



Lecture 9 & 10



Tools of Monetary Policy

Objective

- ▶ What is the **tools** of monetary policy that the Fed use to control money supply and interest rates?

Using the demand and supply analysis of the market for reserves to explain to explain how the Fed set the tools of monetary policy.

- ▶ How these tools are used in practice and their relative advantageous over others?
- ▶ What is unconventional tools of monetary policy?



Federal funds rate

- ▶ Federal funds rate: interest rate on overnight loans of reserves from one bank to another.
- ▶ The market for reserves is where the Fed fund rate is determined. (supply and demand)
- ▶ Federal funds rate target: the policy interest rates that the Fed announce at each Federal Open Market Committee (FOMC) meeting.
- ▶ The tools of monetary policy is used to affect the Fed fund rate.



The Market for Reserves and the Fed Funds Rate (i_{ff}): Demand

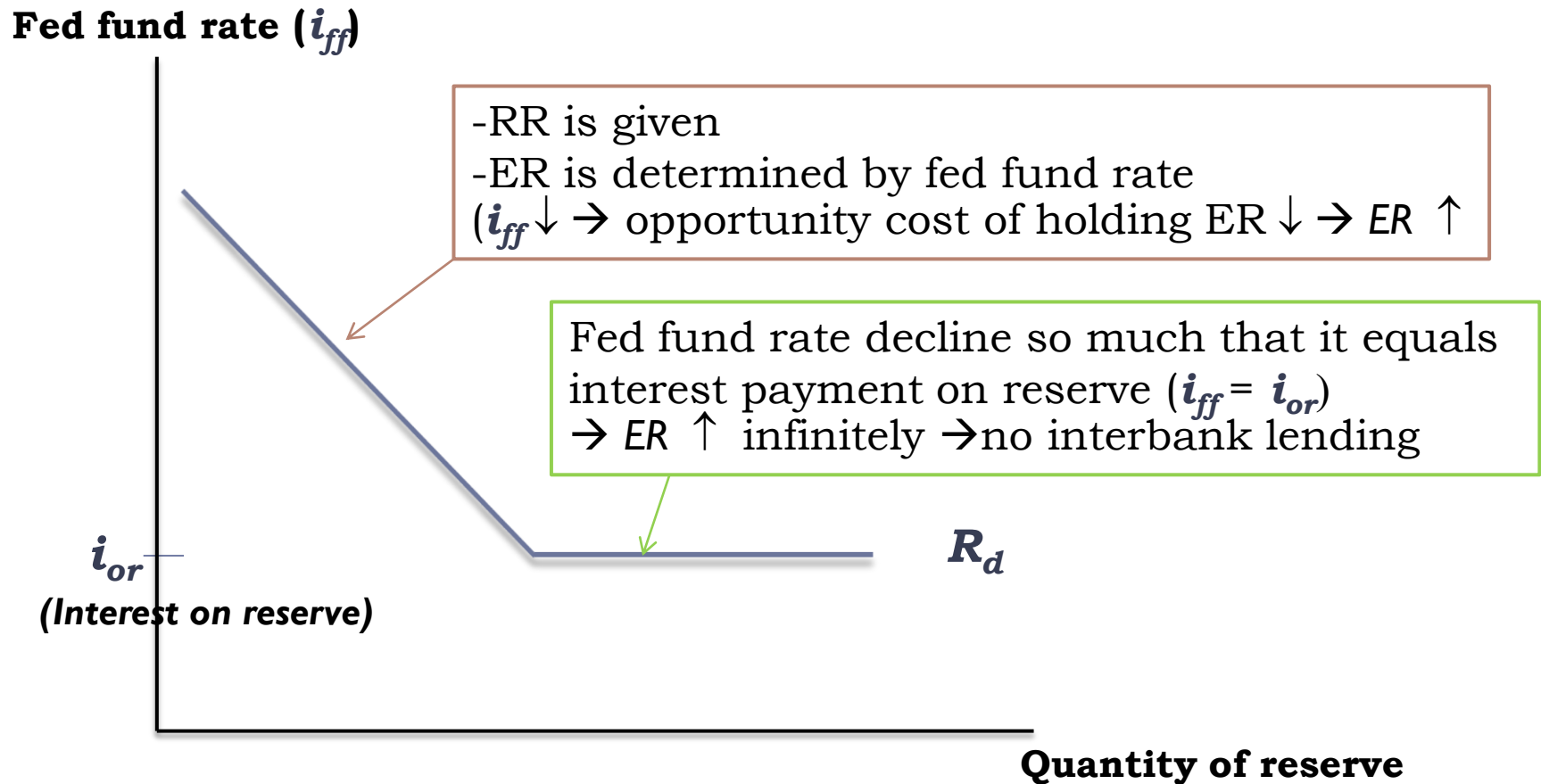
- ▶ Quantity of reserve demand by bank = $RR + ER$
- ▶ ER are insurance against deposit outflow.
- ▶ Opportunity cost of holding ER is interest rate earned on lending reserve out minus interest rate earned on reserves, i_{or}
- ▶ Fed started to pay interest on reserve in 2008, the interest rate is a fixed amount below the Fed fund rate target, therefore changes when the target change.

Demand Curve for Reserves

1. $R = RR + ER$
 2. $i \downarrow$, opportunity cost of $ER \downarrow$, $ER \uparrow$
 3. When $i_{ff} > i_{or}$, demand curve slopes down
 4. When $i_{ff} < i_{or}$, demand curve flat: bank will not lend in the overnight market, but instead keep on adding to their holding of excess reserves indefinitely.
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Demand Curve for Reserves



Fed set interest on reserve below fed fund target to help provide a floor under the fed fund rate

The Market for Reserves and the Fed Funds Rate (i_{ff}) : Supply

- ▶ Reserves supplied by the Fed are from
 - OMO: non borrowed reserve (NBR)
 - Reserve borrowed from Fed: borrowed reserve (BR)
- ▶ Interest rates that Fed charge on loan is called discount rate i_d
- ▶ The discount rate is a fixed amount above the Fed fund rate target, therefore changes when the target change.

