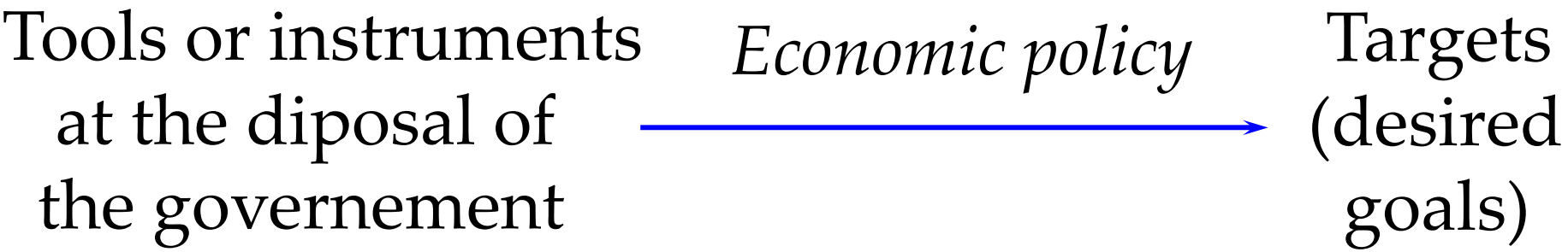
Economic policy

- The economic policy of a government consists of all the decisions by the government that affect the economy with the purpose of achieving certain preestablished goals.
- The following sketch is a basic outline of the economic policy. For macroeconomic policy, the desired goals are expressed as values of certain macroeconomic variables.



Targets, instruments, indicators

- Targets: goals of policy identified with precision.
- Instruments: tools that the policymaker can control and manipulate directly.
- Indicators: variables that inform about the degree of fulfillment of targets.
- An ultimate target defines the goal in which the policymaker is really interested. An intermediate target is a goal considered relevant or necessary to achieve the ultimate target. As it signals closeness to the ultimate target, it may be used as indicator.

Basic rule of economic policy

- States that, when designing a specific economic policy, the number of independent instruments under the government's control cannot be smaller than the number of ultimate targets.

- In a more compact way, the basic rule says: Have at least as many instruments as goals (you cannot expect to be able to kill two birds with one stone).

- For instance, to achieve three goals, it is necessary to have at least three instruments, each one of them capable of complying with a different goal.

Implementing problems

- The implementation of economic policies is subject to several limitations and constraints.
- Lags. Policymaking does not hit the economy immediately: there is a delay between the moment at which intervention is needed and the moment at which the economy responds to the policies.
- Credibility of policymakers and the temporal inconsistency of policies.
- Policymaking should take into account people's reaction to policies (see Goodhart's law).

Lags

- Recognition lag: period between the moment at which a disturbance (problem) occurs and the moment at which it is recognized the need to take some action (this lag makes policymaking analogous to driving a car looking backwards).

- Decision lag: time between the recognition of the problem and the policy decision. Action lag: delay between the policy decision and its execution.

- Effectiveness lag: time needed for the policy action to affect the economy and achieve the desired goal (the effects of the policy take time to appear).

Oil tanker example

- An oil tanker is heading to some obstacle at sea.
- The time took to detect the obstacle (from the time where it can be recognized) is the recognition lag.
- The decision lag refers to the time between the obstacle is detected and the captain decides whether to turn to port or turn to starboard. The action lag is the time needed to communicate that decision to the helmsman.
- The effectiveness lag is the time the tanker takes to turn.

Temporal inconsistency of policies

- A decision made at time t to be carried out at a later time t' is temporally inconsistent if, at time t', the decision-maker would prefer not to carry it out.
- Temporal inconsistent policies are ineffective because they are not credible: when it is the policymaker's turn to execute a temporally inconsistent, he will have an incentive to not execute it.
- Example: to attract foreign investors, a government promises not to tax profits from firms created by foreign investors; but, once the firms get the profits, the government has an incentive to tax them.

Goodhart's law

- Named for Charles Goodhart, a former chief advisor to the Bank of England, it was originally formulated in 1975 as *"Any observed statistical regularity will tend to collapse once pressure is placed upon it for control purposes"*.
- Marilyn Strathern's formulation: "When a measure becomes a target, it ceases to be a good measure".
- Goodhart's law expresses for the social world what the Heisenberg principle expresses for the phyical world: the act of measuring reality changes reality.

Illustrating Goodhart's law

- By Goodhart's law, an empirical regularity tends to vanish when it is used to control the evolution of the variables involved in the regularity.

- Suppose it is an empirical regularity that the students attending more than 85% of the classes pass. To avoid the cost of setting and correcting exams, a teacher may use this regularity to, by controlling attendance, give a pass to those students coming to at least 85% of the classes. If students knew that policy, attendance would no longer be a good measure of the students' performance. Why?

Goodhart's law & economic policy

- By Goodhart's law, when a policymaker makes use of some macroeconomic empirical regularity as a policymaking instrument, the regularity will tend to disappear.

- Empirical regularities link variables. In the previous example, course attendance and course performance. If one of the variables is taken as target (performance), the other variables (attendance) may act as indicators. But taking the indicator as a measure of the target invalidates the indicator: controlling the indicator instead of the target destroys the empirical regularity.

Another example on Goodhart's law

"The most famous example of Goodhart's law should be the soviet factories which, when given targets on the basis of numbers of nails, produced many tiny useless nails and, when given targets on basis of weight, produced a few giant nails.

Numbers and weight both correlated well in a pre-central plan scenario. After they are made targets (in different times and periods), they lose that value."

http://lesswrong.com/lw/1ws/the_importance_of_goodharts_law/

Intervention vs no intervention

- The nonactivist position (no intervention) is based on the belief that the economy is self-regulating and works better when left by itself.
- Intervention may make things worse: policymakers have an imperfect knowledge of both the economic reality and the effects of policies, and may be guided by personal interests.
- Policy design is subject to the previous constraints.
- Crises are good for the economy, as they purge the economy of inefficiencies and weaknesses.

The issue of rules versus discretion

- When an activist position is adopted, the choice is between flexibility and certainty of the policy.
- Flexibility = policymakers do not tie their hands when choosing targets or using tools (the economy and what is known about it changes over time).
- Certainty = policy is conducted by preannounced rules that describe how the policy targets are determined and instruments used in every situation. Taylor's rule (due to John B. Taylor, 1993) is an example of a policy rule.

Taylor's rule

- Taylor's rule is a monetary policy rule telling the central bank (CB) how to set the nominal interest rate. The rule is given by an equation of the sort

$$i = \pi + i_r^* + a(\pi - \pi^*) + b(y - y^*)$$

where: i_r^* is the long-term real interest rate (Fisher hypothesis); π^* is the CB's target inflation rate (π is current inflation); y^* is the "normal" growth rate of the economy (y is current growth); constant $a > 0$ measures the CB's sensitivity to deviations from target π^*; and constant $b > 0$ measures the CB's sensitivity to deviations from normal growth y^*.

Taylor's rule & pure inflation targetting

- If the CB only cares about inflation (and not about growth or unemployment), then $b = 0$. In this case, Taylor's rule becomes

$$i = \pi + i_r^* + a(\pi - \pi^*) \ .$$

- When $\pi = \pi^*$ (the CB's goal is met), $i = \pi - i_r$. Thus, $i - \pi = i_r$: the current real interest rate $i - \pi$ equals the equilibrium real interest rate i_r. Thus, Taylor's rule can be seen as an extension of the Fisher equation.

- The larger a, the more aggresive the CB is in fighting inflation.

Taylor's rule: an example

- With rule $i = \pi + i_r^* + a(\pi - \pi^*)$, if $\pi > \pi^*$, then, to cool off the economy by cutting aggregate demand, the CB rises i so that the current real interest rate $i_r = i - \pi$ is above the equilibrium interest rate i_r^*.

- Example. Let $i_r^* = 1\%$, $\pi^* = 3\%$, and $a = ½$ (so, for each inflation point above the goal, the CB rises i by 0.5 points). Suppose $\pi_0 = 3\%$. Then the CB sets $i_0 = \pi_0 + i_r^* + (\pi_0 - 3)/2 = 3 + 1 + 0/2 = 4\%$.

