

Chapter 8

Banking & Reserves

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The Federal Reserve

- › The Federal Reserve is the central bank (CB) of the U.S.
- › The Fed targets the **Federal Funds Rate (FFR)**
 - *Nominal* rate at which major banks borrow from each other
 - Called the “overnight rate” since loans are repaid overnight
- › Usually a very low interest rate
 - Future discounting is very low since loans are repaid quickly
 - › Also, less risk when loan is paid back quickly

Federal Funds Effective Rate (FEDFUNDS)



A Nominal Interest Rate

- › The Federal Funds Rate is a nominal interest rate
 - You're not calculating your savings account based on how many apples you can buy with the interest rate
 - Similarly, mortgage rates are nominal rates
- › This chapter will continue our focus on nominal rates
 - We'll translate eventually back to real with the Fisher equation

Reserve Requirements

- › The Fed can adjust banking **reserve requirements** to influence the money supply
- › **Reserve requirements (RR)** is the fraction of deposits banks must keep on hand as reserves
 - Lower requirements increase the money supply
 - Key feature in fractional reserve banking

Fractional Reserve Banking

- › The U.S. uses a **fractional reserve banking** system
 - A fraction of a bank's funds are kept in reserve
 - Based on the reserve requirements
- › Let's look at a very simple balance sheet to see how the money supply and reserve requirements interact

Balance Sheets

- › **Balance sheet:** a statement documenting financial status
- › Two general parts:
 1. Assets (something that provides value)
 - › Reserves are assets since they are value held by the bank
 - › Loans are also assets since they are valued owed to the bank
 2. Liabilities (something you're obligated to pay)
 - › Deposits are liabilities since they must eventually be returned

Assets	Liabilities
Reserves = 1,000	Deposits = 1,000

Full-reserve Banking

- › If the bank is required to keep 100% of its deposits on hand, that is a **full-reserve** system
 - Our last example is full-reserve

Bank 1	
Assets	Liabilities
Reserves = 1,000	Deposits = 1,000

Growing the Money Supply (1/2)

- › Suppose the reserve requirement was lowered to 10%
 - Bank 1 now lends out 90% of it's deposits to Bank 2

Bank 1	
Assets	Liabilities
Reserves = 100	Deposits = 1,000
Loans = 900	

Growing the Money Supply (2/2)

- › Bank 2 takes the loan from Bank 1 and lends out 90% of it
 - Geometric series; cycle where a bank keeps 10% and loans 90%

Bank 2	
Assets	Liabilities
Reserves = 90	Deposits = 900
Loans = 810	

- › Total deposits = $\frac{1}{RR} \times \text{Original Deposits} = 10,000!$

Assumptions We've Made

- › Assuming banks hold the minimum amount of reserves
 - Just enough to meet the requirement and not a penny more
 - Excess reserves = 0
- › Households do not hold any cash
 - All currency goes into deposits
- › Neither are particularly true

Cash on Hand and Excess Reserves

- › To see exactly how the money supply grows, let's include the cash people hold to define the **monetary base (MB)**
- › Monetary base = cash (C) + total reserves
 - Total reserves = required reserves (R) + excess reserves (E)
 - Total physical dollars
- › Money supply = cash + deposits (D) (mirrors Ch. 7)

Arriving at the New M^s Formula

$$M^s = \frac{1 + \frac{C}{D}}{\frac{C}{D} + RR + e} \times MB$$

The Money Multiplier and How It Works

$$M^s = \frac{1 + \frac{C}{D}}{\frac{C}{D} + RR + e} \times MB$$

› Increase in:

- $MB = \uparrow M^s$
- $RR = \downarrow M^s$
- $e = \downarrow M^s$

Using the Money Multiplier

- › The Fed can increase M^s through:
 - Lowering RR
 - Increasing MB (via open market operations)

- › March 2020: Fed set $RR = 0$

- › Is this a good thing?

