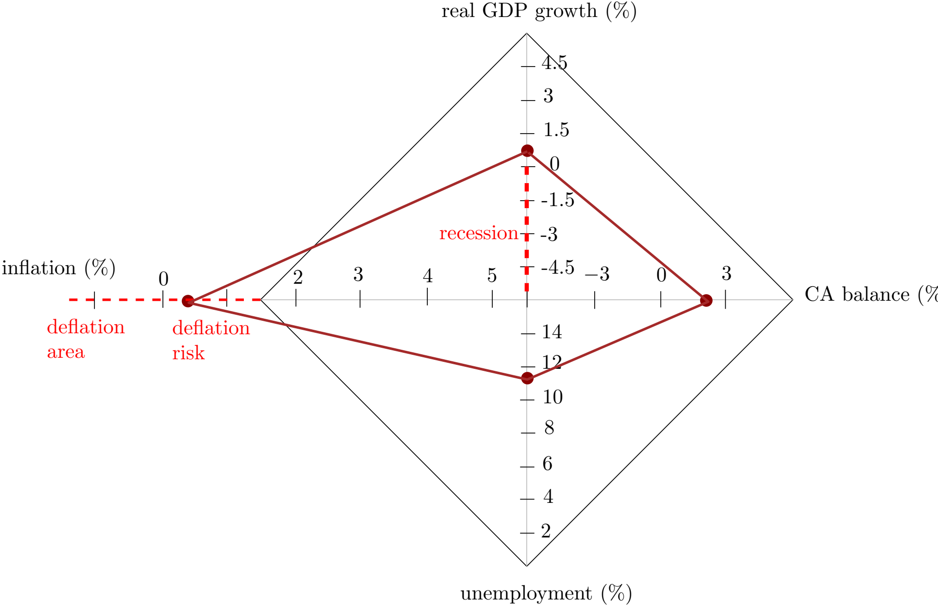
Economic situation, Euro area

Recovery remains modest – 2013



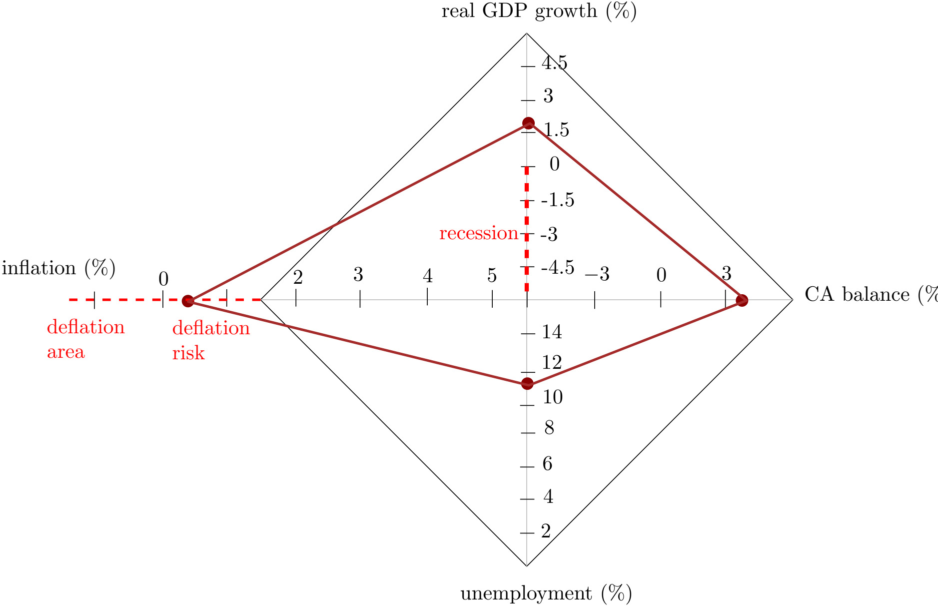
Economic situation, Euro area

In 2014.