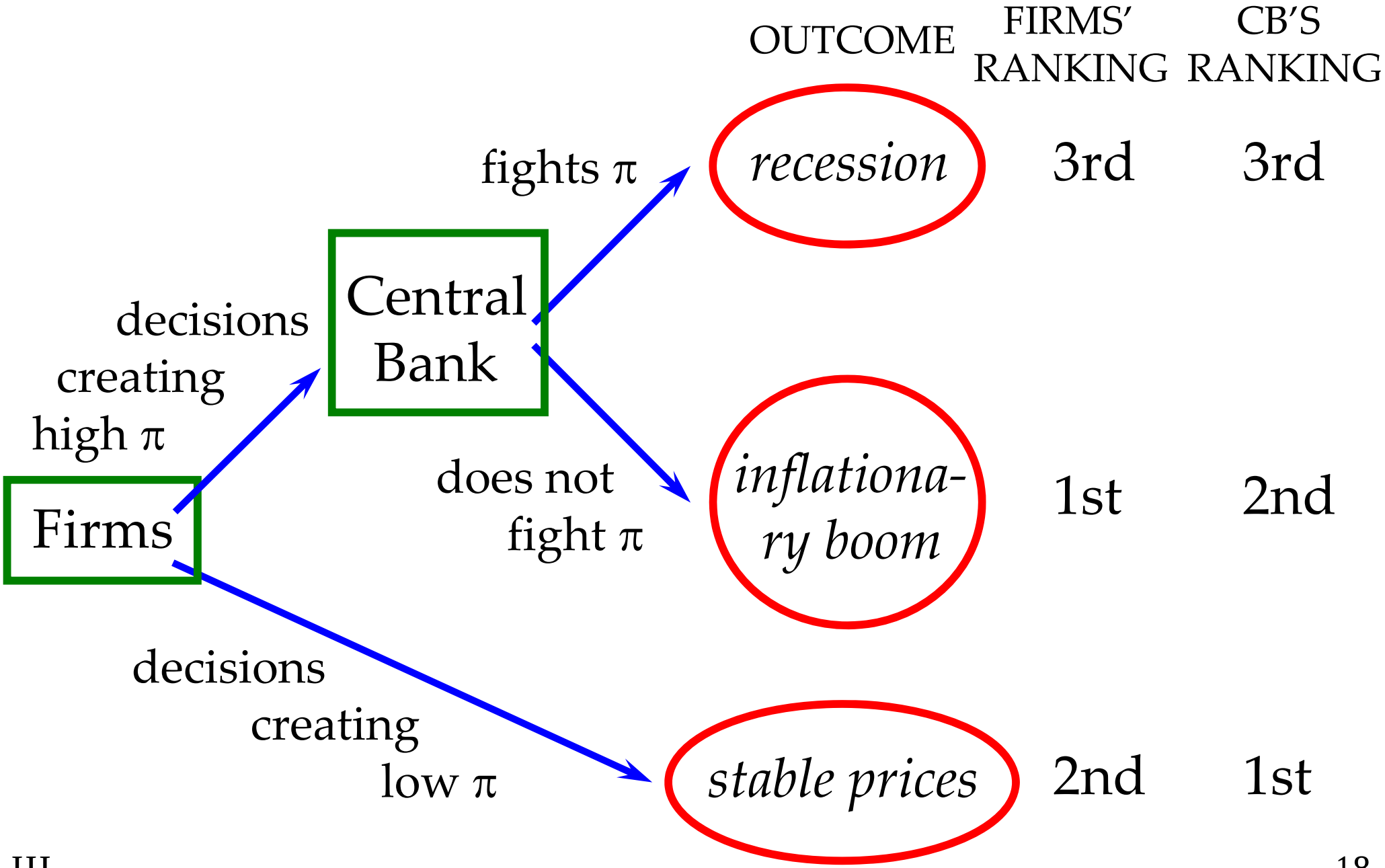
- Imagine that $\pi_1 = 5\%$. Then $i_1 = \pi_1 + i_r^* + (\pi_1 - 3)/2 = 5 + 1 + (5 - 3)/2 = 7\%$. Hence, $i_r = i - \pi = 7 - 5 = 2 > i_r^*$.

Comparison between rules & discretion

- Advantage of rules: when making decisions, people anticipate the policymakers' actions (uncertainty reduced). Problem 1: rules will be eventually changed. If the change is frequent, there is no much difference with discretion. Must there be rules for the change of rules? Problem 2: people need to believe that rules will be followed (reputation).

- Advantage of discretion: unexpected or serious economic problems can be attacked efficiently. Problem: predicting the policymakers' actions becomes a new problem for the agents in the economy (policies may be erratic and arbitrary).

Rules vs discretion: an illustration



Importance of committing to policies

- Case 1: the CB acts discretionally. Solving by backwards induction, the CB prefers not to fight inflation. Given this, firms choose the high inflation option. This leads to the firms' best outcome.

- Case 2: the CB commits itself to fighting inflation. Assume the CB develops a reputation for fighting inflation regardless of any other consideration. Firms then choose the low inflation option. Now, the CB achieves its best outcome without having to engineer recessions: the belief that the CB is willing to generate a recession to fight inflation suffices.

Macroeconomic policies: a typology

- Macroeconomic policies can be classified into two broad categories.
- Supply-side policies. Try to shift the AS function to the right (never intended to shift it left).
- Demand-side policies. Their intended target is the AD function (to contract or expand it). They tend to achieve its goal faster than supply-side policies.
- The main demand-side policies are the fiscal policy (decided by the governement) and the monetary policy (decided by the CB, when independent).

Supply-side policies

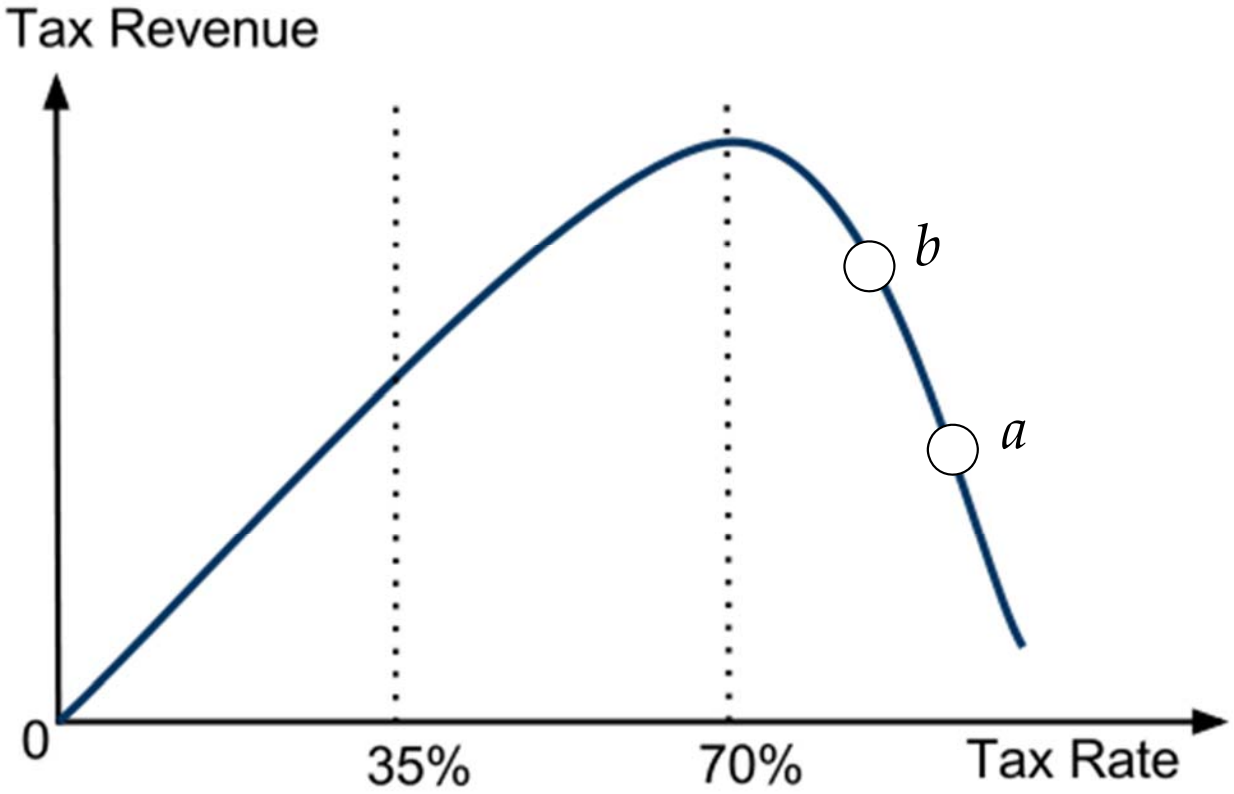
- Policies that move the AS function to the right by improving the productive capacity of the economy.
- Measures to rationalize the government intervention in the economy: remove unnecessary regulation, efficient provision of public services, privatization of public monopolies, tax reductions…
- Measures to improve the way markets operate: stimulate competition, reduce market power…
- Measures to improve the quality of inputs (retraining programmes for unemployed people) and to encourage technological progress.

Supply-side economics

- It is a school of economic thought that contends that the best way to stimulate growth consists of removing the obstacles to production.
- This is achieved by providing incentives to people and firms through reductions of the income tax rate and the capital tax gain rate. The Laffer curve constitutes a theoretical justification of this policy.
- The second typical recommendation is less regulation: the less a government interferes with the economy, the better for the economy.

The Laffer curve

- It is a theoretical relationship between the revenues obtained from taxation and the average tax rate.



A non-symmetric Laffer curve with a maximum Revenue point at around a 70% tax rate.

The tax rate reduction from a to b benefits the economy and the government: a smaller tax rate induces people to work and produce more, and more production yields higher revenues.

III http://en.wikipedia.org/wiki/Laffer_curve

Fiscal vs monetary policy

- Fiscal policy (FP) instruments. Government expenditure (G), net transfers to the private sector (TR), and the tax rate (t).
- FP targets. Typically, GDP growth, unemployment, unemployment rate. Atypically, budget deficit.
- Monetary policy (MP) instruments. Open market operations (OMOs), interest rates set by the CB (discount rate), and reserve requirements.
- MP targets. Main: inflation rate. Secondary: GDP growth, unemployment rate, exchange rate.