Supply Curve for Reserves

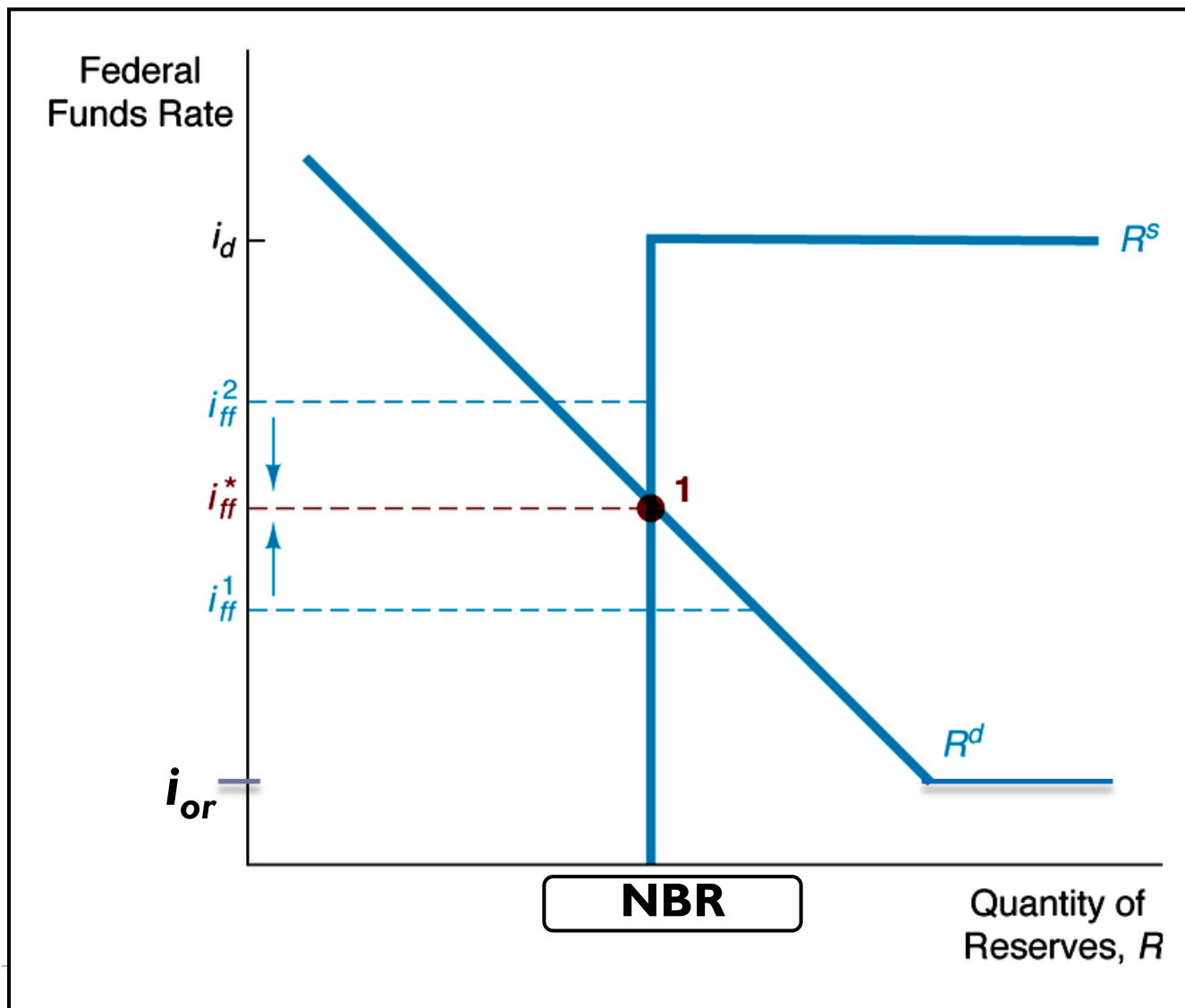
1. If $i_{ff} < i_d$, supply curve will be vertical.
Cheaper to borrow from other banks in fed fund markets, hence $BR=0$. Supply of reserve is only the NBR.
2. If $i_{ff} > i_d$, supply curve will be flat (infinitely elastic at i_d .
Bank want to keep borrow more and more at i_d and lend out in fed fund market at higher rate i_{ff}



Fed fund rate (i_{ff})



Supply and Demand for Reserves



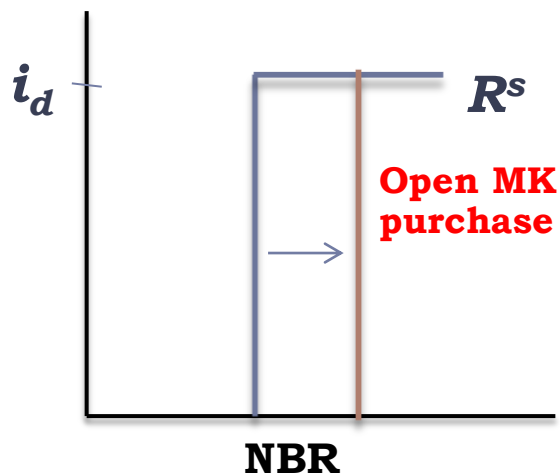
How changes in the tools of monetary policy affect the Fed fund rate?