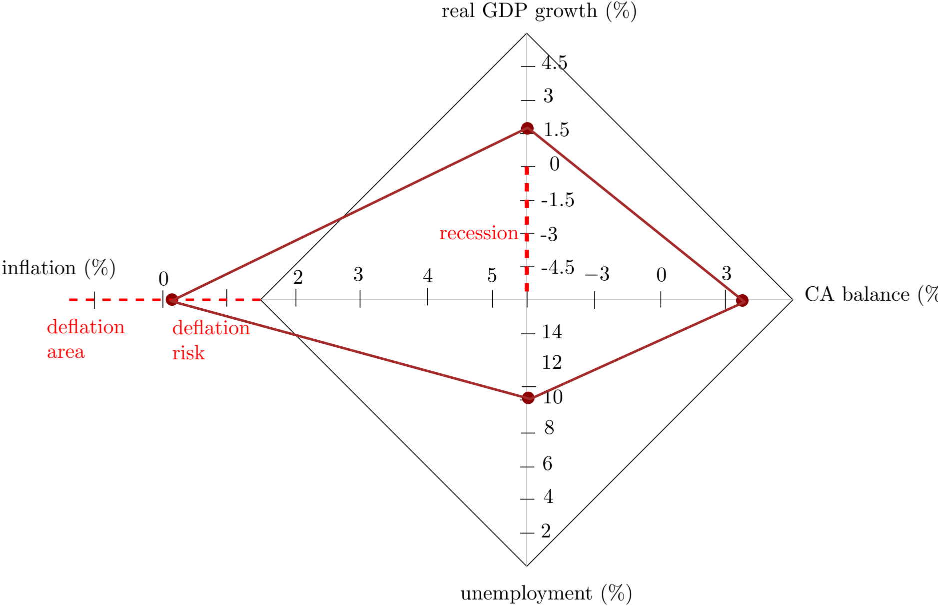
Economic situation, Euro area

In 2015.



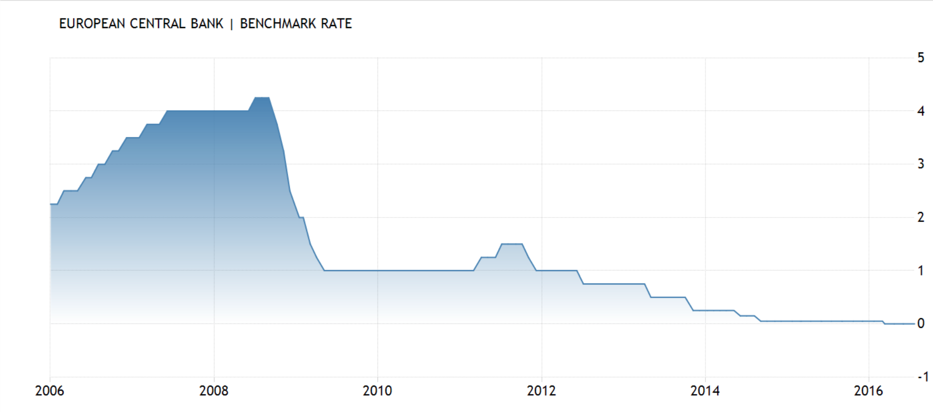
Economic situation, Euro area

Forecast for 2016.



Monetary policy reactions: Euro area

Evolution of the benchmark interest rate in the Euro area



ECB.

From 2014: non-conventional monetary policy

Why?: Weak recovery + fall in oil price $\rightarrow$ inflation threat away, deflation threat considered as serious.

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- **Targeted longer-term refinancing operations** (TLTROs) from 2014, update in 2016: provide funds to banks for lending to the private sector.

From 2014: non-conventional monetary policy

Why?: Weak recovery + fall in oil price $\rightarrow$ inflation threat away, deflation threat considered as serious.

What?

- **Targeted longer-term refinancing operations** (TLTROs) from 2014, update in 2016: provide funds to banks for lending to the private sector.
- **Quantitative easing**:
  - January 2015: 60 b. euro/month for, at least, 19 months, incl. at least 50 b. euro/month in public debt (14% of public debt).
  - Update in March/July 2016: 80 b. euro/month until "*the end of March 2017, or beyond, if necessary, and in any case until it sees a sustained adjustment in the path of inflation consistent with its inflation aim*".

From 2014: non-conventional monetary policy

What?

- **Forward-guidance**: "*The Governing Council continues to expect the key ECB interest rates to remain at present or lower levels for an extended period of time, and well past the horizon of the net asset purchases*", July 2016.
- **Announcements**: e.g. possibility of bail-out of Italian banks in July 2016.

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What for?

- Weaken euro vs. dollar: competitiveness.
- Provide liquidity to the banking sector and decrease longer-term lending rates: investment.
- Psychological impact: confidence.

