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Principles of Economics and Management I

Session 11 · Monetary Policy

Introduction



Where We Came From

We already know what money is, who creates it and what the **Eurosystem** is.

Today we see what the ECB **does** with that power: how it sets the interest rate and why.

This is the session that connects everything we have seen to **investment portfolios**. 



Today's Map

1.  The ECB's objective and instruments
2.  The Taylor rule
3.  The transmission mechanism
4.  Quantitative easing and the zero lower bound
5.  Banking regulation and the policy mix

Part 1 · Objective and Instruments

The ECB's Objective

The ECB's primary mandate is **price stability**: inflation close to **2%** over the medium term.

Beyond that, it supports employment and growth, as long as this does not put prices at risk.

The central tool for this is the **interest rate**. 



The Instruments



Policy rates: the main refinancing rate and the deposit rate. They are the price at which banks fund themselves at the ECB.

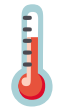


Open market operations: buying and selling securities to manage liquidity.



Minimum reserves: the fraction of deposits banks must hold.

Source: OpenStax *Macro* 3e, [§15.3](#) “How a Central Bank Executes Monetary Policy”: “Open Market Operations”, “Changing the Discount Rate” and “Changing Reserve Requirements”. Names differ in the euro area, instruments do not.



Expansionary or Contractionary



Expansionary: lowering rates. Cheaper credit, more consumption and investment. Against recession.

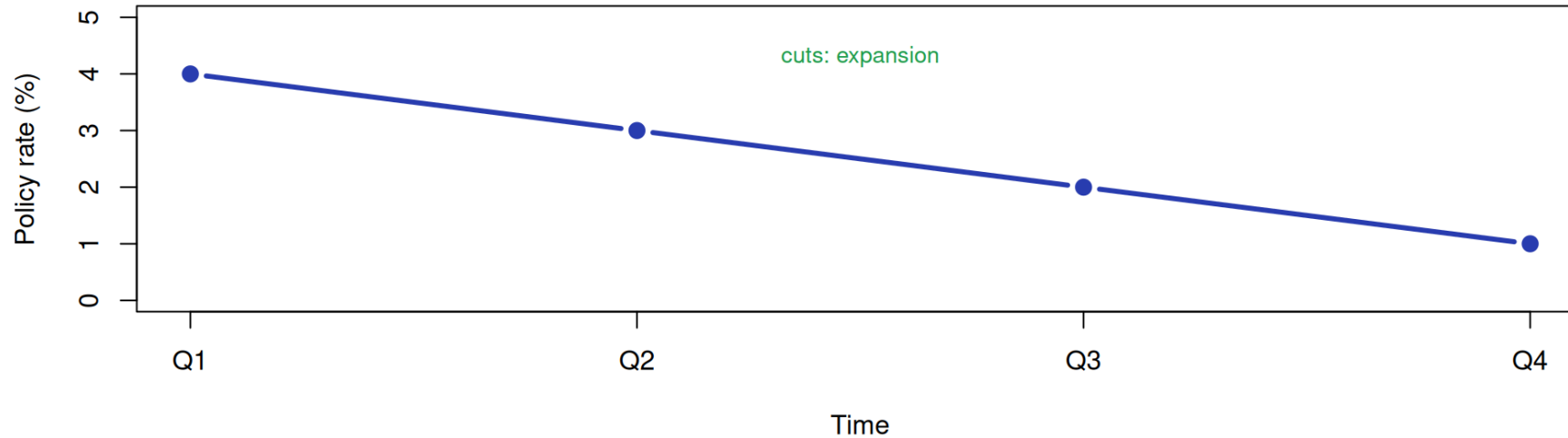


Contractionary: raising rates. More expensive credit, cooling demand. Against high inflation.

This is what the ECB did in 2022 to 2023: it raised rates to stop inflation. 

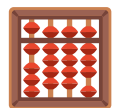


One Instrument, Two Directions



A sequence of cuts is expansionary policy; a sequence of hikes is contractionary.

 Source: OpenStax *Macro* 3e, [§15.4](#) "Monetary Policy and Economic Outcomes", which labels four decades of actual central bank episodes as expansionary or contractionary and asks what followed.

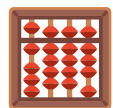


The Taylor Rule

How do you decide the right level for the rate? A practical rule, from John Taylor:

$$i = r^* + \pi + 0.5(\pi - \pi^*) + 0.5(y - y^*).$$

The rate rises if inflation π is above the target π^* , or if output y is above potential y^* .