Bank Runs

- › **Bank run:** panic causes many people to all withdraw their money at once
 - Deposits are a liability for banks since they have to return them upon request
- › Just as the money supply increases quickly, it shrinks quickly as well
- › Fed can be a **lender of last resort** for emergency funds

Silicon Valley Bank (quick version)

- › SVB was a bank that dealt mostly with tech companies
 - Dealing with mostly one industry is risky because if that industry stagnates, you're stuck with them
- › When tech started to slow down (among other economic events), many people got worried and withdrew deposits
 - Their reserves were not enough to cover the run and they failed
- › Small scale example of the Great Depression (1929–1939)

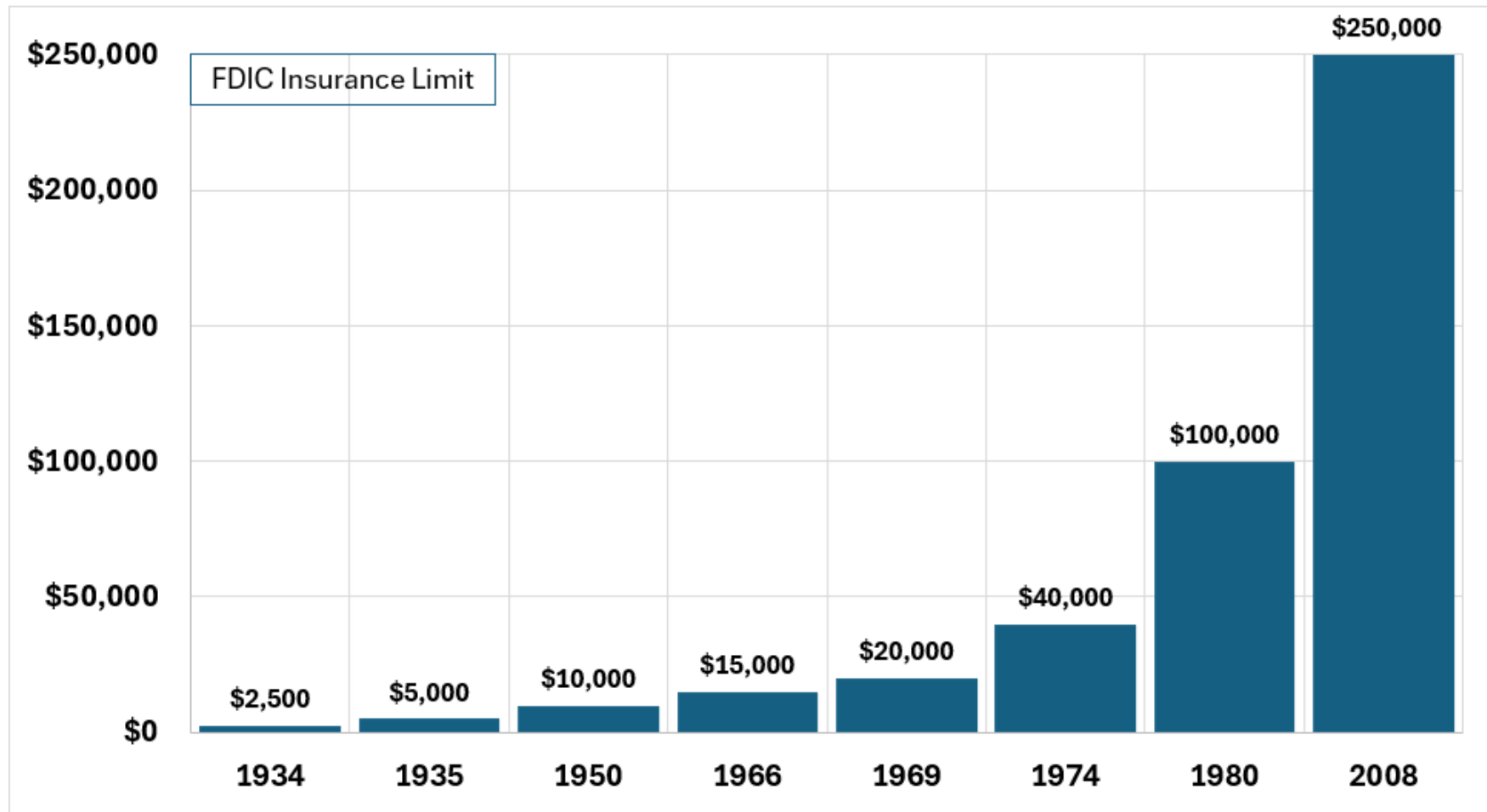
Lender of Last Resort & Moral Hazard

- › In case of failure, Fed can lend to banks to boost liquidity
 - **Lender of Last Resort**
- › However, this creates **moral hazard**
 - Conditions that increase the incentive for risk
- › If investors know they will be bailed out, they will make riskier investments
 - Usually carry higher payouts if successful
 - If unsuccessful, a bailout lowers the cost
 - Bailouts reduce the marginal cost of that investment