Expansionary/contractionary policy

- An expansionary FP consists of $\uparrow G$, $\uparrow TR$, and/or $\downarrow t$.
- A contractionary FP consists of $\downarrow G$, $\downarrow TR$, and/or $\uparrow t$.
- An expansionary MP consists of an expansionary OMO, a reduction of the discount rate, and/or a reduction in the reserve requirements. A contractionary MP consists of the opposite.
- An expansionary FP/MP tries to shift the AD function to the right (increase expenditure). An contractionary FP/MP pursues the opposite.

Effects of the FP in the AS-AD model

One-period (primary) effects of an	instruments			effect on		
	G	TR	t	Y	π	u
expansionary fiscal policy	↑	↑	↓	↑	↑	↓
contractionary fiscal policy	↓	↓	↑	↓	↓	↑

Effects of the MP in the AS-AD model

One-period (primary) effects of an	implies		effect on		
	i_r	M1	Y	π	u
expansionary ("easy") monetary policy	↓	↑	↑	↑	↓
contractionary ("tight") monetary policy	↑	↓	↓	↓	↑

Okun's law

The government (govt) outlays

- The total spending by the govt (govt outlays) consists of three items.
- *G* = govt consumption expenditures (purchases on currently produced goods) + govt investment (purchases on capital goods).
- *TR* = transfer payments made to individuals from whom the govt does not receive current goods in exchange.
- *INT* = net interest payments = interest paid to the holders of govt bonds less interest paid to the govt

The government budget

- There are four main categories of tax receipts T:
  - personal taxes,
  - corporate taxes,
  - taxes on production (sales taxes) and imports (tariffs), and
  - contributions for social insurance.
- Govt budget deficit (or just deficit) = govt outlays – tax receipts = $G + TR + INT - T$.
- Primary govt budget deficit (or just primary deficit) = deficit – INT.

Financing budget deficits

- There are three basic ways of financing a deficit:
  - by increasing current taxes or creating new ones (= *tax now* option);
  - by issuing govt bonds (= *tax later* option);
  - by monetizing the deficit (= creating monetary base = printing money and/or selling the bonds to the CB).

- When considering the effects of an expansionary FP, the way it is financed should be taken into account, as it may offset the primary effect of the FP.

Consequences of taxing now

- Suppose the govt executes an expansionary FP consisting of an increase in govt consumption (ΔG).
- The immediate effect of this policy is an increase in the deficit. Let it be financed by raising taxes now.
- Since people have less disposable income, they will probably cut consumption. Hence, the expansionary effect of ΔG on the AD function is followed by a contractionary effect caused by a reduction in consumption. This qualifies the primary effect of an expansionary FP: it may not alter Y^*.

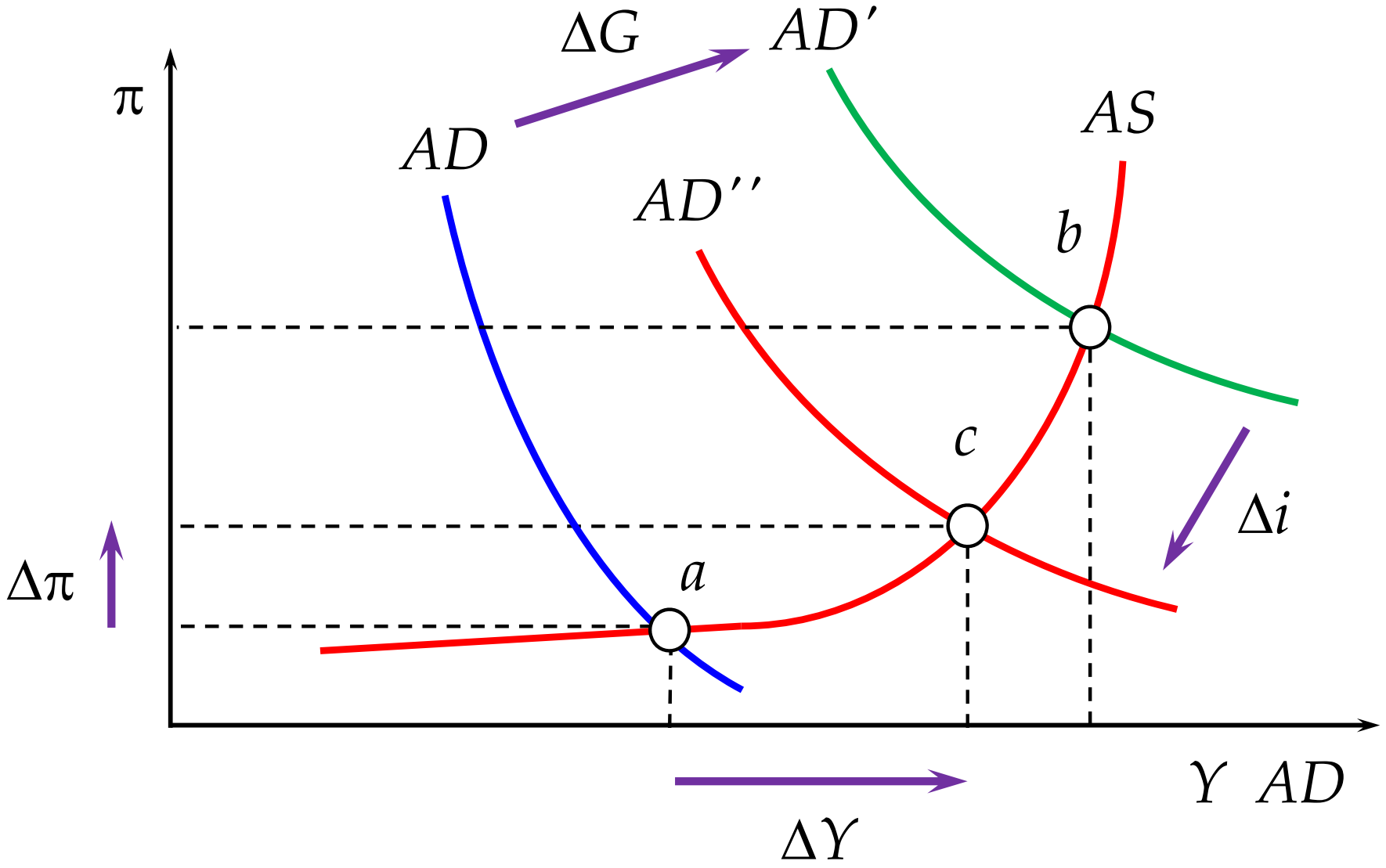
The Ricardian equivalence proposition

- Suggested by David Ricardo (1772-1823). As debt financing by bond issue just postpones taxation, people realize that bonds will be paid off with future increases in taxes, so they will save more now to be able to pay higher taxes in the future.
- The proposition holds that an increase in the deficit leads to an increase in saving equal to that deficit, so it does not matter if the deficit is financed by more taxes or by bond issue. If people save now the taxes to be paid in the future, consumption is reduced now and the effect of an expansionary FP may be neutralized.

Taxing later: the crowding-out effect

- Suppose an expansionary FP consisting of an increase in *G* is financed by bond issue. This shifts the demand for loans to the right causing, in the loan market, a rise in *i*.
- The increase in *i* is likely to have a negative impact on consumption and investment. Therefore, private spending is reduced.
- As a result, *G* (public spending) crowds out *C* + *I* (private spending). The next slide illustrates that phenomenon: instead of reaching *b*, the economy reaches *c* due to the effect of the FP on *i*.