- ▶ Fed use **tools** of monetary policy to control money supply and interest rates.
- ▶ Tools are:
 - ▶ open market operation,
 - ▶ discount policy,
 - ▶ reserve requirement,
 - ▶ interest paid on reserves

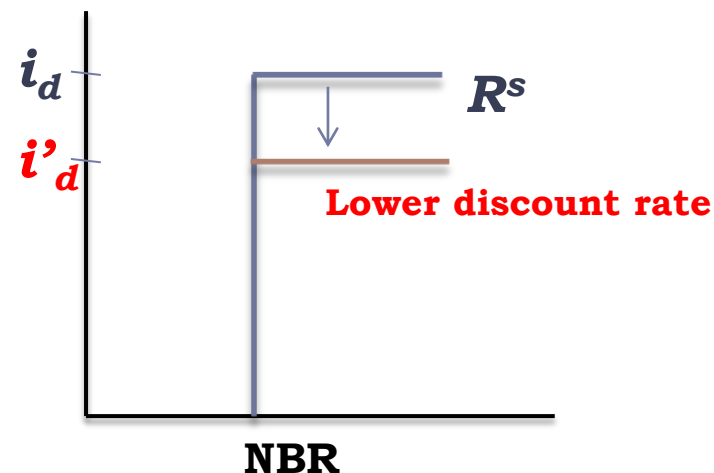


How each tool affect S/D for reserve?

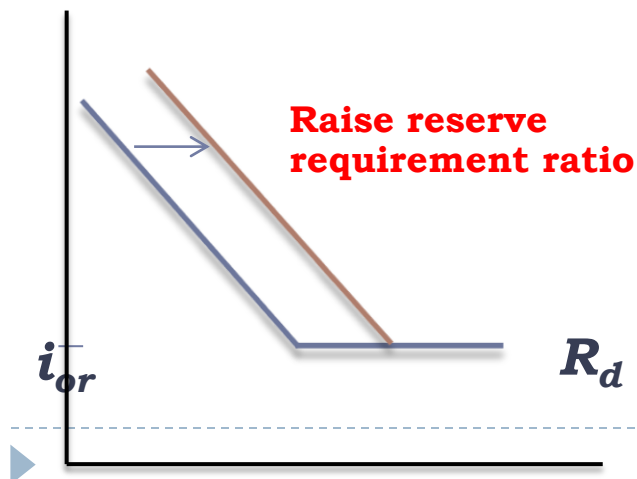
open market operation (R^s)



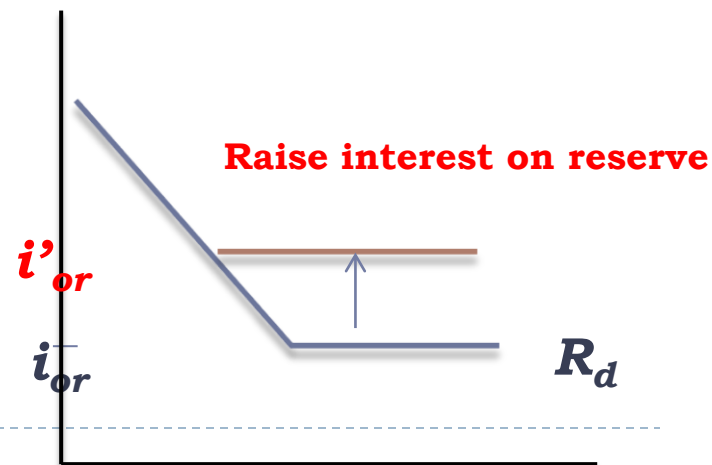
discount policy (R^s)



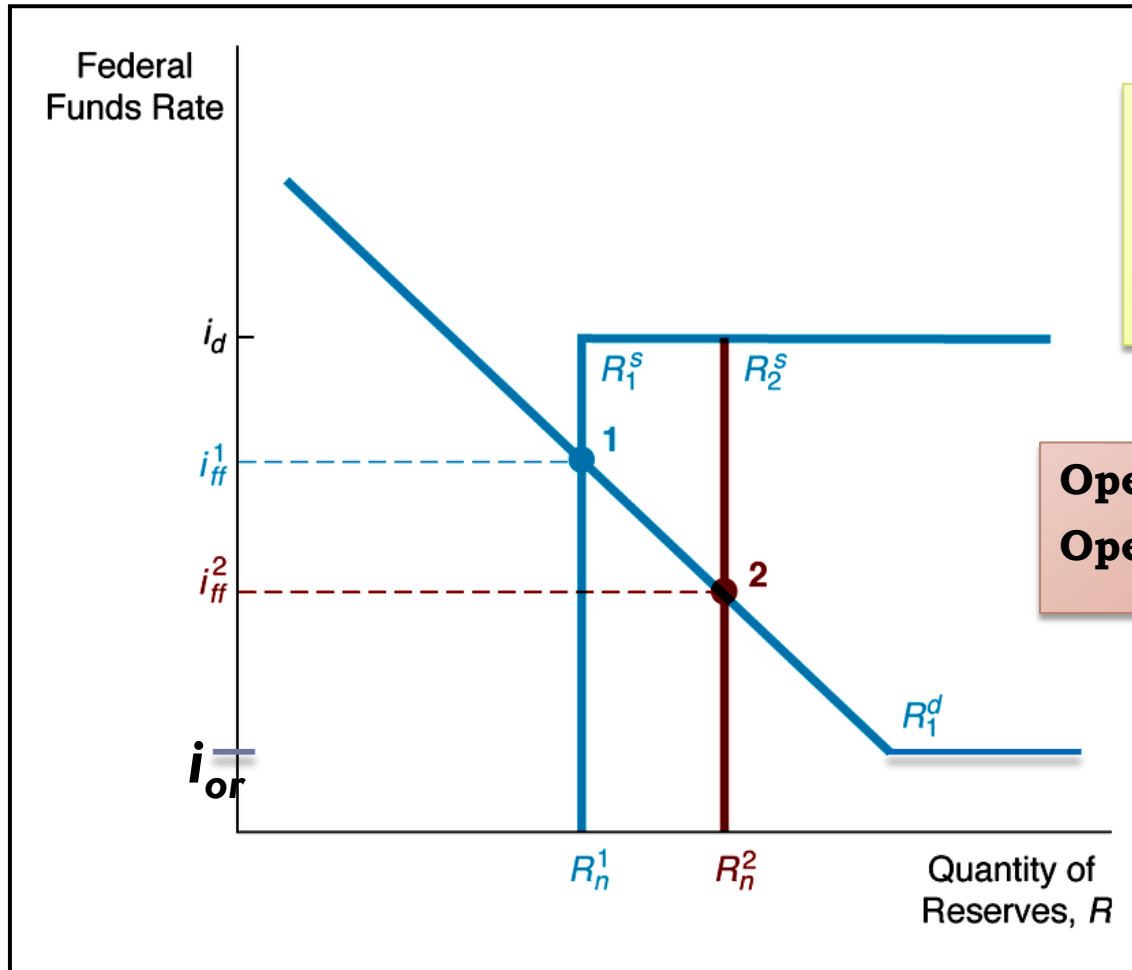
reserve requirement (R_d)



