

ECON UN3265 ▪ MONEY AND BANKING ▪ SUMMER 2026 ▪ SESSION 8

CHAPTER 15

Tools of Monetary Policy

Ritsu Kitagawa

Columbia Business School

Created: June 26, 2026 ▪ Last modified: June 26, 2026

Outline

The Market for Reserves and the Federal Funds Rate

Conventional Monetary Policy Tools

Nonconventional Tools and the ECB

Wrap-up

Reading and objectives

- ▶ Mishkin, *The Economics of Money, Banking, and Financial Markets*, 13th ed.
- ▶ This deck: **Chapter 15** — Tools of Monetary Policy.
- ▶ Chapter 14 showed how the base moves the money supply. Now we get concrete: what *levers* does the Fed pull, and how does each one move the **federal funds rate** — the operating target at the center of modern policy?

Learning objectives

- 15.1** Build the market for reserves; show how policy moves the federal funds rate.
- 15.2** Explain the conventional tools and the advantages/limits of each.
- 15.3** Describe the nonconventional tools used when conventional policy runs out.
- 15.4** Compare the Fed's toolkit with the ECB's.

PART 1

The Market for Reserves and the Federal Funds Rate

The federal funds rate, and the demand for reserves

The **federal funds rate** (i_{ff}) is the interest rate on overnight interbank loans of reserves. Modern policy works by steering it.

- ▶ Banks hold reserves partly as **insurance against deposit outflows**. The cost of holding them is the funds rate forgone, *net of* the interest the Fed pays on reserves (i_{or}).
- ▶ As i_{ff} falls (with i_{or} fixed below it), the opportunity cost of holding reserves falls, so the **quantity demanded rises** — a downward-sloping demand curve.
- ▶ The demand curve goes **flat (infinitely elastic) at i_{or}** : no bank will lend to another below what the Fed pays risk-free.

Mishkin Ch. 15, Section 15.1.

The supply of reserves

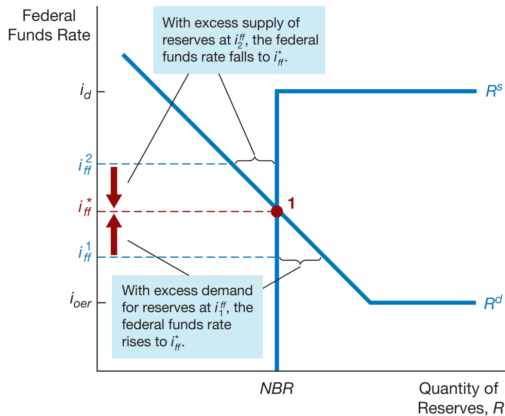
Supply has two components: $R^s = NBR + BR$ (nonborrowed plus borrowed).

- ▶ **Nonborrowed reserves** are set by the Fed through open market operations — the **vertical** part of the supply curve.
- ▶ **Borrowed reserves** come from the discount window at the discount rate i_d . Borrowing from the Fed is a *substitute* for borrowing from other banks.
- ▶ If $i_{ff} < i_d$, no bank borrows from the Fed: $BR = 0$ and supply is vertical.
- ▶ As i_{ff} rises toward i_d , banks borrow more and relend — supply becomes **horizontal (perfectly elastic)** at i_d .

The corridor

Demand flattens at i_{or} (the floor); supply flattens at i_d (the ceiling). The funds rate is trapped between them — a built-in corridor.

Figure 1 — Equilibrium in the market for reserves



Mishkin Ch. 15, Figure 1. Equilibrium i_{ff}^* sits where vertical supply meets downward-sloping demand, between the i_d ceiling and the i_{or} floor.

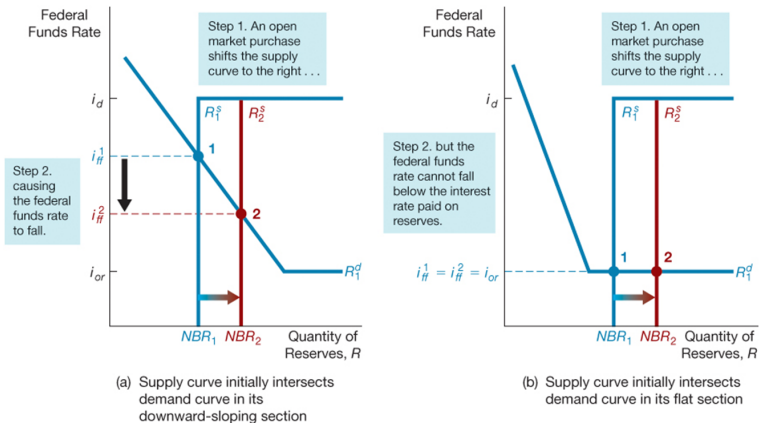
How the tools move the funds rate

Each conventional tool shifts one curve — but the effect depends on *where* the curves cross.