Are low interest rates really the solution to create inflation?

The Fischerian argument

- **Expectation effect**: forward-looking intertemporal-substitution IS equation.

Thank you very much for your attention

Where does inflation come from?

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- Other **cost-push shocks**: price increase in imported intermediate outputs (e.g. exchange rate depreciation), commodities (e.g. oil), processed manufactured goods (e.g. steel, concrete), food products (e.g. in case of bad harvests).
- **Political factors**: seignorage (real resources appropriated by the government by means of base money creation); **fiscal dominance**, especially in developing countries (limited scope for the issuance of domestic debt). back

Inflation: why do we care?

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  - Inflation diverts productive capacities into "unproductive" activities.
  - Inflation is (partly) a **self-fulfilling process**: hard to stabilize.

back

Real versus nominal interest rates

$\Rightarrow$ **Nominal** interest rate, denoted by i, is set by the Central Bank.

$\Rightarrow$ **Real** interest rate, denoted by r, is given by (Irving Fisher's formula):

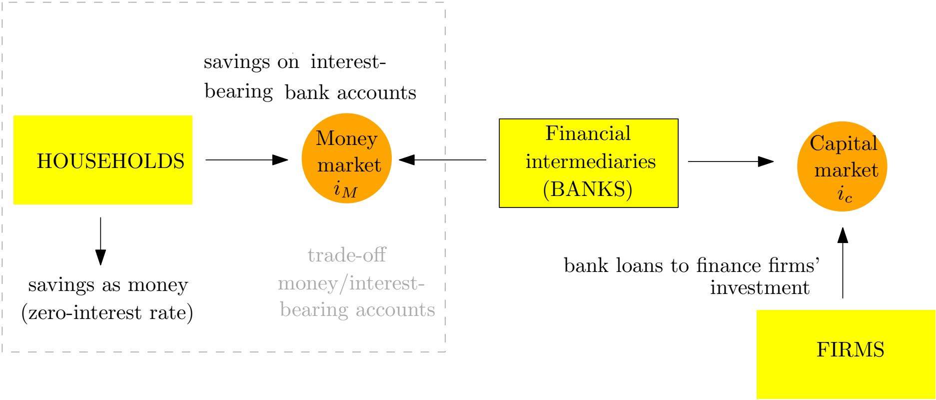
$$r \simeq i - \pi^e$$

π^e refers to inflation expectations

$\Rightarrow$ If prices remain constant, $\pi^e = 0$ and $i = r$.

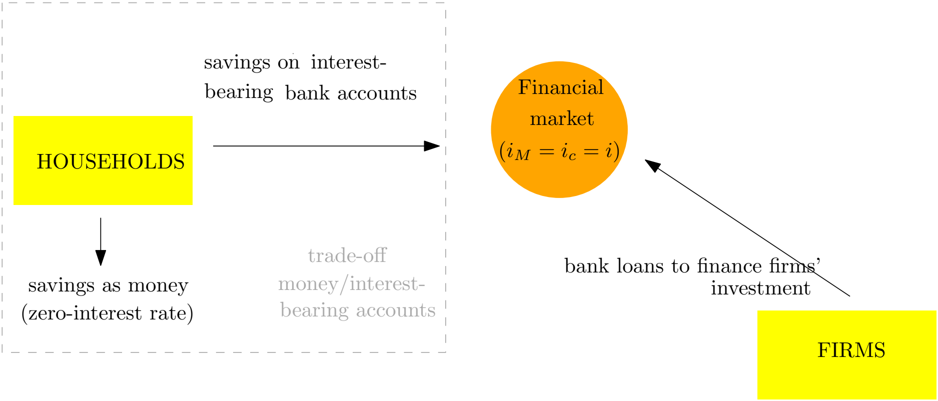
back

In reality ...



⇒ Banks serve as financial intermediaries between households' savings and firms' financial needs.