Trade-off

- › Fractional reserve banking creates a wealth of funds for investors to create better products and more jobs
- › But it also increases the danger of bank runs
- › Federal Deposit Insurance Corp. (FDIC) insures up to \$250,000 of deposits per person – per bank

Historical FDIC Insurance Limits



Data: Federal Deposit Insurance Corporation, 2023

Quantitative Easing (1/2)

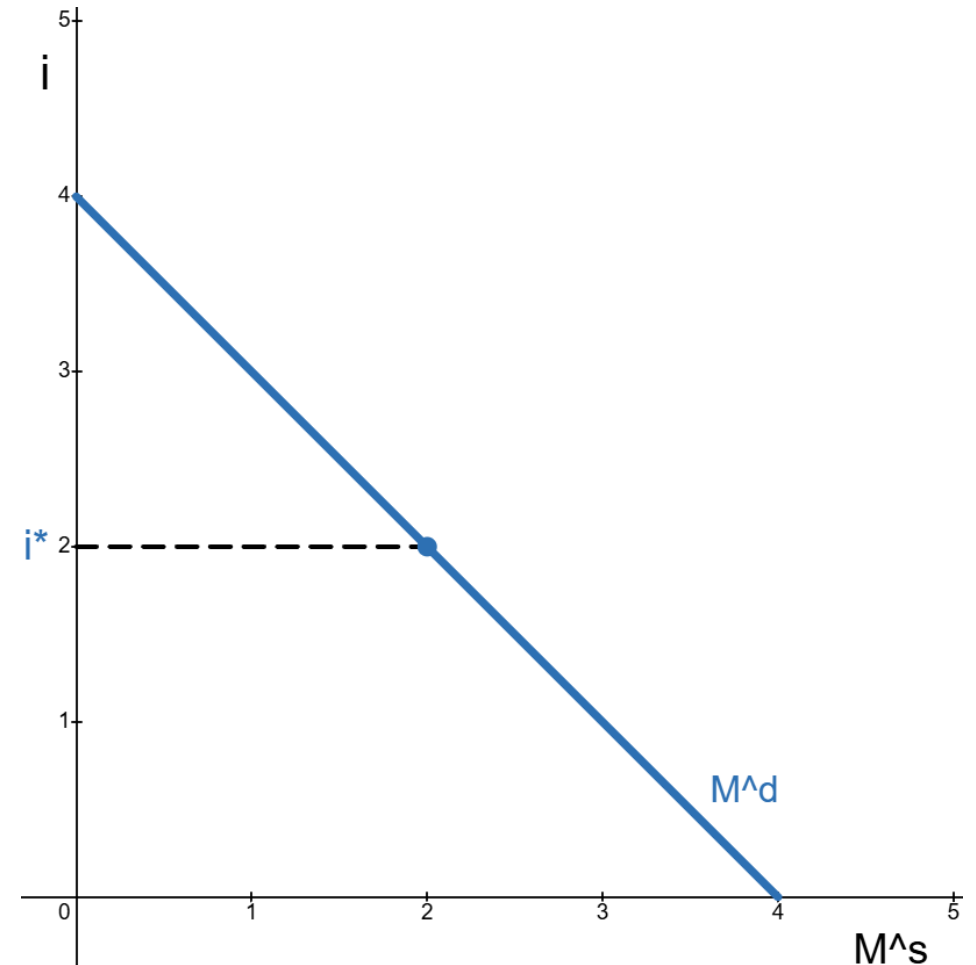
- › **Quantitative Easing (QE)** is a policy where the Fed buys long term bonds (usually government bonds)
 - Considered “unconventional” because it tries to influence substitution effects for different investments
- › Reverse process is called **Quantitative Tightening (QT)**

Quantitative Easing (2/2)