- ▶ **Open market purchase** shifts supply right $\rightarrow i_{ff}$ *falls* (if intersection is on the downward-sloping part). On the flat part, **no effect**.
- ▶ **Discount rate change** matters only if supply and demand meet on the *horizontal* part of supply; on the vertical part, changing i_d does nothing.
- ▶ **Reserve requirement** $\uparrow$ raises reserve demand $\rightarrow i_{ff}$ *rises*.
- ▶ **Interest on reserves** $\uparrow$ raises the demand-curve floor $\rightarrow i_{ff}$ *rises* (when the floor is binding).

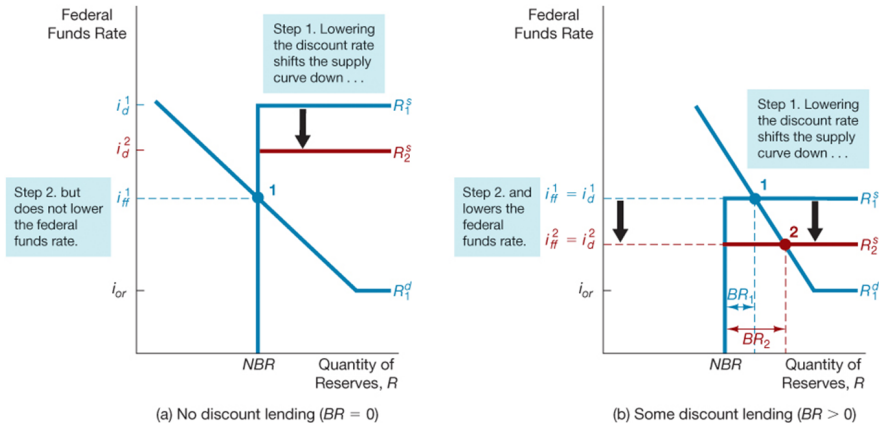
Mishkin Ch. 15, Section 15.1.

Figure 2 — Response to an open market operation



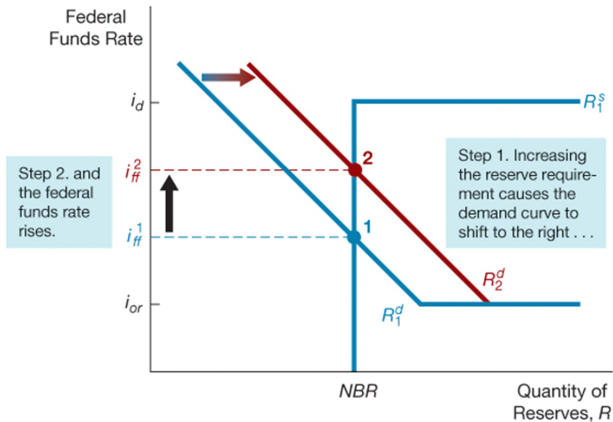
Mishkin Ch. 15, Figure 2. A purchase shifts supply right; the funds rate falls only when the curves cross on demand's downward slope.

Figure 3 — Response to a change in the discount rate



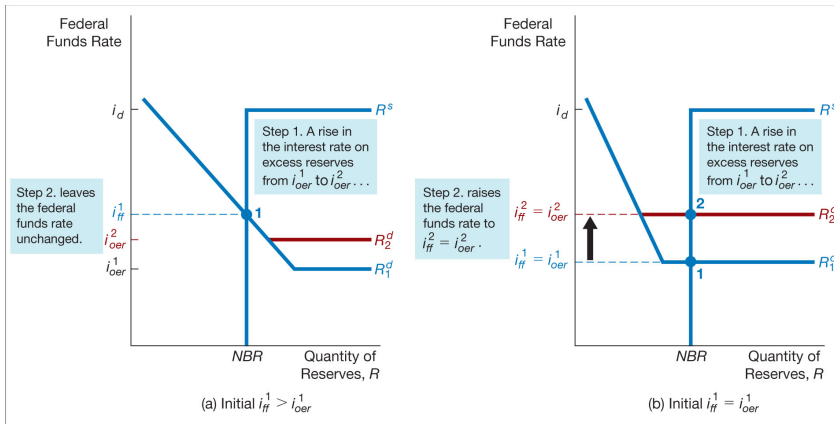
Mishkin Ch. 15, Figure 3. Lowering i_d moves the supply ceiling; it bites only when banks are actually borrowing (the horizontal segment).

Figure 4 — Response to a change in required reserves



Mishkin Ch. 15, Figure 4. A higher requirement raises reserve demand, pushing the funds rate up.