Crowding-out in the AS-AD model



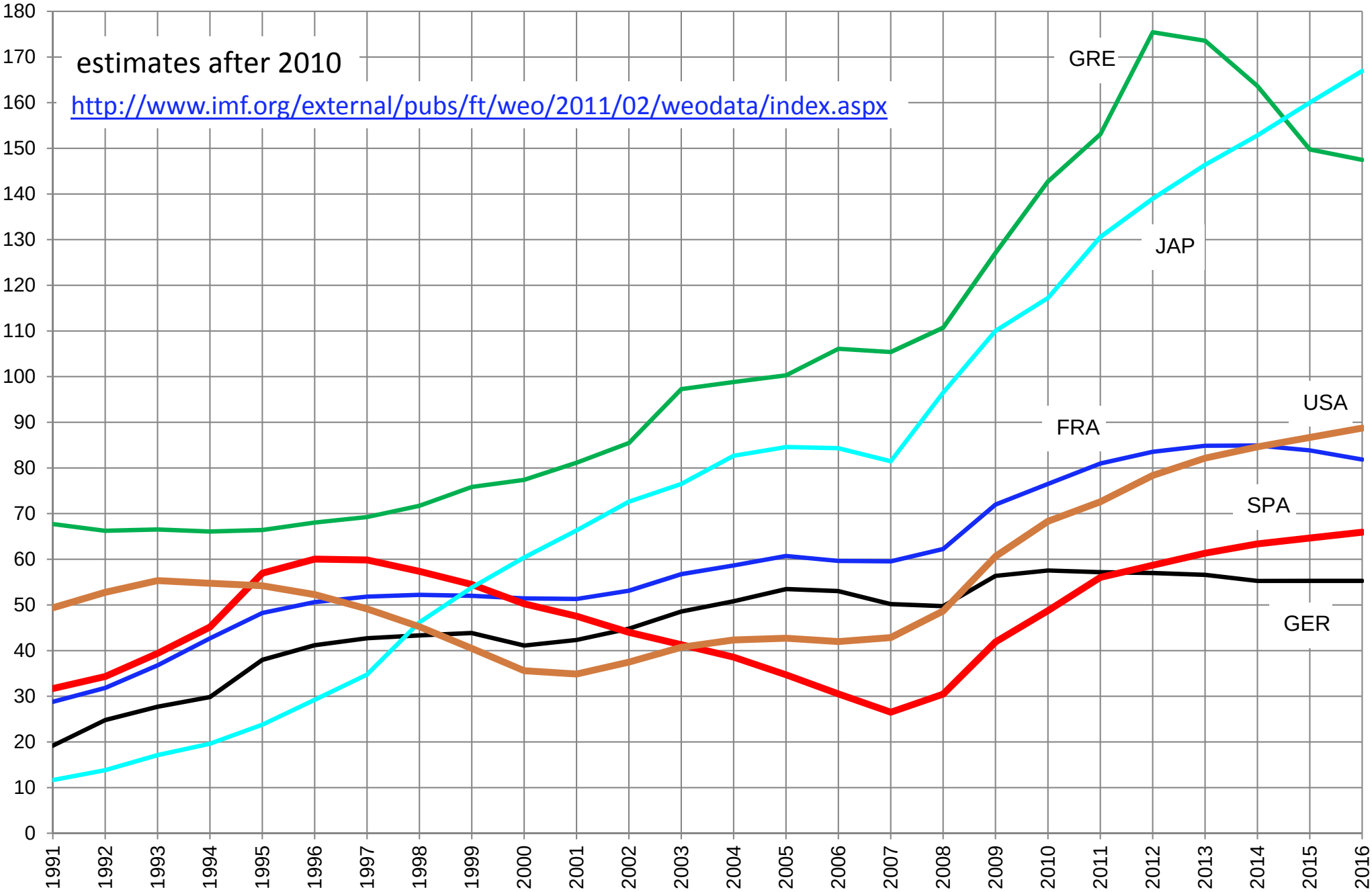
Debt-to-GDP ratio B/Y

- The government debt B_t at time t (a stock variable) is the total value of govt bonds at t (stock of bonds issued in the past). The amount of new govt debt ΔB to be issued at time t equals the govt deficit in t.

$$\underbrace{B_t - B_{t-1}}_{\text{change in debt}} = \underbrace{i\,B_{t-1}}_{\text{interest payment}} + \underbrace{(G_t + TR_t - T_t)}_{\text{primary deficit}}$$

$$\underbrace{\frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}}}_{\text{change in debt-to-GDP ratio}} \approx \underbrace{(i-g)}_{\text{GDP growth}} \underbrace{\frac{B_{t-1}}{Y_{t-1}}}_{\text{initial debt-to-GDP ratio}} + \underbrace{\frac{G_t + TR_t - T_t}{Y_t}}_{\text{primary deficit-to-GDP ratio}}$$

Debt-to-GDP ratio: examples

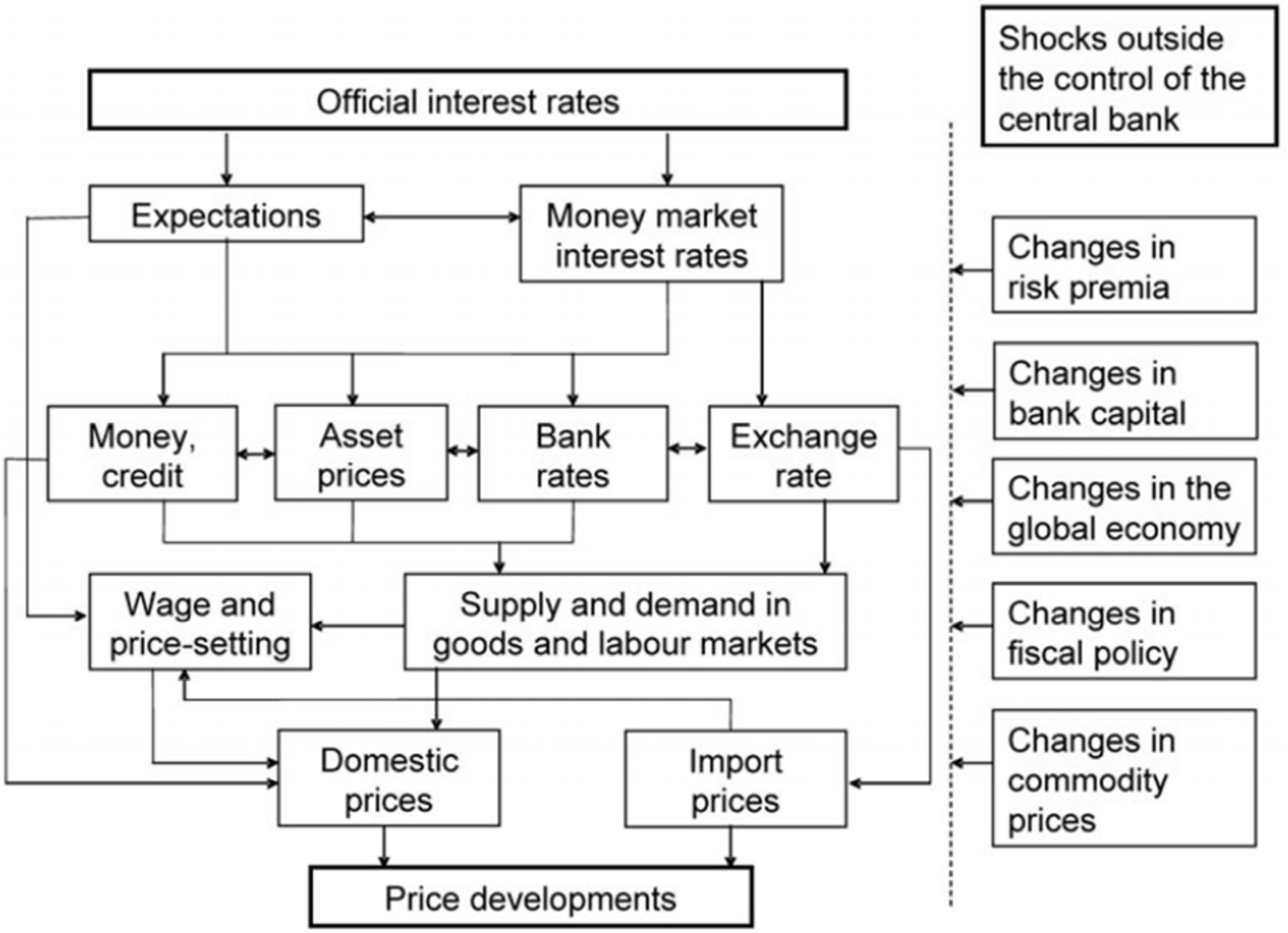


Monetary policy design

Instruments (tools) the CB has → Intermediate targets → Ultimate targets

- Instruments: OMOs, discount rate, and reserve requirements (tools under the CB's direct control).
- Intermediate targets: *i*, M2, M1, growth of M1… (variables that the CB can influence directly and signal if the CB is closer to the desired target).
- Ultimate targets: Y, y, π, u… (they are the goals of policy: variables in which the CB is really interested [desired target] and can be affected in a predictable way by the intermediate targets)

MP transmission channels



http://www.ecb.europa.eu/mopo/intro/transmission/html/index.en.html

Interest rate channel of MP

- The interest rate channel of MP collects all the effects on the economy that work through changes in the (real) interest rate.
- The following sequence illustrates how the channel works when the MP consists of an expansionary open market operation (the sequence presumes that *i* reacts quicker than π, which is reasonable since the prices of financial assets change typically faster than the prices of goods).

$$\uparrow \text{M0} \Rightarrow \uparrow \text{M1} \Rightarrow \downarrow i \Rightarrow \downarrow i_r \Rightarrow \uparrow C \uparrow I \Rightarrow \uparrow AD \Rightarrow \uparrow Y$$

Exchange rate channel of MP

- The exchange rate channel of MP collects all the effects on the economy that work through changes in the (real) exchange rate e_r.
- A tightening of MP raises e_r. Since e_r is a mesure of the economy's competitiveness, a contractionary MP erodes competitivenss. The following sequence shows how this channel works when the MP consists of an expansionary open market operation.

$$\uparrow \text{M0} \Rightarrow \uparrow \text{M1} \Rightarrow \downarrow i \Rightarrow \downarrow e \Rightarrow \downarrow e_r \Rightarrow \uparrow NX \Rightarrow \uparrow AD \Rightarrow \uparrow \text{Y}$$

The credit channel of MP

- This channel collects the effects on the economy that work through credit supply and demand.
- Supply. If the reserve ratio is increased, banks cut lending to accumulate more reserves. Purchases by consumers or small firms that depend on that lending cannot be carried out and AD falls.
- Demand. A tight MP makes borrowers less eligible for loans: if i rises, the firms' financial costs also rise (so their profits fall) and, for consumers, their financial wealth is reduced ($\uparrow i \Rightarrow \downarrow$price of shares).