- › Increases price Gov bonds while providing funds to banks
 - Return from a given asset falls when you pay more for it
 - *Opportunity cost of lending to firms falls*
 - Lenders willing to accept a lower interest rate
 - i increases
 - C also increases slightly as HH assets are worth more

A Link to the Money Market

- › Remember, banks are obligated to honor deposits
- › As HHs demand more liquidity, banks need more reserves
 - Reserve demand is downward sloping, too
- › These reserves are held at the Fed



The Reserves Market

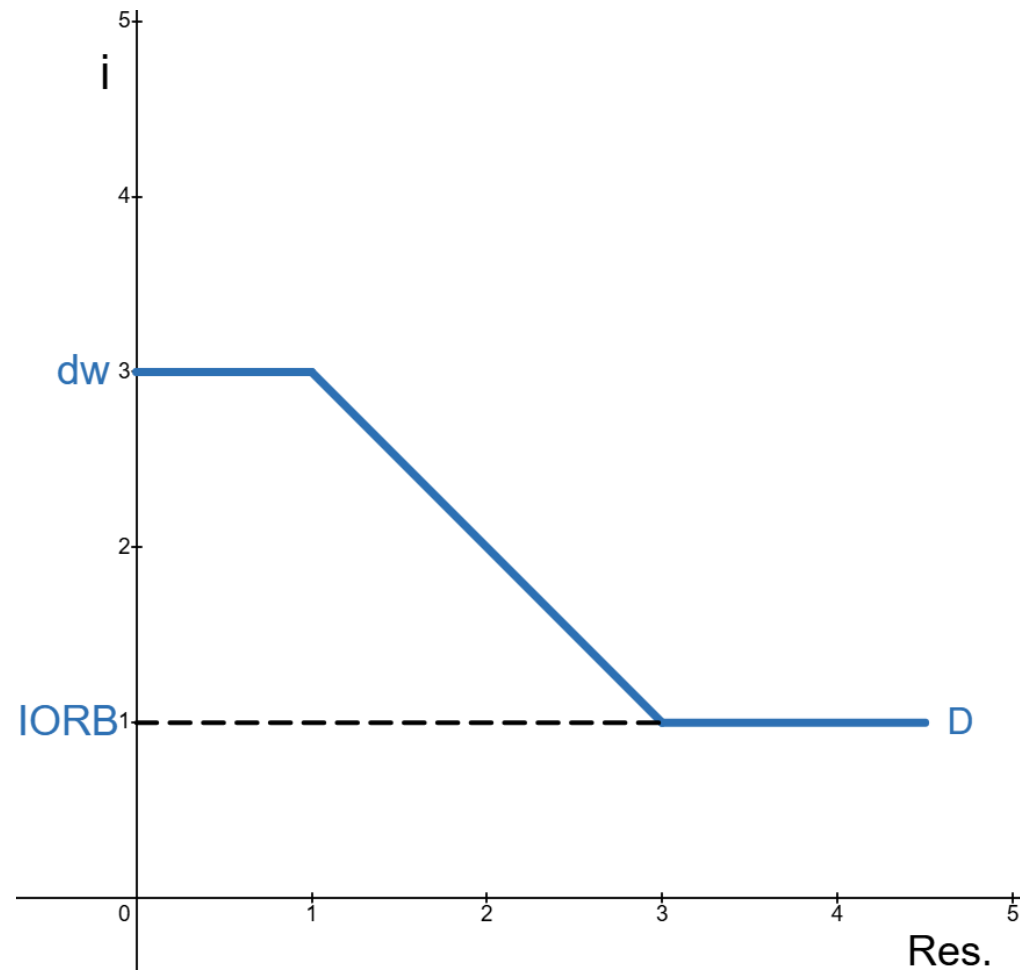
- › During the Great Recession (2008) the Fed started paying banks **interest on reserve balances (IORB)**
 - Increases marginal benefit of having reserves
 - Helps mitigate the effects of bank runs
- › For non-bank entities, the Fed uses the **overnight reverse repo facility (ON RRP)**
 - Fed sells securities to managed funds and agrees to buy it back the next day at a higher rate
 - Works in step with IORB; we'll mainly focus on IORB