interest paid on reserves (R_d)



1. Response to Open Market Operations: typical situation ($i_{ff} > i_{or}$)



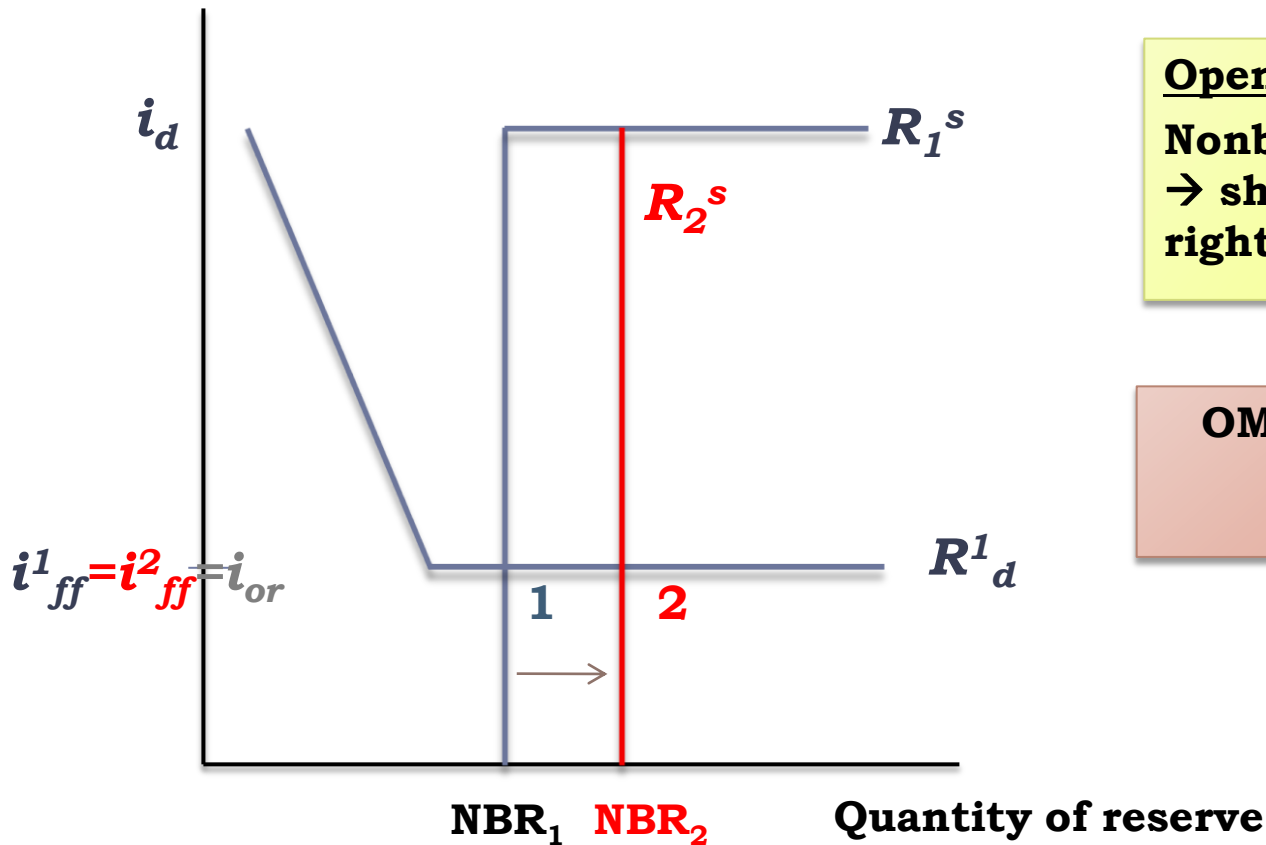
Open Market Purchase

Nonborrowed reserves, R^n , $\uparrow$
 $\rightarrow$ shifts supply curve to
right $R_1^s \rightarrow R_2^s \rightarrow i \downarrow$ to i_{ff}^2

Open market purchase cause $i_{ff} \downarrow$
Open market sale cause $i_{ff} \uparrow$