Stock market channel of MP

- The stock market channel of MP collects all the effects on the economy that work through changes in the stock prices (and, in general, in the financial asset prices).
- The following sequence shows how this channel works when the MP consists of an expansionary open market operation.

$$\uparrow \text{M0} \Rightarrow \uparrow \text{M1} \Rightarrow \downarrow i \Rightarrow \uparrow \textit{price of financial assets} \Rightarrow$$
$$\Rightarrow \uparrow \textit{wealth} \Rightarrow \uparrow C \uparrow I \Rightarrow \uparrow AD \Rightarrow \uparrow Y$$

Classical dichotomy

- The classical dichotomy holds that real variables do not depend on nominal variables (for instance, real GDP is not affected by changes in M1). The classical dichotomy is not consistent with the Phillips curve (there is a relationship between a real variable, u, and a nominal variable, π).
- It appears that most macroeconomists (and virtually all textbooks) believe that the classical dichotomy holds in the long run: even though nominal variables may have an impact on real variables in the short run, in the long run that effect vanishes (so, in the long run, MP is ineffective).

Neutrality of money

- Money is neutral if changes in the money stock do not affect real variables (but merely the price level).
- The belief that the classical dichotomy holds in the long run implies the belief that money is neutral in the long run.
- Money neutral in the long run means that more money in the economy only amounts, eventually, to more inflation not more wealth. Mainstream macroeconomics accepts that money is neutral in the long run (that justifies the present role of CBs).

Monetarism

- It is a school of thought that holds that the money stock is the chief determinant of the (short-run) aggregate demand (and, therefore, the nominal GDP, the price level, and the inflation rate).
- Its main policy recommendation is to control the inflation rate by controlling the money stock.
- According to Milton Friedman (1912-2006), monetarism's leading exponent, "Inflation is always and everywhere a monetary phenomenon". Monetarism is based on the quantity equation.

Quantity equation

- The quantity equation (or equation of exchange) is

$$M \cdot V = P \cdot Y$$

  where M = money stock, V = velocity of money (number of times per year a euro turns over), P = price level, Y = real GDP (so $P \cdot Y$ is nominal GDP).

- The equation says that the total number of € spent in a year ($M \cdot V$) equals the nominal value of the goods produced that year (nominal GDP = $P \cdot Y$). That is, the nominal value of everything sold equals the nominal value of everything bought.

Quantity equation & rates of change

- Using lower case letters to designate rates of change, the rates of change version of the quantity equation is
$$m + v \approx \pi + y \, .$$
- If the velocity of money remains constant, $v = 0$. In this case, $m \approx \pi + y$. That is, $\pi \approx m - y$.
- This means that the excess of money growth with respect to the economy's growth is inflation. If the economy does not grow ($y = 0$), then $\pi \approx m$: <u>all the increase in the money stock becomes inflation</u> (more money, higher inflation).

Monetization of budget deficits

- A CB monetizes budget deficits when it purchases debt issued by the government to finance a deficit.
- In practice, monetizing the deficit is like paying the budget deficit by issuing/printing new money. This source of revenue for governments is known as seigniorage.
- Monetization may feed inflation. If the CB does not monetize the deficit and the government finances it by issuing bonds, the interest rate will rise and crowd out private expenditure.

The costs of inflation

- The cost of holding money rises with inflation. A cost of holding money is the interest forgone by not holding an interest-bearing asset. By the Fisher effect, more inflation leads to higher interest rates.
- Inflation as a tax. A rising inflation reduces the purchasing power of money (is like losing money).
- Wealth redistribution. Inflation redistributes wealth between debtors and creditors: it benefits nominal debtors and hurts those receiving fixed nominal payments (like pensioners).

Why are CBs independent?

"The central banker's task is to provide the monetary and credit conditions that achieve the ideal balance between accommodating economic expansion and engendering inflation or deflation. […] Why do we have independent central banks? To provide a barrier between government and the money supply. Why is this necessary? Because doing the right thing for the long-term interests of the people can be very hard to do. Monetary policymakers often have to make decisions that can cause economic pain for real people in the short term, or decide not to do things that could help people out of an immediate bad situation, in order to preserve the welfare of the people over the long run."

 http://www.dallasfed.org/news/speeches/fisher/2008/fs080207.cfm

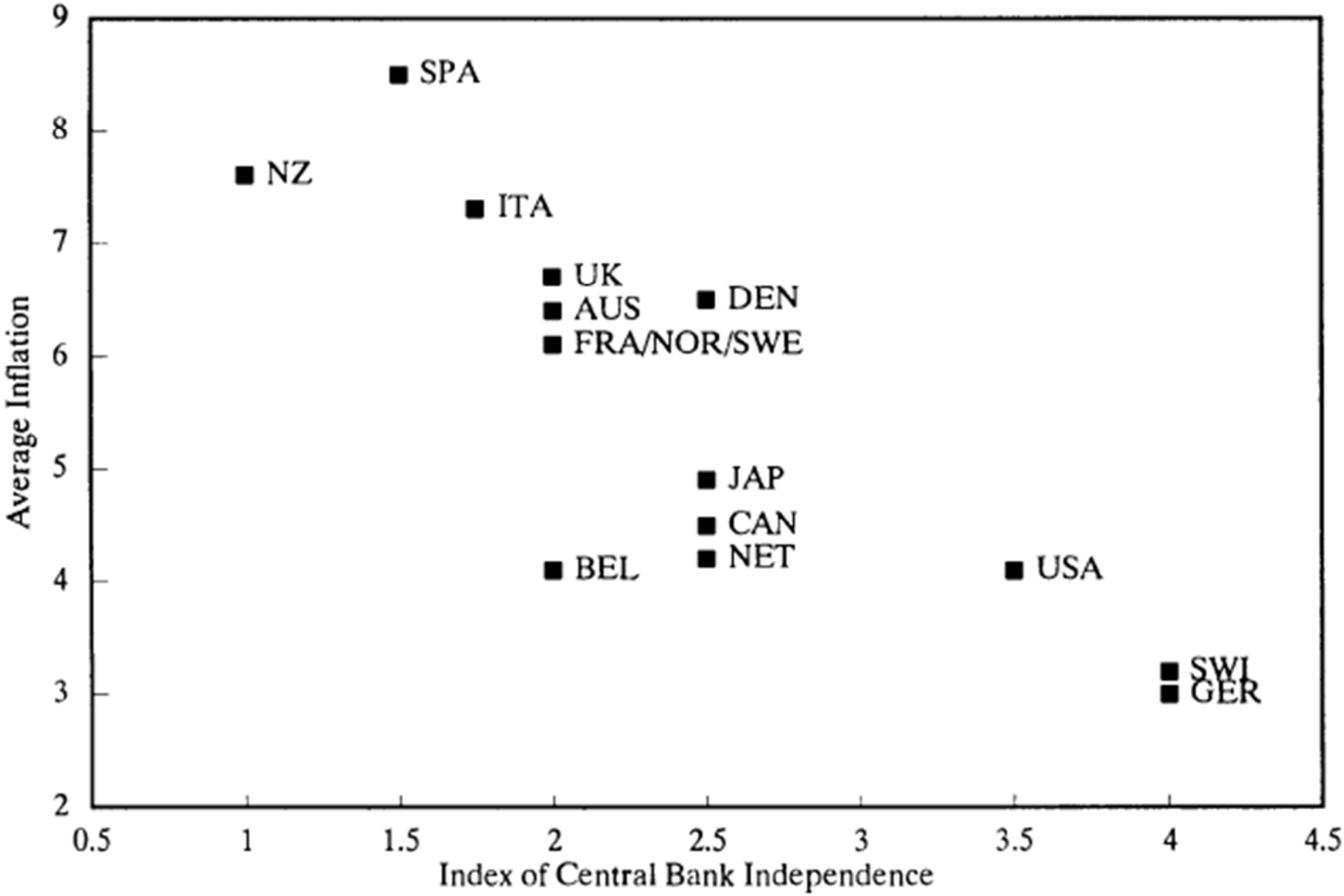
Monetization in Zimbabwe 2004-2009

- Zimbabwe experienced hyperinflation from 2004 to April 2009, with an unemployment rate of 94% at the beginning of 2009, thereby becoming one of the worst economies in the world.

- By December 2008, annual inflation was estimated at 6.5×10^{108} (6.5 octodecillion = 650 million googol) per cent (1 googol = 10 sexdecilliard = 10^{100}).

- In 2007, President Mugabe unsuccessfully declared inflation illegal. The final solution: in April 2009 the home currency (Zimbabwean dollar) was suspended and foreign currencies were adopted instead.