... in the $IS - LM$ model



$\Rightarrow$ Only two agents: firms and households (+ policy makers).

back

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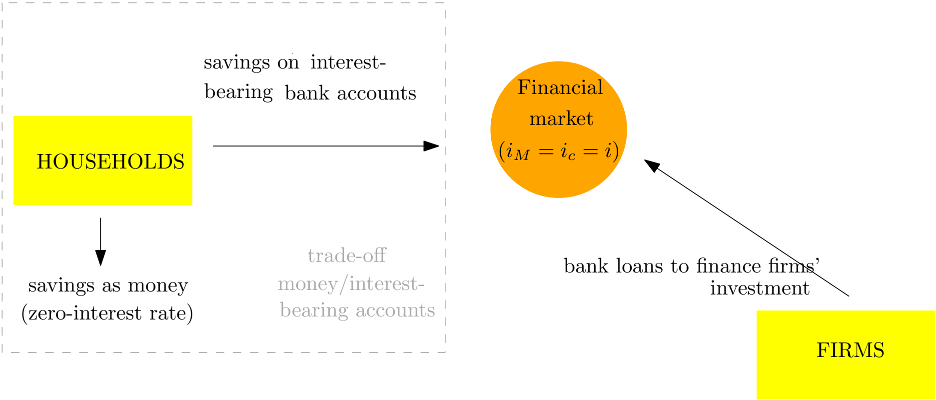

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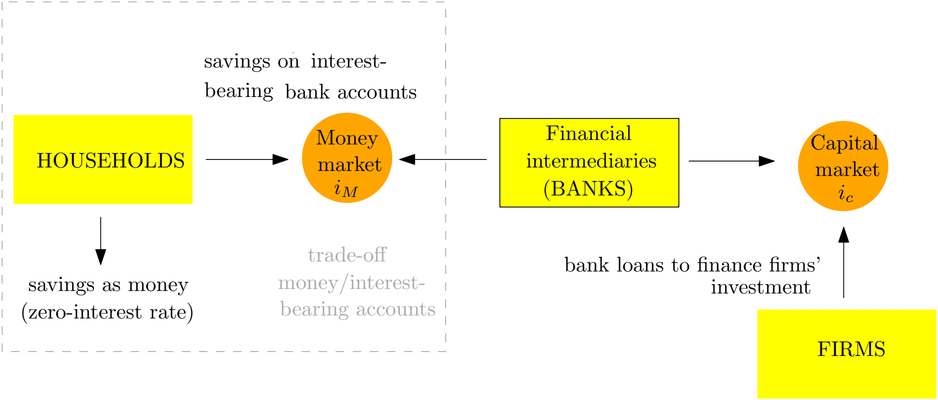
back

... but in reality



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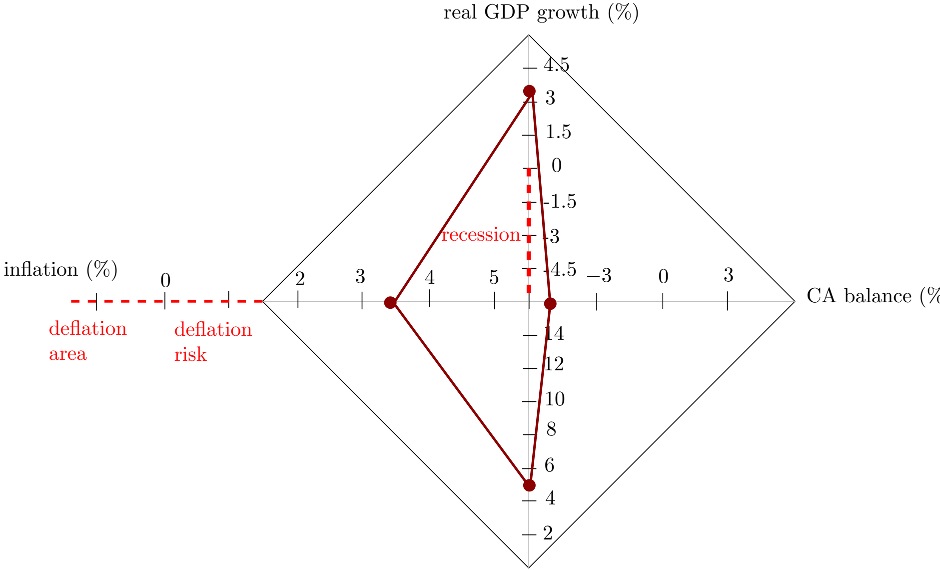
back