The Taylor Rule

Inflation **above** target: the term $(\pi - \pi^*)$ is positive, and the rule calls for **higher** rates.

Economy in **recession** ($y < y^*$): the last term is negative, and the rule calls for **lower** rates.

It is a useful description of how many central banks **actually** behave. 

 The Taylor rule is **not** in the OpenStax books. For it, go to Blanchard, in the chapters the syllabus lists for this session. The original is Taylor (1993), “Discretion versus Policy Rules in Practice”.



The Taylor Principle

Look closely at the coefficient on inflation. In the rule, i responds to π with weight $1 + 0.5 = 1.5$.

What matters for the economy is the **real** rate $r \approx i - \pi$. So a one point rise in inflation must raise i by **more than one point**, or the real rate **falls**.

Taylor principle: respond to inflation more than one for one, otherwise the policy meant to fight inflation is accidentally loosening.

Violate it and inflation becomes self-reinforcing: higher inflation, lower real rate, more demand, higher inflation still. Several inflationary episodes of the 1970s look exactly like this. 🔥

? Multiple Choice 1

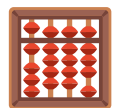
Inflation rises by 2 points and the central bank raises the nominal rate by 1 point. Monetary policy has become:

- A. Tighter, since the nominal rate rose.
 - B. Neutral, since the rate moved in the right direction.
 - C. Impossible to judge without the output gap.
 - D. Looser, because the real rate fell by 1 point.
- ✓ **D.** The real rate is what the economy responds to: $r \approx i - \pi$, so it fell from its starting point. Moving in the right direction is not enough; you must move by **more than one for one**. That is the Taylor principle.

? Multiple Choice 2

Under the Taylor rule, the policy rate rises when:

- A. Inflation is below target.
 - B. Public debt falls.
 - C. Inflation is above target, or output is above potential.
 - D. Unemployment is above the natural rate.
-  **C.** Both gaps enter with positive weight. Note D describes a **negative** output gap, which pushes the rate the other way.



Numerical Question

Taylor rule $i = r^* + \pi + 0.5(\pi - \pi^*) + 0.5(y - y^*)$, with $r^* = 1$ and $\pi^* = 2$.

- a) Find i when $\pi = 5$ and the output gap is zero.
- b) Find i when $\pi = 5$ and the output gap is -3 .
- c) Compute the implied **real** rate in each case.
- d) In case (b), is policy tight or loose relative to r^* ?



Solution

a) $i = 1 + 5 + 0.5(3) + 0 = 7.5$ percent.

b) $i = 1 + 5 + 1.5 + 0.5(-3) = 6$ percent. The recession pulls the rate down even with inflation far above target.

c) $r \approx i - \pi$: that is 2.5 percent in (a) and 1 percent in (b).

d) In (b), $r = 1 = r^*$: exactly **neutral**. The rule is trading off an inflation overshoot against a recession, and lands on doing neither. 

Part 2 · Transmission and Unconventional Instruments



The Transmission Mechanism

How does a rate set in Frankfurt reach the real economy?

Through a chain:

Policy rate → lending and deposit rates → **credit and investment** → aggregate demand → **output and inflation**.

Every link has lags and uncertainty. Monetary policy acts with a **delay**. 

 Source: OpenStax *Macro* 3e, [§15.4](#), “The Effect of Monetary Policy on Interest Rates” and “The Effect of Monetary Policy on Aggregate Demand”.



The Transmission Mechanism

The chain above is really five parallel routes, and they do not all work at once:



Interest rate: borrowing costs move, so investment and durable consumption move.



Credit: banks tighten or loosen lending standards, which bites hardest on small firms with no market access.



Asset prices: discount rates move, so bonds, equities and housing reprice, and wealth moves with them.