CB independence & inflation (1955-88)



http://www.deu.edu.tr/userweb/yesim.kustepeli/dosyalar/alesinasummers1993.pdf

Interest rates set by CBs (29 Mar 2012)

Name of interest rate	country/region	current rate	direction	previous rate	change
American interest rate FED	United States	0.250 %	↓	1.000 %	12-16-2008
Australian interest rate RBA	Australia	4.250 %	↓	4.500 %	12-06-2011
Banco Central interest rate	Chile	5.000 %	↓	5.250 %	01-12-2012
Bank of Korea interest rate	South Korea	3.250 %	↑	3.000 %	06-10-2011
Brazilian interest rate BACEN	Brazil	9.750 %	↓	10.500 %	03-07-2012
British interest rate BoE	Great Britain	0.500 %	↓	1.000 %	03-05-2009
Canadian interest rate BOC	Canada	1.000 %	↑	0.750 %	09-08-2010
Chinese interest rate PBC	China	6.560 %	↑	6.310 %	07-06-2011
Czech interest rate CNB	Czech Republic	0.750 %	↓	1.000 %	05-07-2010
Danish interest rate Nationalbanken	Denmark	0.700 %	↓	0.800 %	12-15-2011
European interest rate ECB	Europe	1.000 %	↓	1.250 %	12-08-2011
Hungarian interest rate	Hungary	7.000 %	↑	6.500 %	12-20-2011
Indian interest rate RBI	India	8.500 %	↑	8.250 %	10-25-2011
Indonesian interest rate BI	Indonesia	5.750 %	↓	6.000 %	02-09-2012
Israeli interest rate BOI	Israel	2.500 %	↓	2.750 %	01-23-2012
Japanese interest rate BoJ	Japan	0.100 %	↓	0.100 %	10-05-2010
Mexican interest rate Banxico	Mexico	4.500 %	↓	4.750 %	07-17-2009
New Zealand interest rate	New Zealand	2.500 %	↓	3.000 %	03-10-2011
Norwegian interest rate	Norway	1.500 %	↓	1.750 %	03-14-2012
Polish interest rate	Poland	4.500 %	↑	4.250 %	06-09-2011
Russian interest rate CBR	Russia	8.000 %	↓	8.250 %	12-23-2011
Saudi Arabian interest rate	Saudi Arabia	2.000 %	↓	2.500 %	01-19-2009
South African interest rate SARB	South Africa	5.500 %	↓	6.000 %	11-19-2010
Swedish interest rate Riksbank	Sweden	1.500 %	↓	1.750 %	02-16-2012
Swiss interest rate SNB	Switzerland	0.250 %	↓	0.500 %	03-12-2009
Turkish interest rate CBRT	Turkey	1.500 %	↓	1.750 %	12-17-2010

http://www.global-rates.com/interest-rates/central-banks/central-banks.aspx

Eurosystem

- The Eurosystem is the monetary authority of the eurozone, the 17 EU (European Union) members that have adopted the euro as official currency.
- It consists of the ECB (European Central Bank) and the CBs of the eurozone members (the national CBs apply the MP decided by the ECB).
- Primary objective: price stability. Secondary objectives: financial stability and financial integration.
- It is different from the European System of Central Banks (ESCB = ECB + CBs of all the EU members).

European Central Bank

- Established by the Treaty of Amsterdam in 1998.
- Core of the Eurosystem and the ESCB and responsible for the conduct of the MP since 1 Jan 1999.
- In practice, the Eurosystem can be identified with the ECB (both have the same decision-making bodies).

Decision-making bodies of the ECB

- Governing Council. It is the main decision-making body of the ECB. Formulates the MP for the euro-zone (liquidity and key ECB interest rates decisions). Ensures the performance of the tasks assigned to the Eurosystem.

- Executive Board. Implements the MP according to the guidelines and decisions by the GC. Manages the day-to-day business of the ECB.

- General Council. It is a transitional body: will be dissolved once all EU members have adopted the euro. It helps to coordinate eurozone members with the rest of EU members.

Governing Council

- Consists of the six members of the Executive Board plus the 17 governors of the national CBs of the 17 euro area countries.

Executive Board

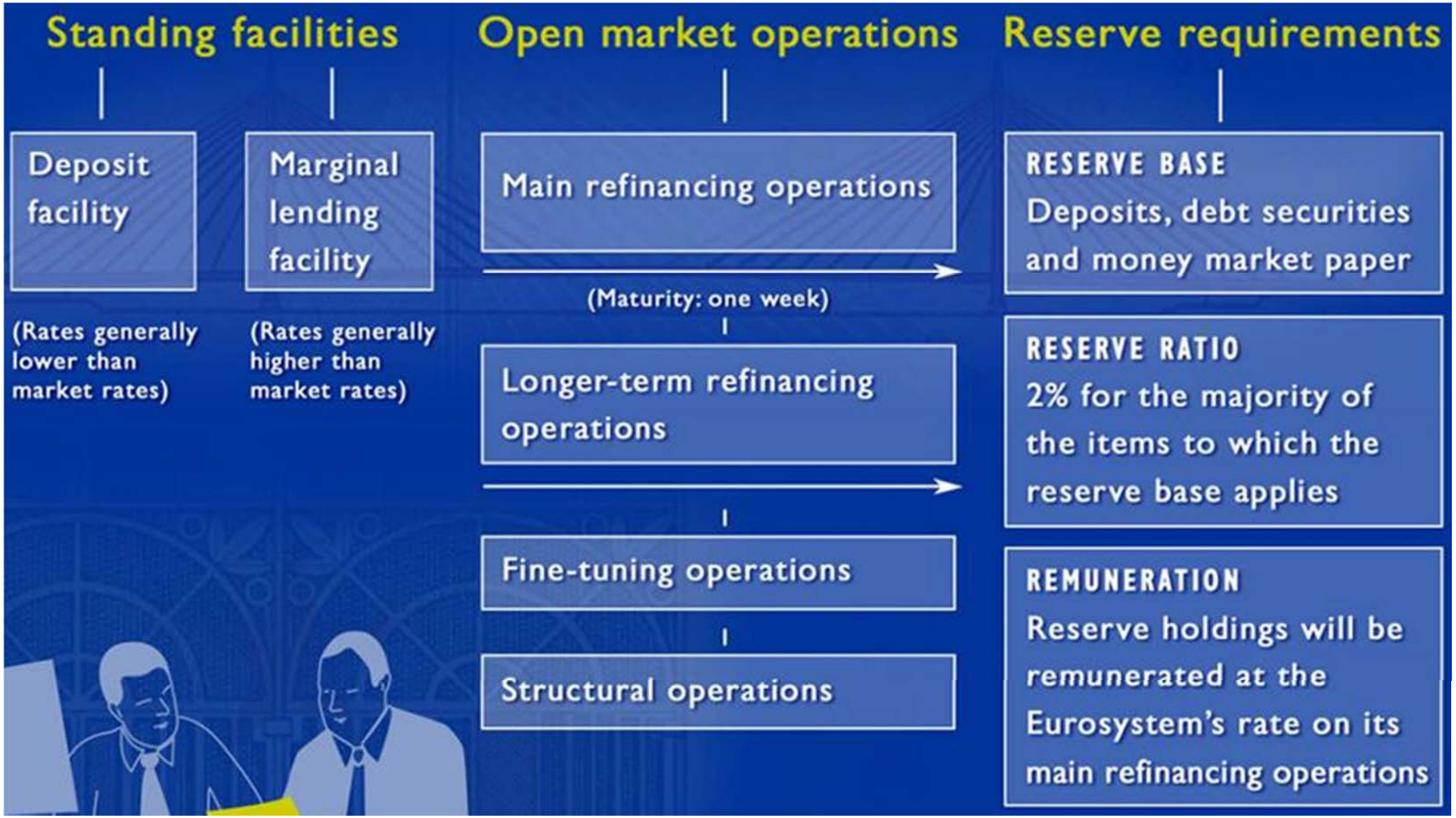
- Consists of 6 members, including the President (Mario Draghi) and the Vice-President.

http://www.ecb.int/ecb/orga/decisions/eb/html/index.en.html

General Council

- Consists of the President and the Vice-President of the ECB plus the governors of the national CBs of the 27 EU Member States.

MP instruments of the ECB



III http://www.ecb.int/ecb/educational/shared/img/presentation_mp.en.zip 60

Reserve requirements

- The minimum reserve system pursues the stabilization of money market interest rates and the regulation of liquidity.
- The reserve ratio is around 2% (1% since 18 Jan 12). Compliance is determined on the basis of averages of reserve holdings during the maintenance period.
- Reserves are remunerated at the average of MRO's rates (1%). Reserve holdings above the minimum are not remunerated. Non-compliance is penalized (payment at least the marginal lending rate, 4.25%).

Reserve maintenance statistics

- From 13/02 to 11/03/2008 average required reserves was 200 billion €, the remuneration rate was 4.1%, and the penalization rate 7.5%.
- From 21/01 to 10/02/2009: 221 billion €, 2%, 5.5%.
- From 08/12/2009 to 19/01/2010, 210 billion €, 1%, 4.25% .
- In February 2011: 212 billion €, 1%, and 4.25%.
- From 15/02 to 13/03/2012, 104.2 billion €, 1%, and 4.25%

http://www.ecb.int/mopo/implement/mr/html/index.en.html

Standing facilities

- "Standing facilities are aimed at providing and absorbing overnight liquidity, signal the general stance of MP and bound overnight market interest rates. Two standing facilities are available to eligible counterparties on their own initiative."
- Counterparties (banks) can use: (i) the marginal lending facility to obtain overnight liquidity from the national CBs against eligible assets (the interest rate on the MLF is a ceiling for overnight market rates); or (ii) the deposit facility to make overnight deposits with the national CBs (the interest rate on the DF is normally a floor rate).

Types of OMO by the ECB

- According to aim, regularity, and procedures, OMOs are classified into four categories: main refinancing operations (MROs), longer-term refinancing operations, structural operations, and fine-tuning operations.