Economic situation, US

Before the Great Recession – 2006



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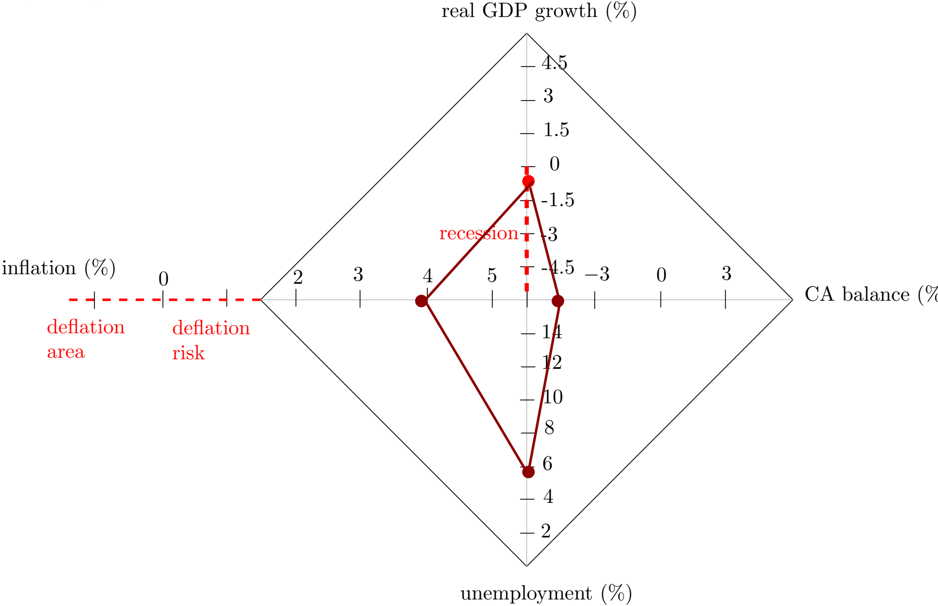
Beginning of the Great Recession – 2008



Economic situation, US

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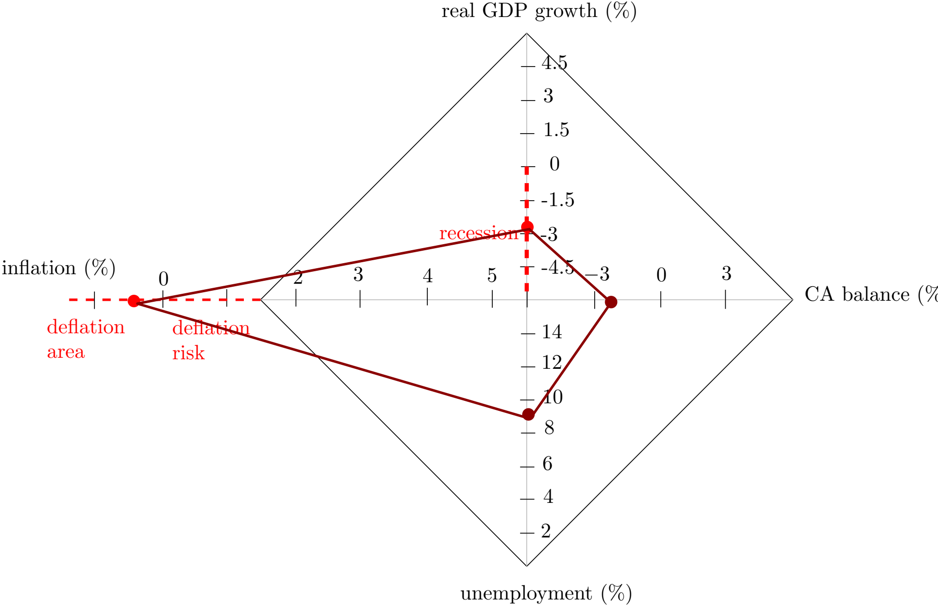
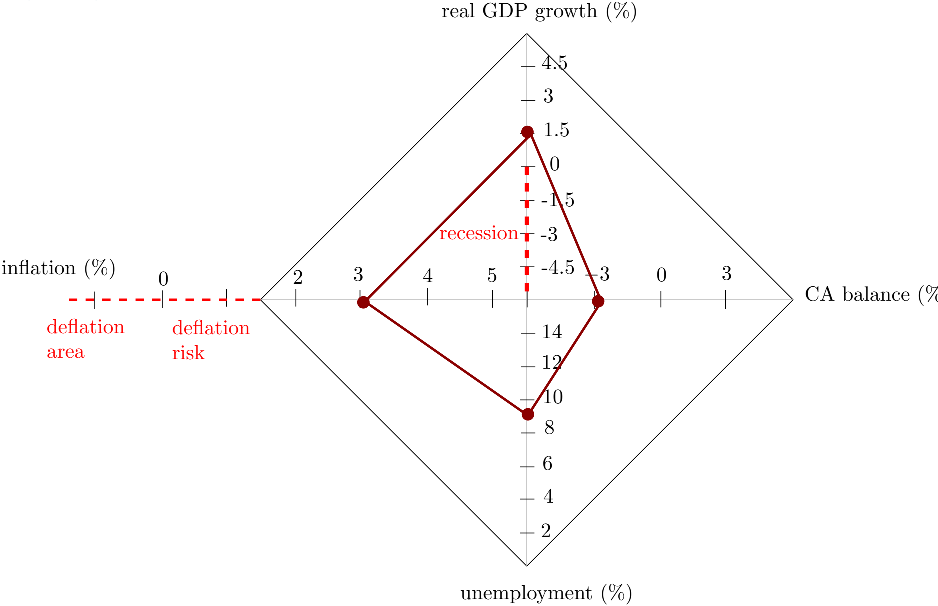