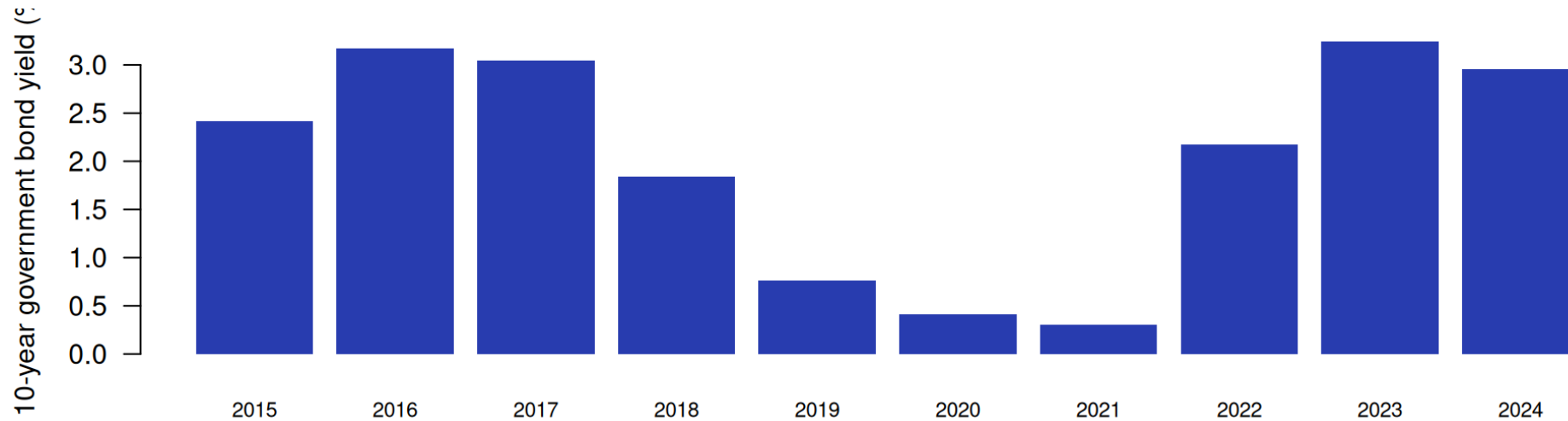
Exchange rate: higher rates attract capital and the euro **appreciates**: one euro buys more dollars, so imports get cheaper and exports dearer. Session 13 does the currency market properly.



Expectations: what the ECB says about **future** rates moves long rates today. This channel works before any rate has changed at all.



The End of the Low Rate Era



Portuguese 10-year government bond yields: a low in 2021, then a sharp rise with the ECB's tightening. Source: Eurostat. ▲



The Asset Price Channel

Lowering rates also **raises** asset values.

Lower rates raise the price of bonds and, in general, of equities (future flows discounted at a lower rate).

That is why markets react so strongly to every ECB decision. 



Quantitative Easing

And what happens when rates are already close to **zero** and cannot fall further?

Quantitative easing (QE): the central bank buys assets on a large scale (mostly debt) to inject liquidity and lower long-term rates.

The ECB used this on a large scale after 2015 and during the pandemic. 🦠

📖 Source: OpenStax *Macro* 3e, §15.3, “Quantitative Easing”, written around the Federal Reserve’s programmes after 2008.



The Zero Lower Bound

Nominal rates cannot fall much below zero (otherwise people hold cash instead).

Effective lower bound: the point at which lowering rates further stops working.

That is why QE and *forward guidance* became important tools. 

? Multiple Choice 3

Quantitative easing consists of:

- A. Lowering the policy rate below zero.
 - B. The central bank buying assets, mostly government debt, creating reserves.
 - C. Raising banks' minimum reserves.
 - D. Issuing larger quantities of physical currency.
- ☒ **B.** It is large-scale asset purchases, used when the policy rate can no longer fall.

? Multiple Choice 4

The effective lower bound is a problem because:

A. With i stuck near zero, falling inflation raises the real rate exactly when it should fall.

B. Inflation becomes mathematically impossible.

C. Banks are forbidden from lending at low rates.

D. The ECB loses its independence at low rates.

✓ **A.** The instrument is not merely exhausted: $r \approx i - \pi^e$ then moves the **wrong way** on its own, and deflation tightens policy without anyone deciding to tighten.

Discussion Question

The nominal rate is at $i = 0\%$ and expected inflation is $\pi^e = -1\%$.

- a) Compute the real interest rate.
- b) Explain why this is a problem for the central bank.
- c) Inflation expectations fall further, to -2% . What happens to r ?
- d) Name two tools that still work at this point, and say which channel each uses.



Solution

a) $r \approx i - \pi^e = 0 - (-1) = +1\%$.

b) Stimulus needs a **negative** real rate, but i cannot go below zero while deflation pushes r up. Policy tightens exactly when it should loosen.

c) r rises to $+2\%$. Worse still, this is **self-reinforcing**: tighter policy weakens demand, which lowers expectations further. A deflationary spiral. 

d) **QE**, working through the asset price channel by pushing down long rates directly. And **forward guidance**, working through the expectations channel by promising low rates for longer, which raises π^e and so lowers r . 

Part 3 · Limits, Regulation and the Policy Mix



The Limits of Monetary Policy



Lags: the effects take months to a year to show up.



One rate for 20 countries: what suits Germany may not suit Greece. This is the challenge of a monetary union.