Price Floor and Ceiling

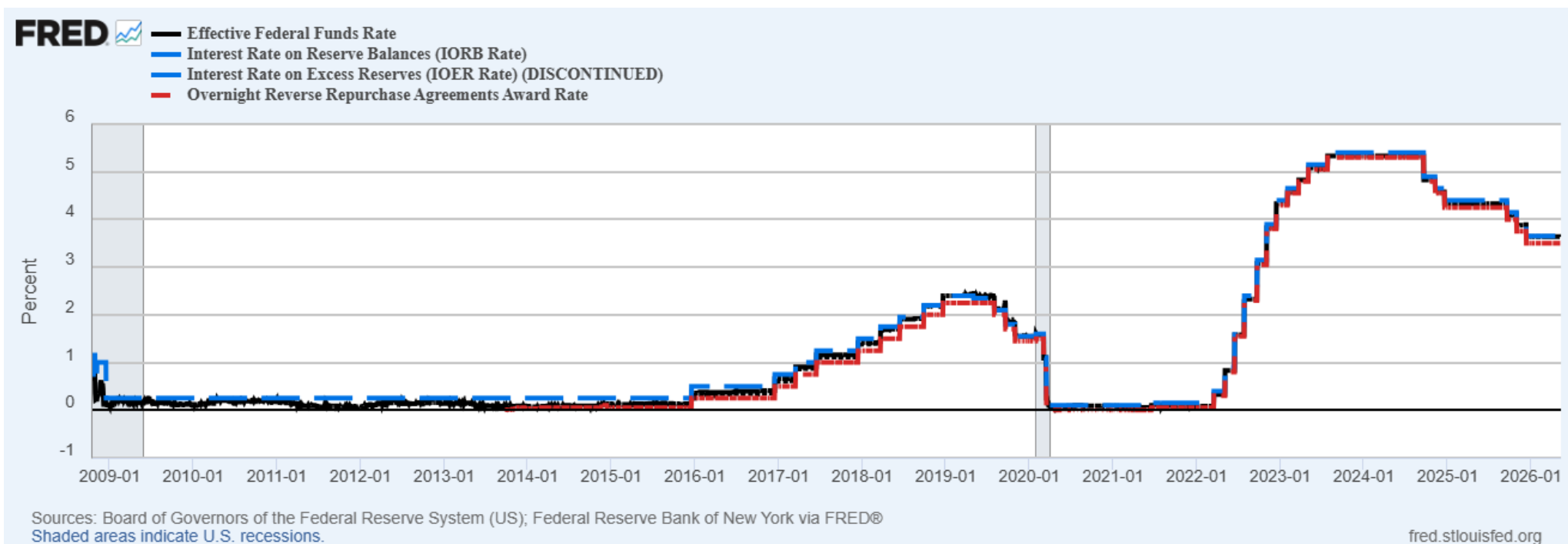
- › If banks earn 3% on reserves from IORB, why lend to anyone else for less than 3%?
 - Price floor on reserves
- › Fed also has a **discount window (dw)** where banks can borrow in short term [minor] emergencies
 - Higher rate that sets a price ceiling on reserves