1. Response to Open Market Operations ($i_{ff} \leq i_{or}$)

Fed fund rate

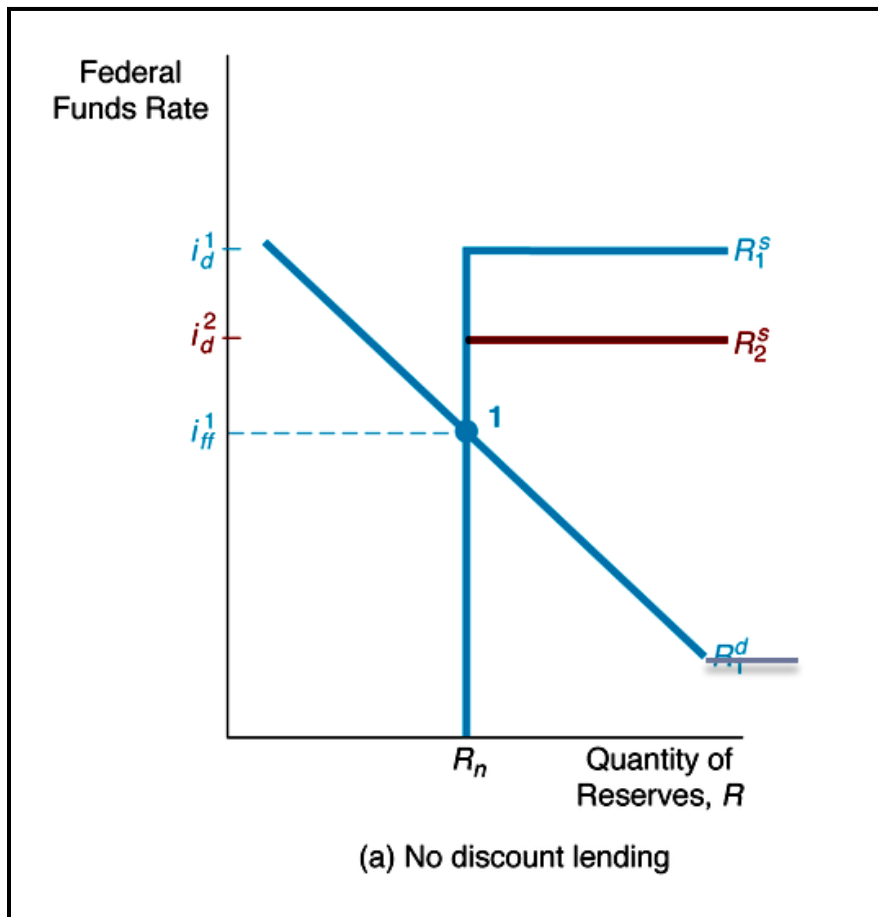


Open Market Purchase

Nonborrowed reserves, R^n , $\uparrow$
 $\rightarrow$ shifts supply curve to right $R^s_2 \rightarrow i$ is unchanged