Time inconsistency: the ECB always gains, today, from a small surprise inflation. Everyone knows it, so nobody would believe a promise not to. Rules, a published target and independence exist to make the promise **binding**. 

 Source: OpenStax *Macro* 3e, [§15.5](#) “Pitfalls for Monetary Policy”, which also covers excess reserves, unstable velocity and asset bubbles as limits on what the instrument can do.



The Union-Specific Problem

One rate is set in Frankfurt, but it does not arrive in every country the same way.

Sovereign yields can diverge sharply on the same policy rate: the **spread**, the extra interest a country pays over Germany, widens. In 2011 and 2012 the ECB's stance was one thing in Germany and quite another in Portugal, Spain and Italy.

This is **fragmentation**: the transmission mechanism itself breaks along national lines, and monetary policy stops being single in practice even though it is single on paper.

Hence the instruments aimed specifically at it, and the argument that a monetary union also needs some common fiscal policy. 



Banking Regulation

The central bank and other supervisors impose rules on banks.



Minimum reserves and **capital ratios**: making sure banks can absorb losses.

The objective is **financial stability**: preventing the failure of one bank from infecting the whole system. 

 Source: OpenStax *Macro* 3e, [§15.2](#) “Bank Regulation”, “Bank Supervision” and “Deposit Insurance”.



Two Levers, One Objective

The other lever is fiscal policy, spending and taxes, which is the next session.

Monetary policy (interest rates) and **fiscal** policy (spending and taxes) are the two great levers of macroeconomics.

Ideally, they are coordinated. In the euro area, monetary policy is single, but fiscal policy belongs to each country. 



Why It Matters for You

Anticipating ECB decisions is central to portfolio management: bonds, equities and currencies all react to rates.

Understanding the Taylor rule and the transmission mechanism means reading the map that moves markets. 

? Multiple Choice 5

Germany is booming while Portugal is in recession. The single ECB rate:

- A. Can be set separately for each country by its national central bank.
 - B. Automatically adjusts for national conditions through the Taylor rule.
 - C. Is a compromise, so it is too loose for one and too tight for the other.
 - D. Is irrelevant, since fiscal policy is national anyway.
- ✓ **C.** This is the core cost of a monetary union: one instrument, many cycles. Adjustment has to come from somewhere else, which is why national **fiscal** policy carries the load in the euro area.

? Multiple Choice 6

The ECB signals that rates will stay low for longer than markets expected. Even before any rate moves, you expect:

- A. Bond prices to fall, since low rates mean low coupons.
 - B. No reaction until the rate actually changes.
 - C. Equities to fall, since low rates signal a weak economy.
 - D. Long rates to fall and asset prices to rise, through the expectations channel.
- ✓ **D.** A long rate is essentially an average of expected future short rates. Change the expected path and long rates move today, which reprices everything discounted off them. This is why the press conference moves markets more than the decision does.

Discussion Question

The ECB cuts its policy rate in response to a recession.

- a)** Trace the transmission through to output.
- b)** Name two other channels that operate in parallel.
- c)** Why does the effect arrive with a lag, and roughly how long?
- d)** Why might the cut fail to work at all?



Solution

- a) Policy rate falls, lending rates follow, credit expands, investment and durable consumption rise, aggregate demand expands, firms produce and hire more.
- b) **Asset prices** (lower discount rates raise wealth) and the **exchange rate** (the euro depreciates, helping exports). The expectations channel runs alongside both.
- c) Every link takes time: banks reprice, firms plan, projects are built. The usual estimate is several quarters up to about two years for the full effect. ⌚
- d) If banks will not lend or nobody wants to borrow, the chain breaks at the first link. This is the euro area after 2008: rates near zero and credit flat. ✅

Wrap-Up

What to Take From This Session

The ECB's mandate is **price stability**: inflation close to 2% over the medium term.

 The **Taylor rule** summarizes how the rate responds to inflation and to the output gap.

 Transmission runs through credit, **asset prices** and the exchange rate, with a lag.

 At the **zero lower bound**, the rate stops reaching far enough and tools like QE come in.



To Review

OpenStax *Macro* 3e, the sections this session used:

- **Ch. 15, Monetary Policy and Bank Regulation:** [§15.2](#) · [§15.3](#) · [§15.4](#) · [§15.5](#)

For the formal treatment: Blanchard, Amighini and Giavazzi, chapters 4, 5, 21 and 22. The Taylor rule is only in Blanchard.

Then problem set 11.

Next Session

Fiscal Policy.

The other lever: what the state spends, what it collects, and what that does to the **debt**. 

See you next week. 