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Demand for Reserves



Targeting the FFR



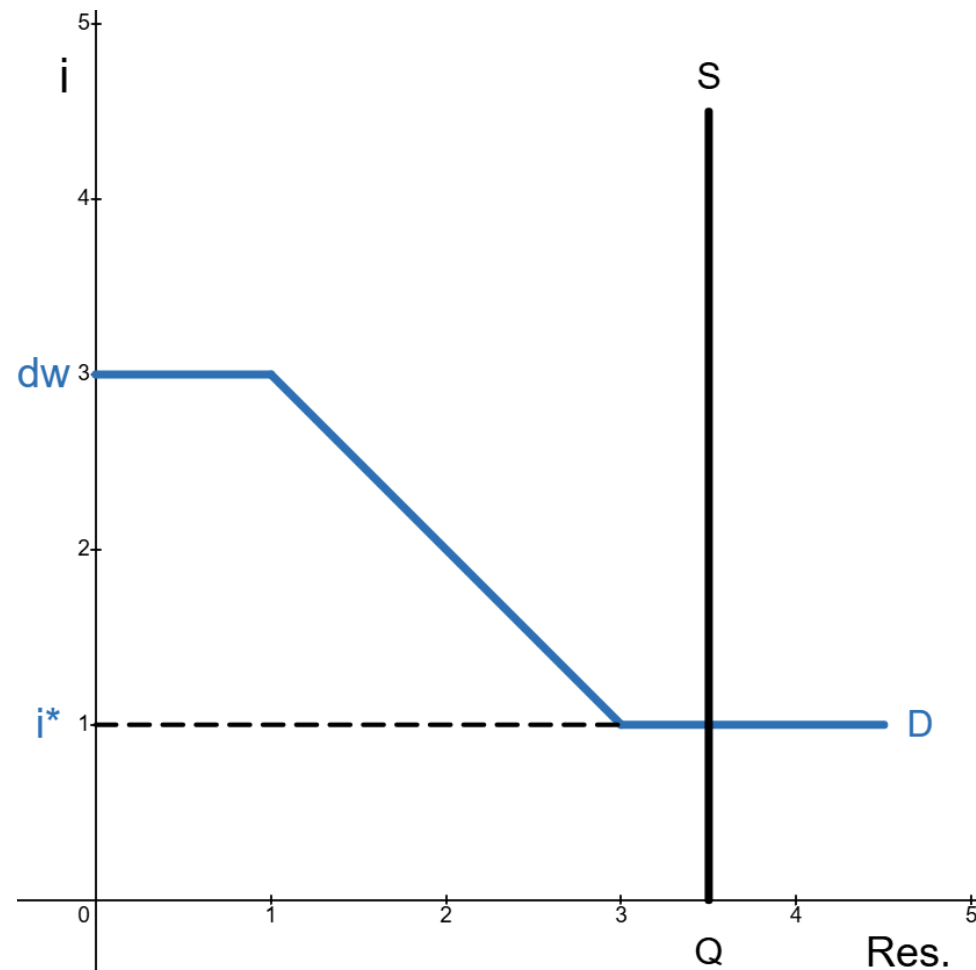
Ample Reserves

- › Post-2008 the Fed runs an **Ample Reserves** regime
 - Enough supply that changes don't move the FFR meaningfully
 - Unofficially called abundant reserves when there's no change at all

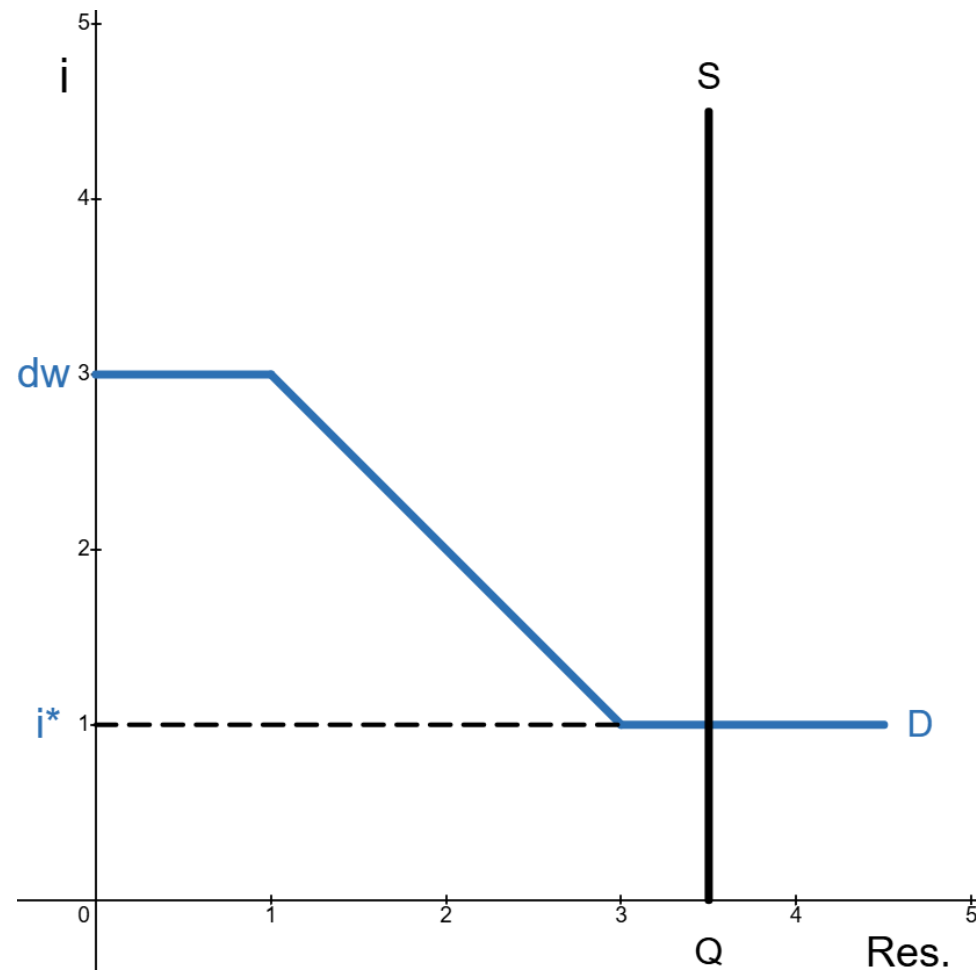
- › This means the Fed can just pick the interest rate it wants
 - Just move the IORB
 - We'll assume the d_w moves with the IORB