- Five types of instruments are available to conduct OMOs: reverse transactions (the most important instrument), outright transactions, issuance of debt certificates, foreign exchange swaps, and the collection of fixed-term deposits.

http://www.ecb.int/pub/pdf/other/gendoc2006en.pdf

Open market operations by the ECB

MP operations	*Maturity/frequency*	*Liquidity*
Main refinancing operations	1 week/weekly	provision (RT)
Longer-term refinancing operations	3 months/monthly	provision (RT)
Structural operations	not standardized	provision/absorption
Fine-tuning operations	not standardized	provision/absorption
Reverse transactions		provision/absorption
Outright transactions	not standardized	provision/absorption
Foreing exchange swaps	not standardized	provision/absorption
Issuance of debt certificates	< 12 months/…	absorption
Collection of fixed-term deposits	not standardized	absorption

http://www.ecb.int/mopo/implement/omo/html/index.en.html

Reverse transactions and MROs

- "Reverse transactions refer to operations where the Eurosystem buys or sells eligible assets under repurchase agreements or conducts credit operations against eligible assets as collateral."
- "The MROs are the most important OMOs conducted by the Eurosystem, playing a pivotal role in pursuing the aims of steering interest rates, managing the liquidity situation in the market and signalling the stance of MP. They also provide the bulk of refinancing to the financial sector."

http://www.ecb.int/pub/pdf/other/gendoc2006en.pdf Chapter 3

MROs

- MROs constitute the basic tool of MP.
- They are liquidity-providing reverse transactions.
- Executed regularly each week.
- Normally have a maturity of one week.
- Executed in a decentralized manner by the national CBs of the Eurosystem.
- Executed in the form of standard tenders: a fixed rate (volume) tender or a variable rate (interest) tender.

Fixed/variable rate tender MROs

- In a fixed rate tender MRO, the ECB specifies the interest rate in advance. Participants next bid the amount of money they would like to transact at the given interest rate.
- In a variable rate tender MRO, participants "bid the amounts of money and the interest rates at which they want to enter into transactions with the national central banks".
- Since October 2008, MROs are conducted at fixed rates (up to the 30th of March 2012, 1%).

Example of a fixed rate tender MRO

- The ECB wants to provide liquidity and decides to allot 300 million € at a given interest rate *i*.
- Only four counterparties (banks) submit a bid: B1 = 160, B2 = 80, B3 = 100, and B4 = 60 million €. Thus, total demand is 400. The percentage of allotment is 300/400 = 75%.
- Each bank is allotted the 75% of its bid: B1 receives 120 = 160·75%; B2 gets 60 = 80·75%; B3 is assigned 75 = 100·75%; and B4 obtains 45 = 60·75%.

Fixed rate tender with full allotment

- The late-2000s financial crisis was triggered by a liquidity shortfall that caused some large US financial institutions to collapse.
- To enhance the provision of liquidity, the Governing Council decided on the 15th of October 2008 to conduct all longer-term refinancing operations through a fixed rate tender procedure with full allotment. In March 2012, MROs with full allotment are still been announced.

http://www.ecb.int/mopo/implement/omo/pdf/EUR_USD_CHF_calendar.pdf
http://www.ecb.int/press/pr/date/2008/html/pr081015.en.html
http://en.wikipedia.org/wiki/Late-2000s_financial_crisis

Example of a variable rate tender MRO

- The ECB decides to provide liquidity by an amount of 70 million €. Only two banks bid, B1 & B2. The bid consists of a list of interest rates and amounts demanded at each rate; see the next slide. For instance, at 5%, B1 asks for 7 million € and B2 asks for 3. Column 4 indicates total bids: 10 at 5%; 30 at 4%; 50 at 3%; and 110 at 50. Column 5 displays cumulative bids: up to 5%, 10; up to 4%, 40; up to 3%, 90; and up to 2%, 200.

- Banks ask for 200, whereas the ECB only offers 70. The ECB determines the allotment as follows.

Example of a variable rate tender MRO

i	*bids by banks*		*total bids*	*cumu lative bids*	*allotment*		
	B1	B2			B1	B2	
5%	7	3	10	10	7	3	
4%	10	20	30	40	10	20	
3%	20	30	50	90	20·60% = 12	30·60% = 18	
2%	40	70	110	200	–	–	
Total *The ECB wants to provide 70*					29	41	70

Example of a variable rate tender MRO

- The ECB starts with the highest rate (5%) and fully allots the bids (10). Only 60 remain to be assigned.
- At the following rate (4%), banks ask for 30. Since there are 60 to be allocated, banks receive 30, so there are only 30 left to be assigned.
- At 3% banks ask for 50. Since there are only 30 to be assigned, the percentage of allotment is 30/50 = 60%. As in the fixed rate tender, this percentage is applied to the bids at 3%.
- The table in the previous slide summarizes the results: B1 is allotted 29 and B2 is assigned 41.

Marginal interest rate of the tender

- It is given by the smallest interest rate at which some bid is (maybe partially) satisfied.
- It is obtained by finding the first cumulative bid larger than the amount the ECB wants to inject. In the case at hand, that cumulative bid is 90.
- The interest rate associated with that bid defines the marginal interest rate of the tender (above that rate, full allotment holds: all wants are given what they ask for). In the present example, it is 3%.

Interest rates applied to allotments

- There are two basic procedures to determine the interest rate applied to allotments.
- If the allotment procedure follows a multiple rate (American) auction, B1 receives 7 (at 5%) + 10 (at 4%) + 12 (at 3%) = 29 and B2 gets 3 (at 5%) + 20 (at 4%) + 18 (at 3%) = 41.
- If the allotment procedure follows a fixed rate (Dutch) auction, B1 receives 29 at the marginal rate (3%) and B2 gets 41 also at the marginal rate (3%).

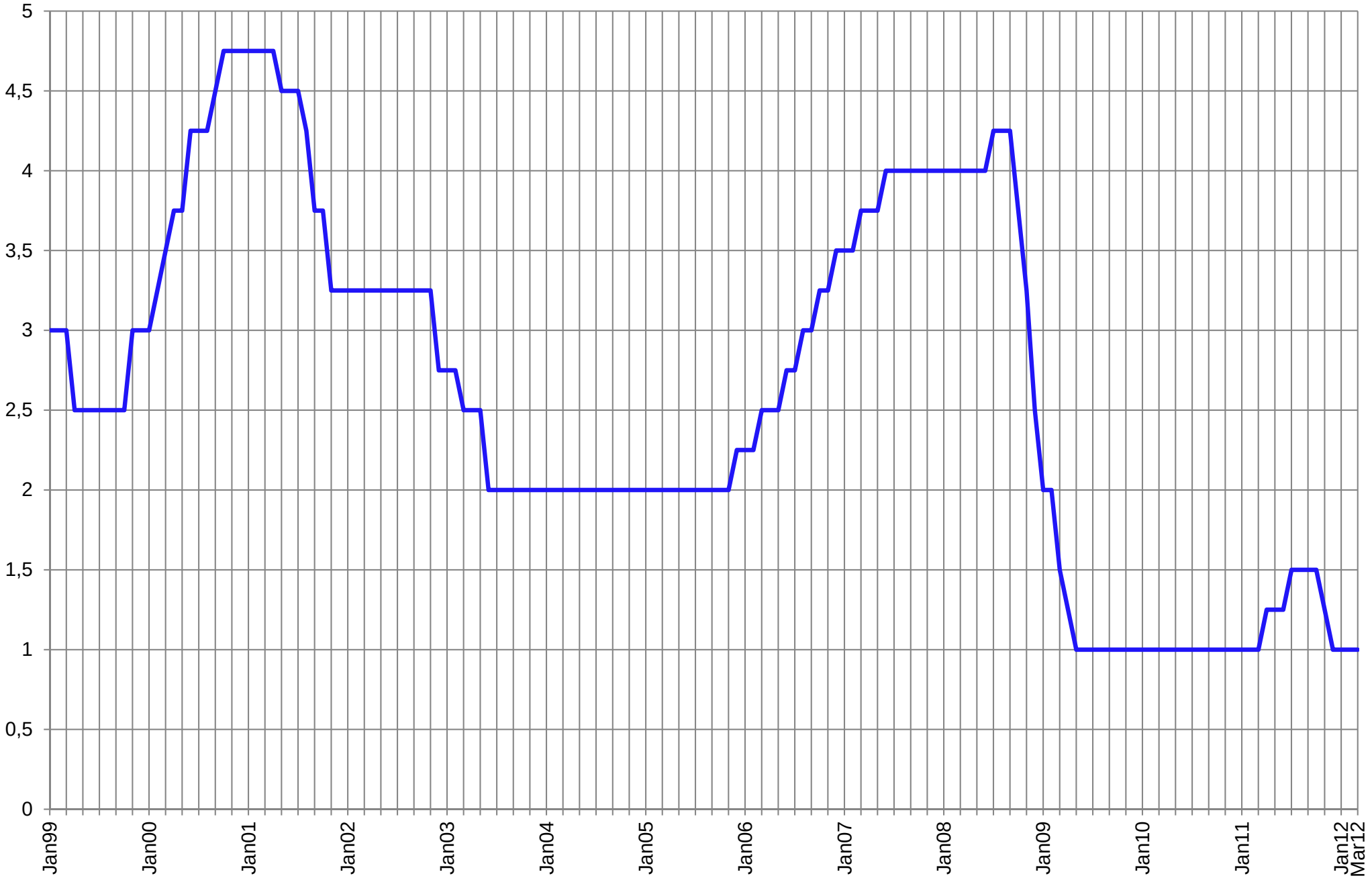
Interest rates set by the ECB

- The next slide shows the 3 interest rates set by the CB. The key one is the interest rate of MROs (1%).
- Column 2 shows the interest rate on the deposit facility (what banks obtain from an overnight deposit at the national CBs: 0.75%) and column 5 the interest rate on the marginal lending facility (what banks must pay for overnight lending: 1.75%).
- Column 3 displays the interest rates associated with fixed rate MROs (the procedure currently adopted) and column 4 the minimum bid rate accepted in a variable rate MRO.