OMO have no effect on i_{ff}
 i_{or} set a floor for i_{ff}

2. Response to a Change in the Discount Rate: typical situation

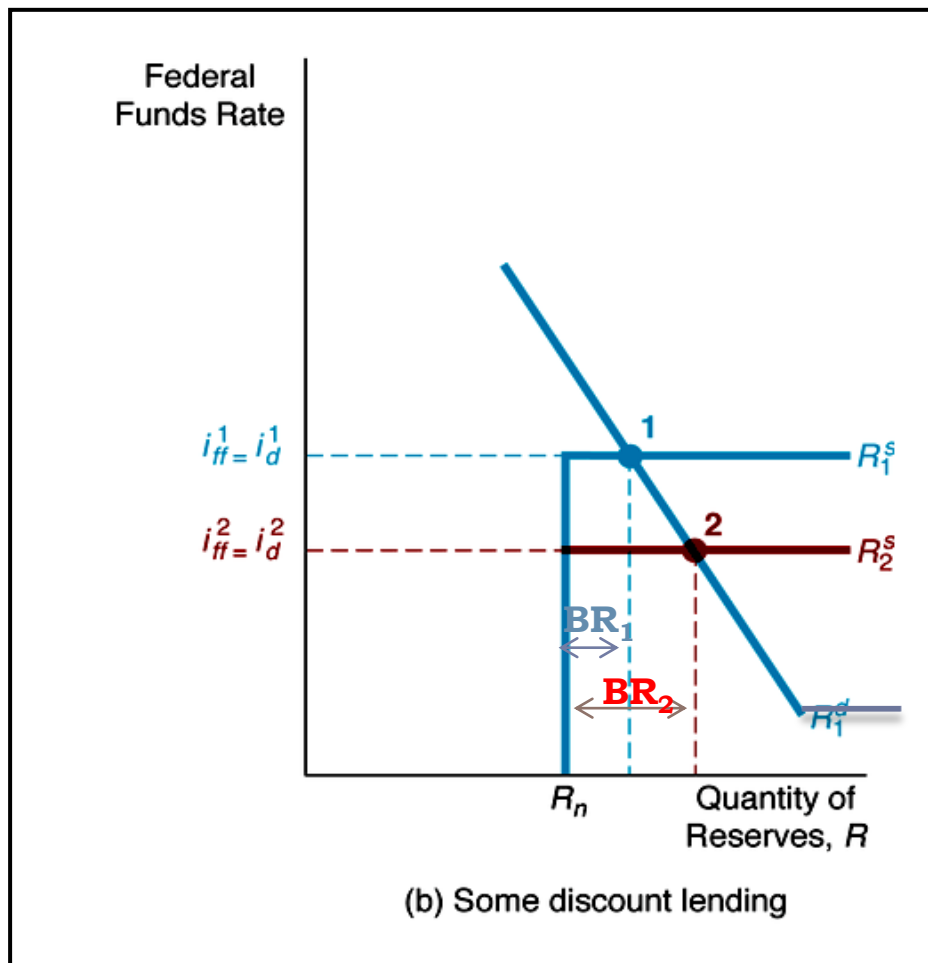


Lower Discount Rate

Horizontal to section ↓ and supply curve just shortens, i_{ff} stays same

Most changes in discount rate have no effect on fed fund rate

2. Response to a Change in the Discount Rate: some discount lending



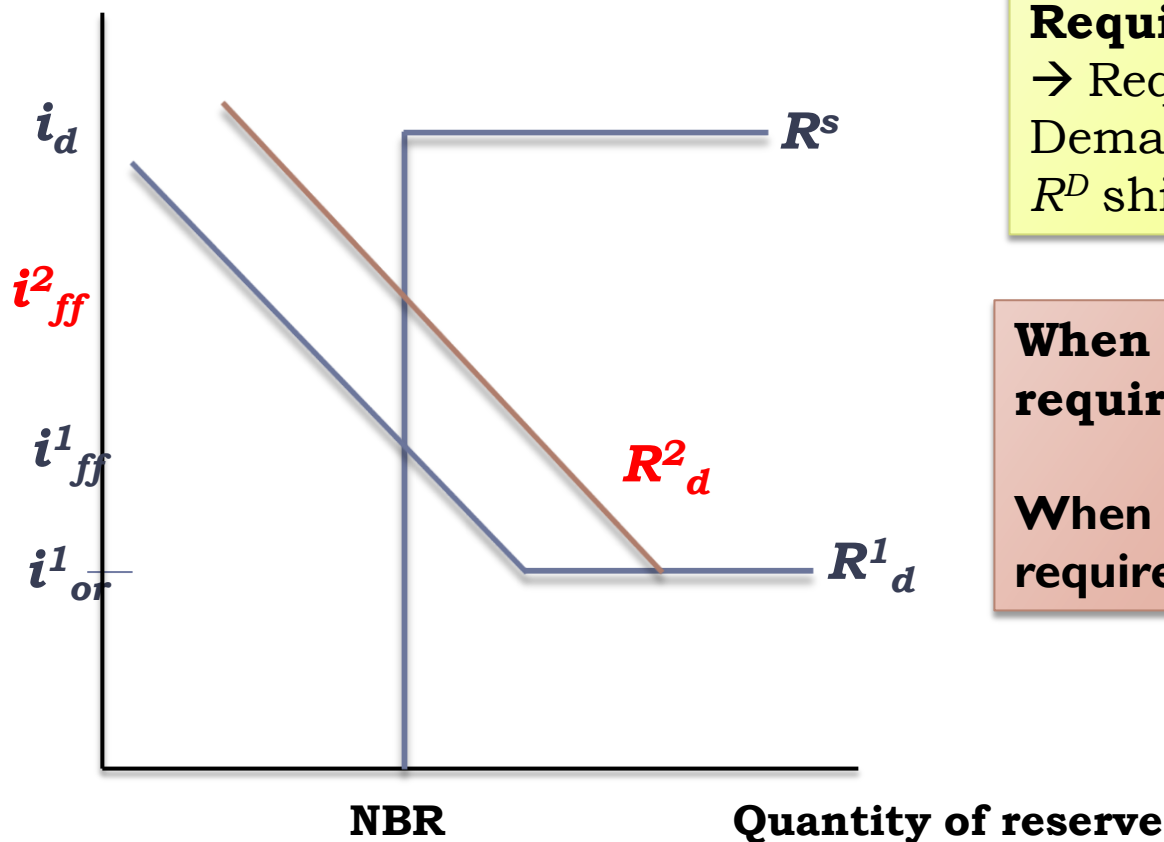
Lower Discount Rate

Horizontal to section $\downarrow \rightarrow BR \uparrow \rightarrow i_{ff}$
 $\downarrow$ to $i_{ff}^2 = i_d^2$

Changes in discount rate affects the fed fund rate

3. Response to Change in Required Reserves

Fed fund rate



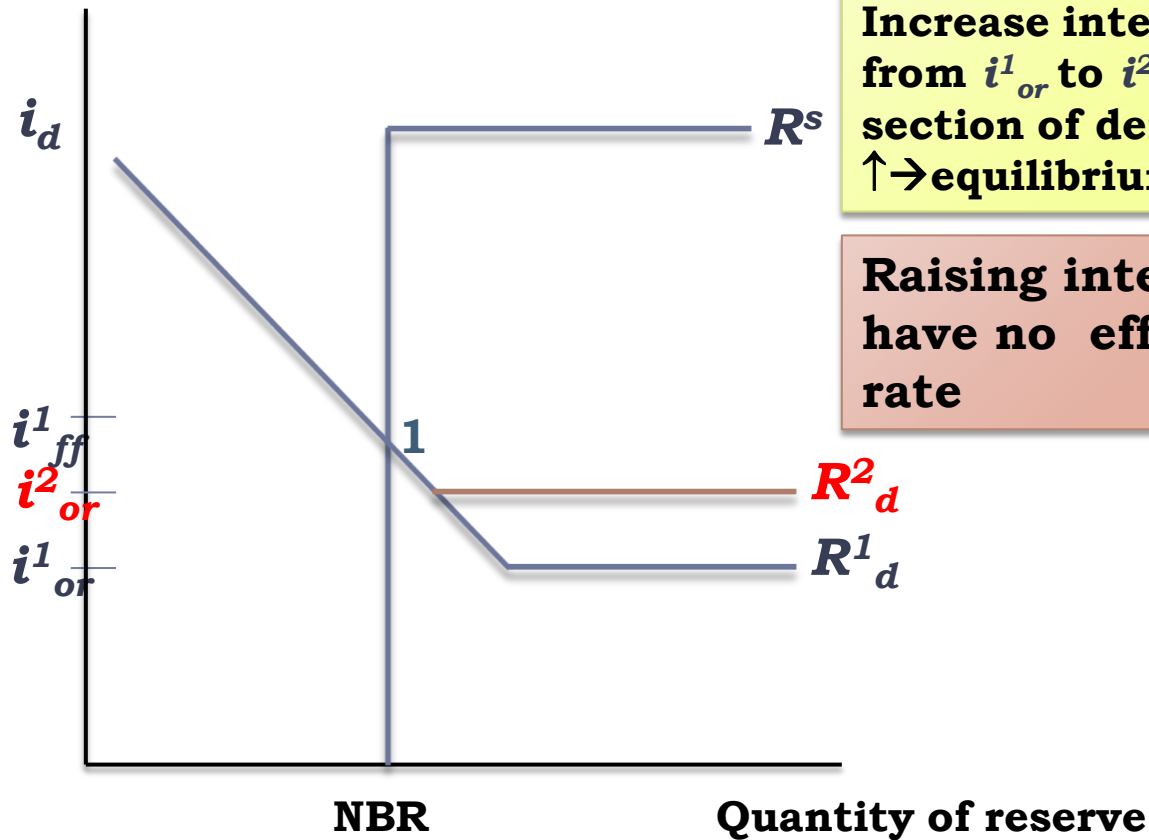
Required reserve ratio $\uparrow$
 $\rightarrow$ Required reserve $\uparrow \rightarrow$
Demand for reserves $\uparrow \rightarrow$
 R^D shifts right $\rightarrow i_{ff} \uparrow$ to i^2_{ff}