- › Note: pre-2008 the Fed moved the M^s based on the money market (Ch. 7)

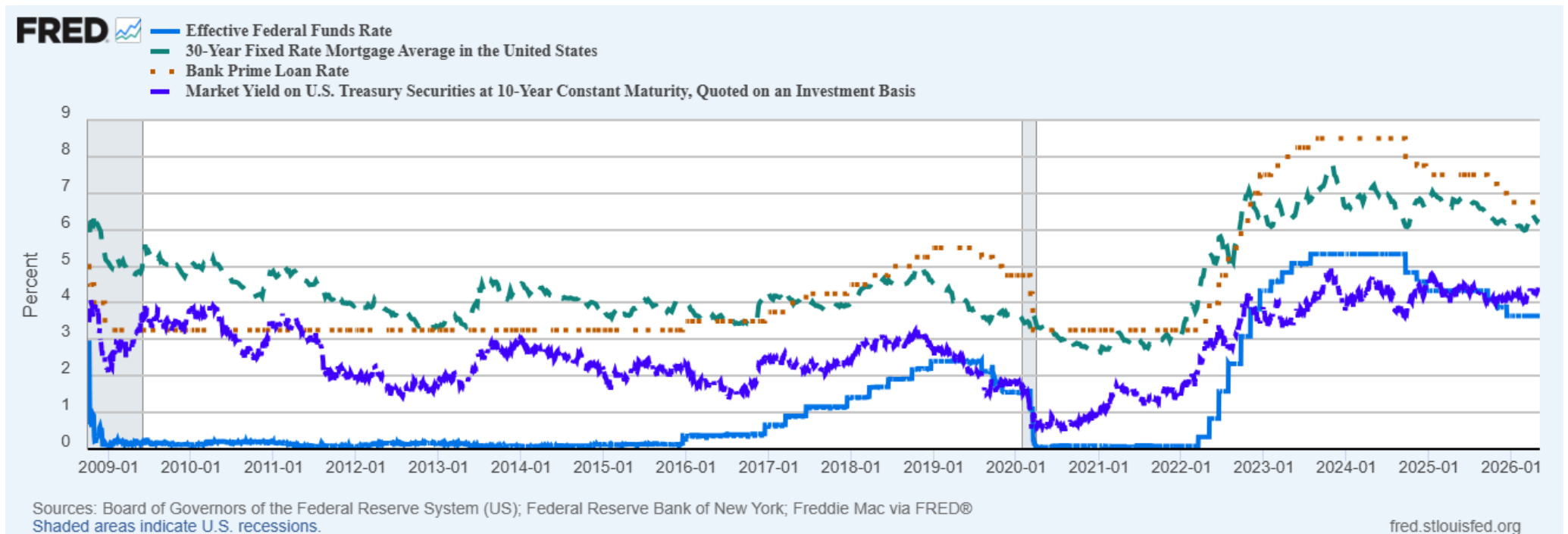
Ample Supply of Reserves



An Increase in the IORB



Transmission Throughout Economy



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- A. All non-cited graphs for this course made by me on [Desmos](#).

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