Figure 5 — Response to a change in the interest rate on reserves



Mishkin Ch. 15, Figure 5. Raising i_{oer} lifts the demand-curve floor — the linchpin of the post-2008 “floor system.”

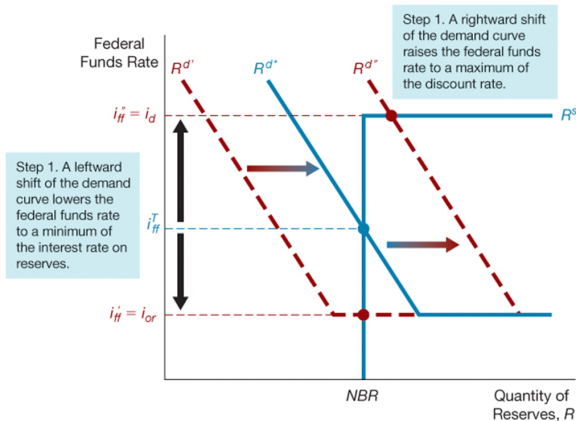
Why the operating procedures limit volatility

Putting the corridor to work, the Fed's design keeps the funds rate from swinging wildly.

- ▶ The **discount window** caps the funds rate at i_d : if interbank rates spike, banks just borrow from the Fed instead.
- ▶ **Interest on reserves** puts a floor at i_{or} : banks will not lend below the risk-free rate the Fed pays.
- ▶ Together they form a **band** $[i_{or}, i_d]$ inside which day-to-day shocks to reserve supply barely move the rate.

Mishkin Ch. 15, Section 15.1; Application.

Figure 6 — How operating procedures limit fluctuations



Mishkin Ch. 15, Figure 6. With a floor at i_{or} and a ceiling at i_d , shifts in reserve supply leave the funds rate nearly unchanged.

PART 2

Conventional Monetary Policy Tools

Open market operations

The **dominant** tool in normal times. Executed by the trading desk at the New York Fed.

- ▶ **Dynamic** operations change the level of reserves; **defensive** operations offset other disturbances (e.g. float, Treasury balances).
- ▶ Conducted with **primary dealers** via TRAPS (Trading Room Automated Processing System).
- ▶ Fine-tuning uses **repurchase agreements** (temporary injections) and **matched sale–purchase / reverse repos** (temporary drains).

Why it dominates

The Fed has complete control over the volume, and the operations are **flexible, precise, easily reversed, and quickly implemented** — everything you want in a primary tool.

Mishkin Ch. 15, Section 15.2.

Discount policy and the lender of last resort

The discount window lends reserves directly to banks.

- ▶ **Primary credit** — the standing facility for sound banks (a “Lombard facility”), priced above the funds-rate target; it sets the corridor ceiling.
- ▶ **Secondary credit** for banks in trouble; **seasonal credit** for small, cyclical lenders.
- ▶ Its great value: the Fed as **lender of last resort**, supplying liquidity to prevent panics from cascading.

The catch

The lender-of-last-resort role creates a **moral hazard** problem — banks that expect rescue may take on more risk.

Mishkin Ch. 15, Section 15.2; “Using Discount Policy to Prevent a Financial Panic.”

Reserve requirements and interest on reserves

Reserve requirements (under the 1980 DIDMCA, uniform across depository institutions):

- ▶ Historically tiered — 0% on the smallest deposits, 3%, then 10% above a threshold (the Fed may vary the top rate between 8% and 14%).
- ▶ A blunt tool: small changes have large effects and can cause liquidity problems, so it is rarely used.

Interest on reserves (since 2008):

- ▶ Lets the Fed raise the funds rate even when reserves are abundant — it “came to the rescue” as excess reserves ballooned after the crisis.
- ▶ The foundation of the modern **floor system** of rate control.

Mishkin Ch. 15, Section 15.2.

Relative advantages of the conventional tools

Open market operations

- ▶ Complete Fed control of volume
- ▶ Flexible and precise
- ▶ Easily reversed
- ▶ Quickly implemented

Discount & reserve requirements

- ▶ Discount rate: no longer binding for most banks; can cause uncertainty — but the window is invaluable as lender of last resort
- ▶ Reserve requirements: too blunt; rarely changed

Bottom line

Open market operations do the day-to-day steering; the discount window is kept in reserve for crises; reserve requirements are largely dormant.

Mishkin Ch. 15, Section 15.2.

PART 3

Nonconventional Tools and the ECB

When conventional tools fail

In a full-scale financial crisis the ordinary toolkit stops working, for two reasons:

1. The financial system **seizes up** — it can no longer channel capital to productive uses, so investment and the economy collapse, no matter the funds rate.
2. The shock can drive the funds rate to its **zero lower bound**, leaving no room for further conventional cuts.