When fed raise reserve requirement, fed fund rate $\uparrow$

When fed reduce reserve requirement, fed fund rate $\downarrow$

4. Response to interest on reserve

Fed fund rate

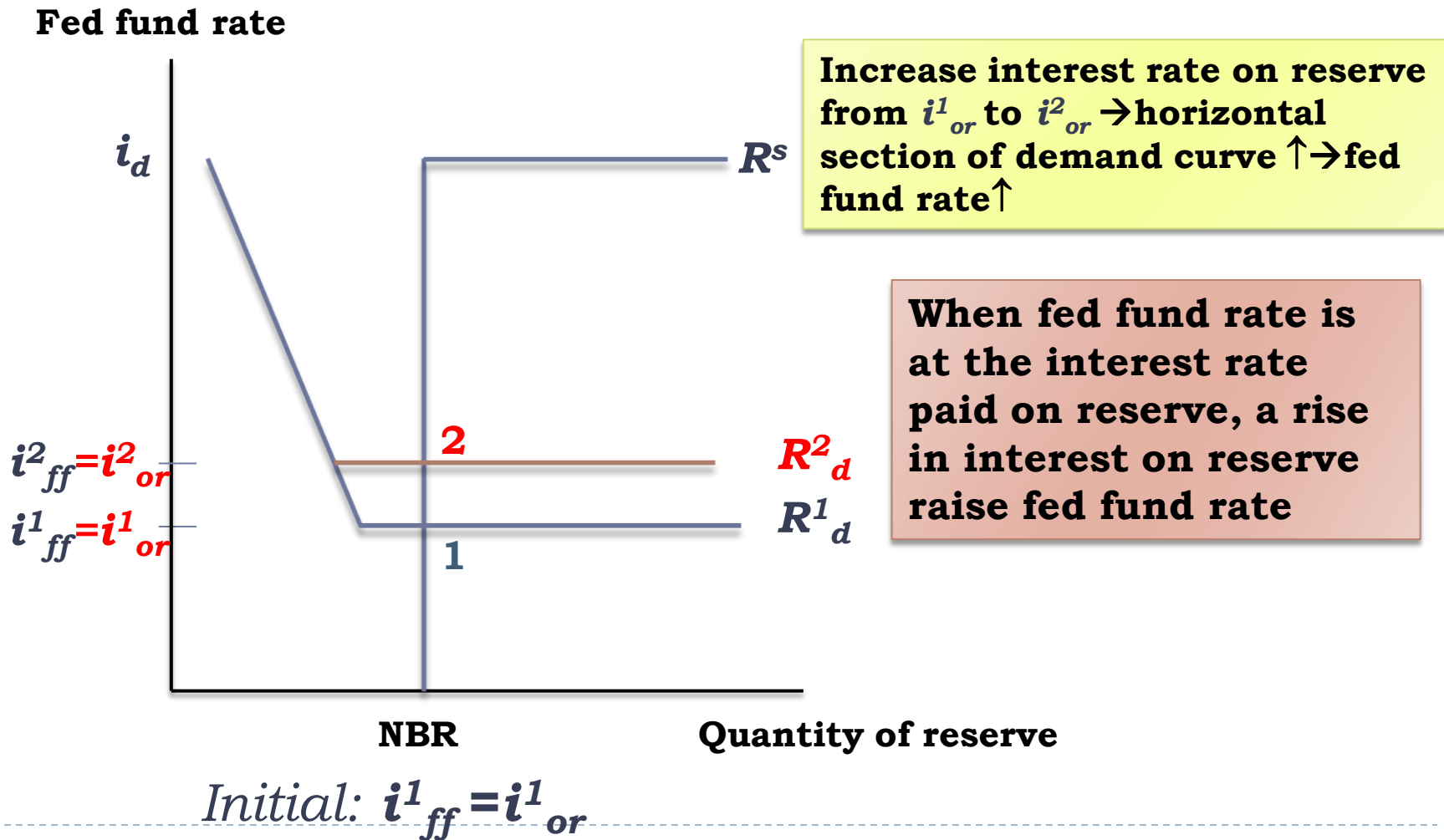


Increase interest rate on reserve from i^1_{or} to i^2_{or} → horizontal section of demand curve
↑ → equilibrium remain at point 1