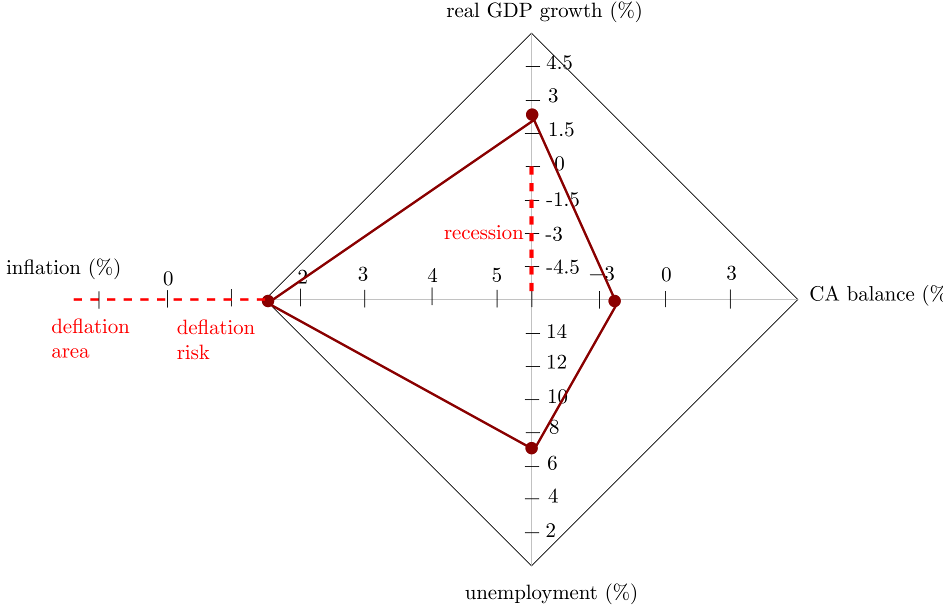
Economic situation, US

Beginning of the recovery from the Great Recession – 2011



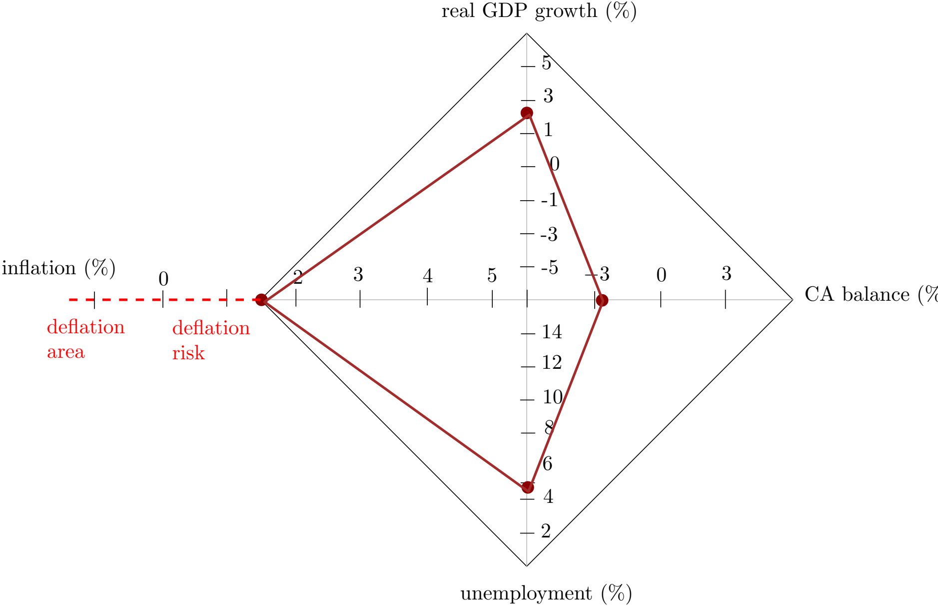
Economic situation, US

Recovery on the way – 2013



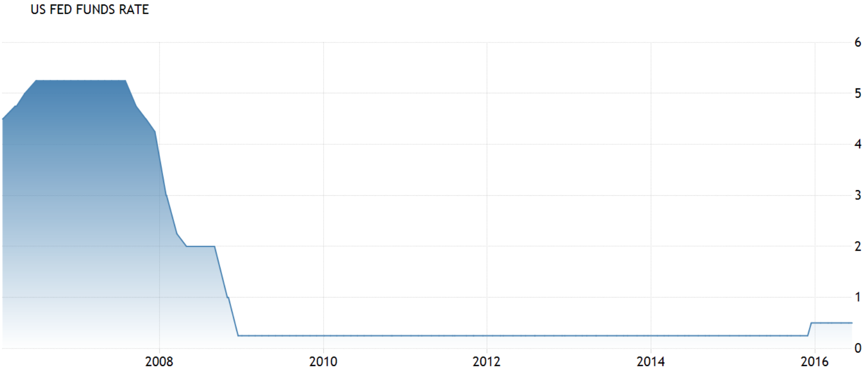
Economic situation, US

Forecasts for 2016