The motivation for going nonconventional

When you cannot cut the policy rate further *and* the plumbing is broken, you need tools that act directly on liquidity, on specific credit markets, and on *expectations*.

Mishkin Ch. 15, Section 15.3.

Nonconventional tools, part 1: liquidity and asset purchases

Liquidity provision — expanding lending facilities far beyond the normal window:

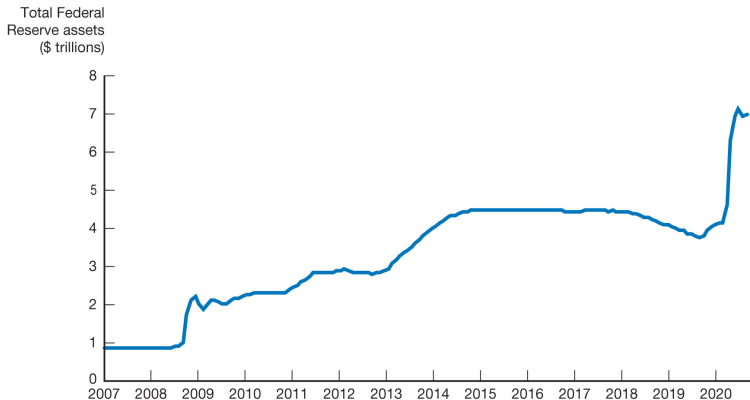
- ▶ Discount window expansion; the **Term Auction Facility**; an alphabet soup of new lending programs (TALF, CPFF, PDCF, ...) reaching nonbank markets.

Large-scale asset purchases (LSAPs) — buying long-dated assets to push down particular interest rates:

- ▶ GSE/agency-MBS purchases plus QE2 and QE3.
- ▶ These produced a **huge expansion of the Fed's balance sheet** — the name we give it is **quantitative easing**.

Mishkin Ch. 15, Section 15.3.

Figure 7 — The expansion of the Fed's balance sheet, 2007–2020



Mishkin Ch. 15, Figure 7. Successive QE rounds and the COVID response multiply the size and change the composition of the Fed's assets.

Nonconventional tools, part 2: QE, guidance, negative rates

- ▶ **Quantitative easing vs. credit easing.** QE expands the balance sheet's *size*; credit easing changes its *composition* to unclog specific markets. Mishkin stresses that simply enlarging the base did little once banks just held the proceeds as excess reserves.
- ▶ **Forward guidance.** By committing to keep the funds rate near zero for an extended period, the Fed lowers expected *future* short rates — and hence *long*-term rates today.
- ▶ **Negative interest rates on reserves.** Used by the ECB and others to push banks to lend rather than hoard; evidence that it actually stimulates spending is mixed.

Mishkin Ch. 15, Section 15.3.

The ECB's toolkit

The ECB's tools parallel the Fed's, with European labels:

- ▶ **Open market operations:** *main refinancing operations* (weekly reverse transactions) plus *longer-term refinancing operations*.
- ▶ **Lending to banks:** the *marginal lending facility* (ceiling, like the discount window) and the *deposit facility* (floor, like interest on reserves).
- ▶ **Reserve requirements:** about 2% of short-term deposits, *with interest paid*, so the cost of compliance is low.

Same logic, different plumbing

The corridor idea — a lending ceiling and a deposit floor around the policy rate — is shared. The ECB just runs it through national central banks rather than a single desk.

PART 4

Wrap-up

Key terms from Chapter 15

- ▶ federal funds rate; market for reserves
- ▶ interest on reserves i_{or} (floor)
- ▶ discount rate i_d (ceiling); corridor
- ▶ nonborrowed vs. borrowed reserves
- ▶ dynamic vs. defensive OMOs
- ▶ primary dealers; repos; reverse repos
- ▶ discount window; primary/secondary/seasonal credit
- ▶ lender of last resort; moral hazard
- ▶ reserve requirements; DIDMCA 1980
- ▶ zero lower bound
- ▶ quantitative easing; credit easing
- ▶ forward guidance; negative rates

The one idea to take away

It is all the market for reserves

Every tool — open market operations, the discount rate, reserve requirements, interest on reserves — works by shifting **supply** or **demand** in the market for reserves to hit a target **federal funds rate**. The floor (i_{or}) and ceiling (i_d) form a corridor that keeps the rate stable.

- ▶ In normal times, open market operations do the steering. In a crisis — at the zero lower bound, with the system frozen — the Fed reaches for liquidity facilities, large-scale asset purchases, and forward guidance.
- ▶ Next: **Chapter 16** — having the tools, how should the Fed decide *what to aim at*? Goals, strategy, and the Taylor rule.