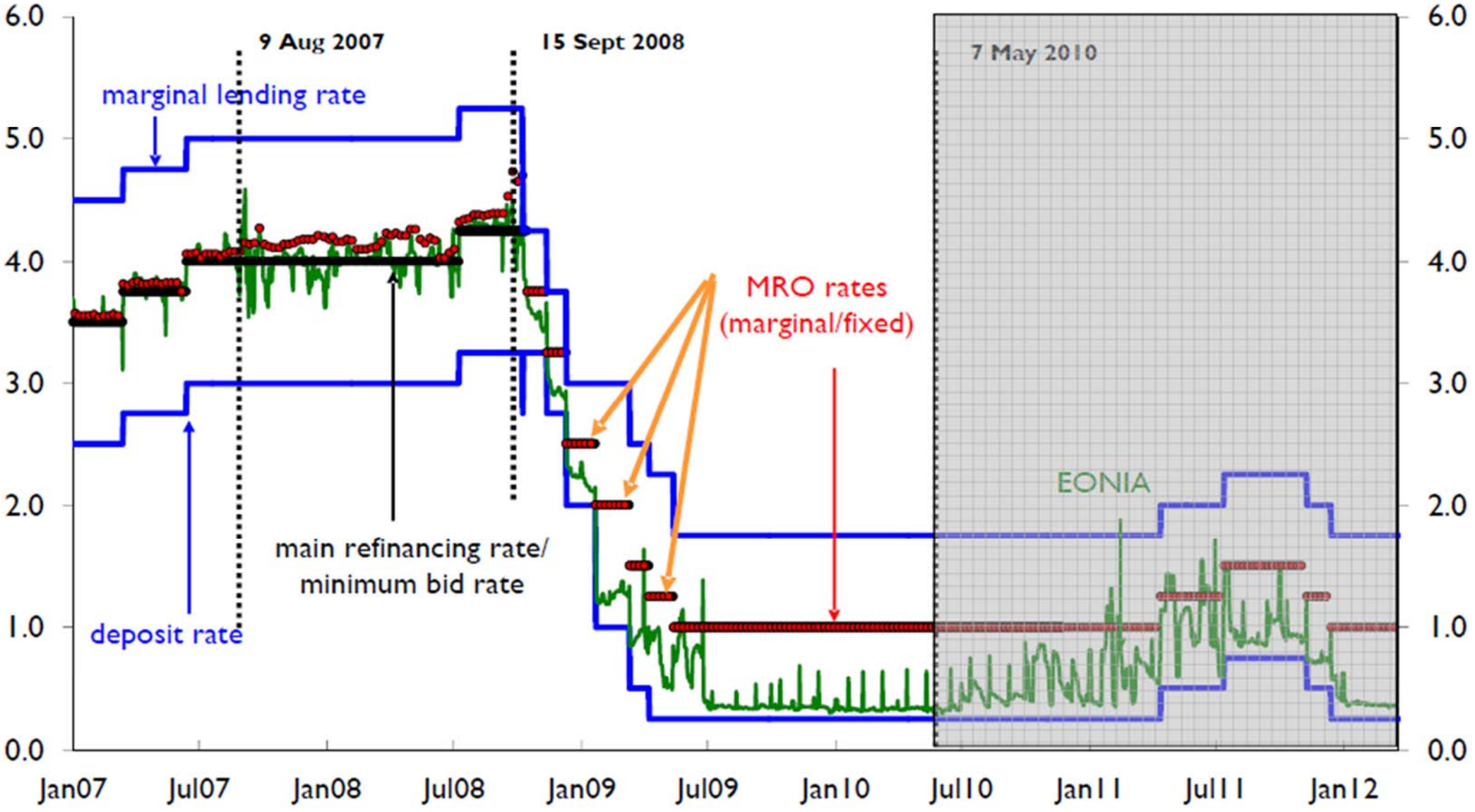
	Deposit facility	*MRO (fixed rate)*	*MRO (minimum bid rate)*	*Marginal lending facility*
14 Dec 2011	0.25	1		1.75
9 Nov 2011	0.5	1.25		2
13 July 2011	0.75	1.5		2.25
13 Ap 2011	0.5	1.25		2
13 May 2009	0.25	1		1.75
8 Apr 2009	0.25	1.25		2.25
11 Mar 2009	0.50	1.50		2.50
21 Jan 2009	1	2		3
10 Dec 2008	2	2.5		3
12 Nov 2008	2.75	3.25		3.75
15 Oct 2008	3.25	3.75		4.25
9 Oct 2008	3.25			4.25
8 Oct 2008	2.75			4.75
9 Jul 2008	3.25		4.25	5.25
13 Jun 2007	3		4	5
14 Mar 2007	2.75		3.75	4.75
13 Dec 2006	2.5		3.5	4.5

http://www.ecb.int/stats/monetary/rates/html/index.en.html

ECB main refinancing rate, 1999-2012

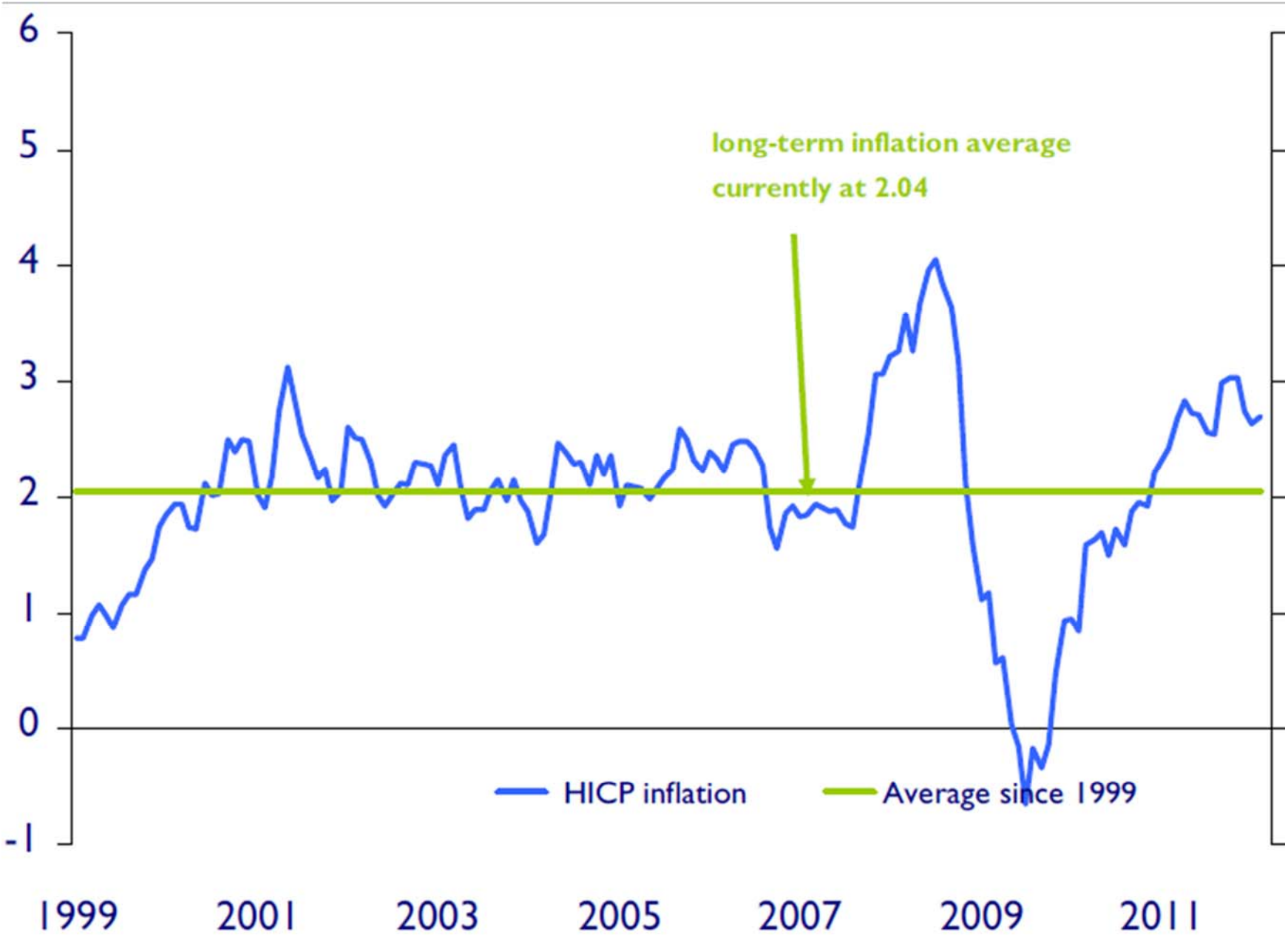


Post-Lehman monetary policy response



http://www.ecb.int/press/key/date/2012/html/sp120326.pdf

Inflation rate, Eurozone, 1999-2012



http://www.ecb.int/press/key/date/2012/html/sp120326.pdf