Monetary policy reactions, US

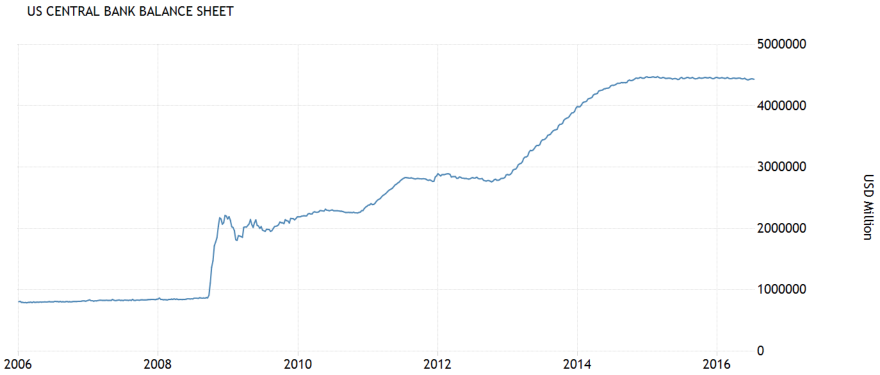
Evolution of the Federal funds rate, US.



Source: Federal Reserve.

Monetary policy reactions, US

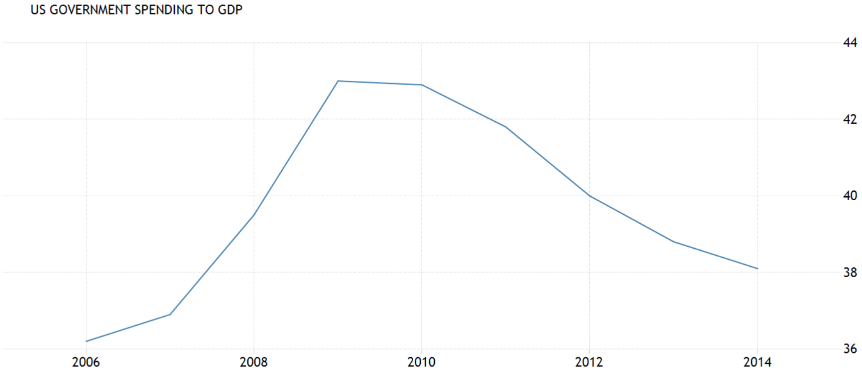
Evolution of the Federal Reserve Balance Sheet



Source: Federal Reserve.