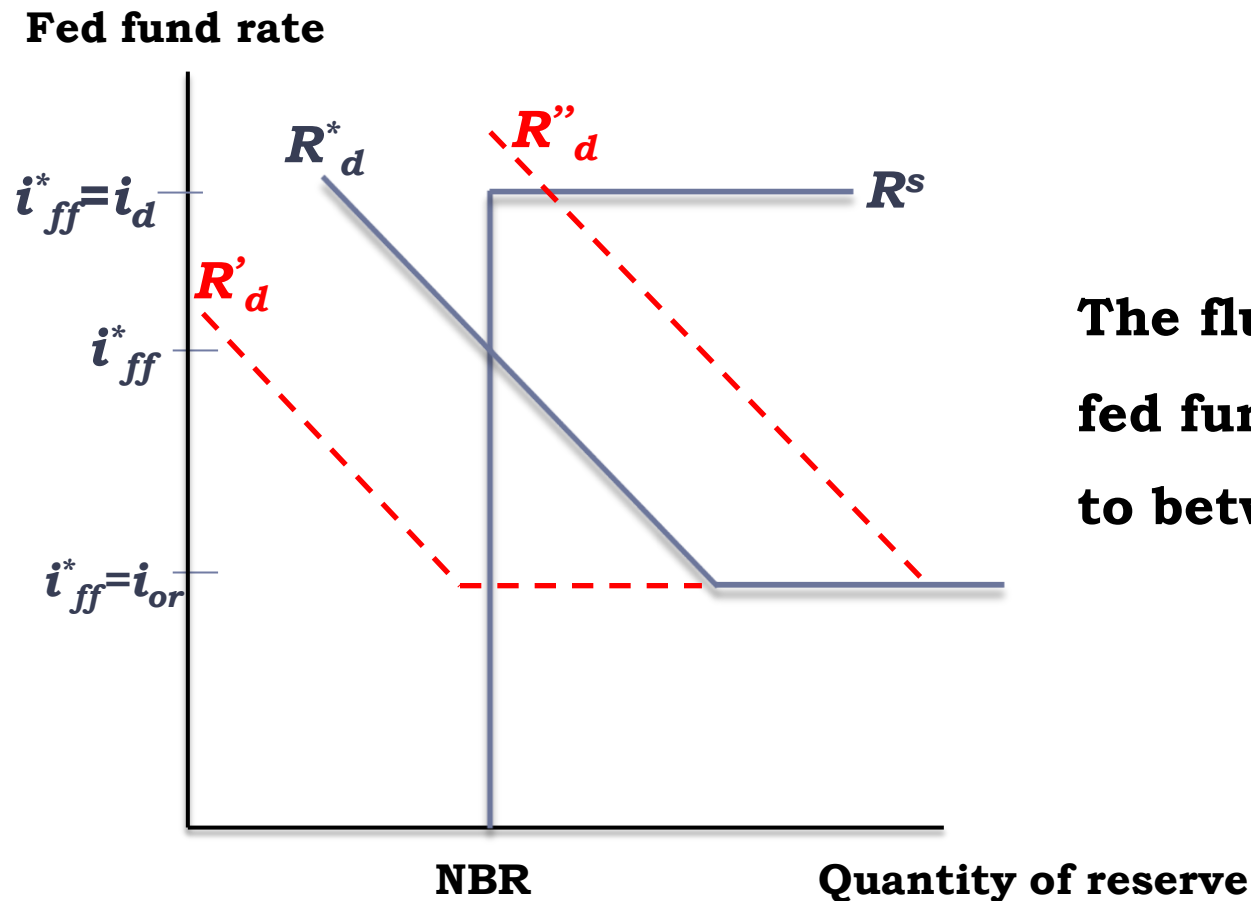
Raising interest on reserve have no effect on fed fund rate

Initial: $i^1_{ff} > i^1_{or}$

4. Response to interest on reserve



How the Fed operating procedures limit fluctuations in the fed fund rate



The fluctuations in the fed fund rate is limited to between i_{or} and i_d

Discount Policy and the Lender of last resort

Operation of the discount window: 3 Types

1. Primary Credit:

Given to healthy bank, which borrow at very short maturity (usually overnight), charge discount rate (1% above fed fund rate)

2. Secondary Credit:

Given to financial troubled bank with severe liquidity problems (0.5% above discount rate)

3. Seasonal Credit:

Given to meet the need of small bank in vacation and agricultural area that have seasonal pattern of deposits (average of fed fund rate and certificate of deposit rate)

Lender of Last Resort Function

-To prevent banking panics/ To prevent nonbank financial panics

-Can create moral hazard problem (bank takes more risk, 'too big to fail')



Interest on reserve

- ▶ Interest on reserve is not currently used by Fed as a monetary policy tool.
- ▶ In the aftermath of global financial crisis, bank accumulate huge amount of excess reserves.
- ▶ Interest rate on reserve can be an attractive tool for Fed going forward, when Fed want to exit from zero interest rate environment.
- ▶ To increase fed fund rate would require massive amount of OMO to remove these reserves from banking system. Raising interest on reserve can instead be used to raise the fed fund rate (as in slide 17)



Advantages of Open Market Operations

1. Fed has complete control over their volume
(Fed has partial control over discount operation)
2. Flexible and precise
3. Easily reversed
4. Implemented quickly
(change in RR takes time to implement, need to allow time for bank to adjust financial system)



Advantages of other tools over OMO

Occurs in 2 situations:

1. Fed wants to raise interest rate after banks have accumulated large amount of excess reserves (to avoid massive OMO, increasing interest on reserve can be easier)
2. Discount policy can be better used for performing role as a lender of last resort



Unconventional monetary policy tools

- ▶ Liquidity provision
- ▶ Asset purchase
- ▶ Quantitative easing/credit easing
- ▶ Commitment to future policy action