Fiscal policy reactions, US

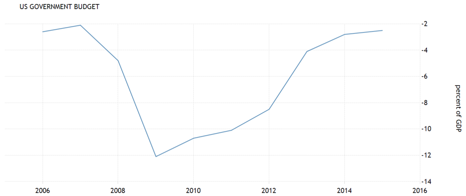
Evolution of public spending over GDP, (US).



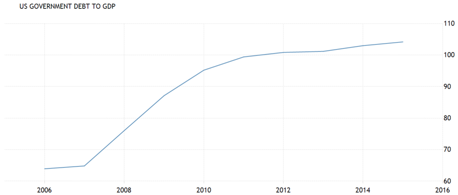
Source: US Bureau of Economic Analysis.

Fiscal policy reactions, US

Overview of the current economic situation



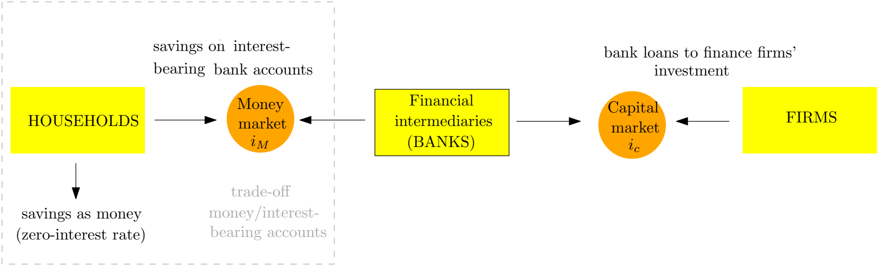
Source: US Treasury.



Source: US bureau of public debt. back

Financial markets & risk premiums

The money and the capital markets



Targeting M or i

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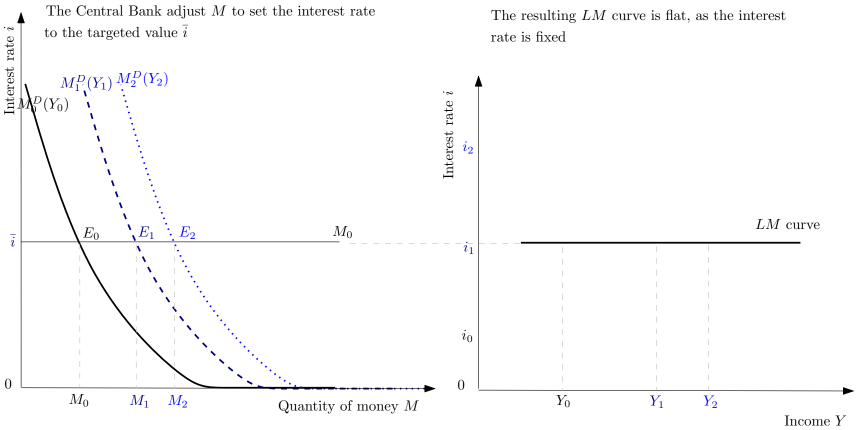

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- Therefore, LM can be replaced by a Monetary Policy (MP) curve with similar shape and conclusions (especially regarding the ZLB).

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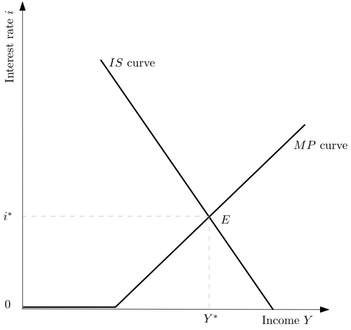

The fiscal theory of prices (Leeper, Woodford) ▸ back

- The valuation equation of government debt:

$$\frac{\text{Nominal debt}_t}{P_t} = E_t \sum_{j=0}^{\infty} \frac{\text{Real primary surplus}_{t+j}}{\text{Discount rate}_{t,t+j}} \tag{11}$$

$\rightarrow \simeq$ stock prices that depend on expected future earnings.

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- Because if B_t is a **short-run maturity debt**, it cannot fall, so for this equation to hold, the government can:
  - adjust future taxes to act on the expected real primary surplus.
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  - **decrease expected future interest rates**
  - hope for **growth** (increasing expected surpluses).

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- If ***expected*** surpluses go down (bad news), P increases and inflation can come **before** deficits and monetization (no only future seignorage inflation): inflation beyond the CB's control.