Chapter 15: Tools of Monetary Policy - PART I

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Chapter 15: Tools of Monetary Policy

- The Market for Reserves and the Federal Funds Rate
  - Fed Funds Rate is determined by the Demand and Supply analysis in the Market for Reserves
- How does the Fed use 4 tools to affect the Federal Funds Rate
  - open market operations
  - discount loan
  - reserve requirements
  - interest paid on reserves
- Nonconventional Monetary Policy Tools

The Market for Reserves and the Federal Funds Rate

Market for Reserves and Fed Funds Rate

- Reserves: banks's vault cash and deposits with the Fed
- Fed funds rate: interest rate on borrowing overnight loans of reserves from banks in the fed funds market
- The **target** for the federal funds rate is set at Fed Open Market Committee meetings
- Fed Funds Rate is determined by the demand for and supply of reserves
  - derive **demand curve for reserves**
  - derive **supply curve for reserves**
  - the reserves market equilibrium determines the level of the **federal funds rate**

Demand Curve

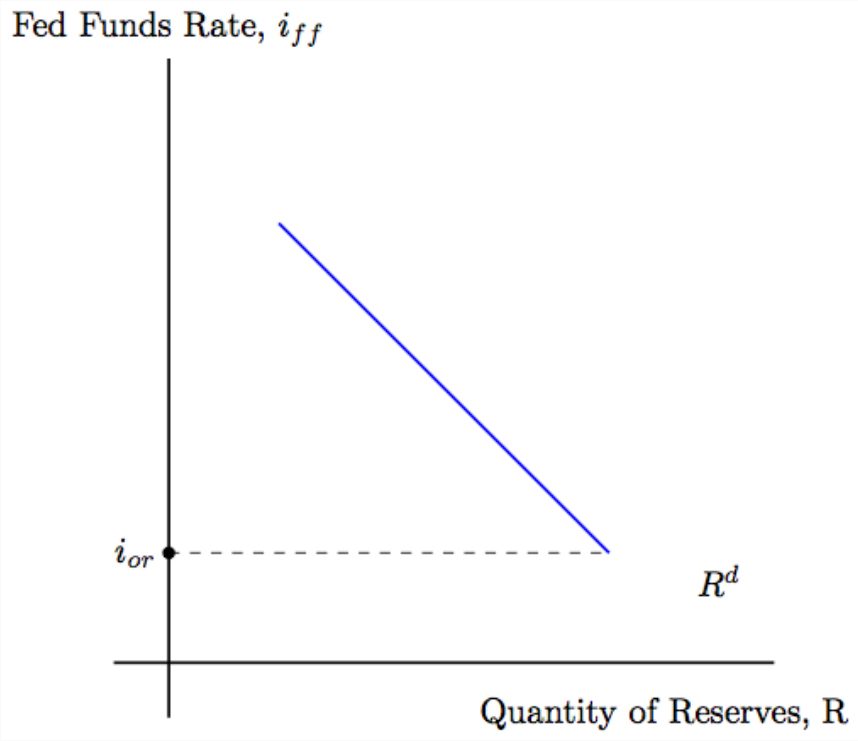
- RR: required reserves, the required reserve ratio times **checkable deposits**
- in addition to depositing a certain amount of reserves at their accounts at the Fed as required reserves RR, banks have two options if they have additional reserves
  - to deposit at the Fed banks **choose** to hold as excess reserves, ER
  - to lend to other banks, fed funds
- 2 components of quantity of reserves demanded: $R^d = ER + RR$

Demand Curve

- Since the fall of 2008: the Fed has started paying **interest on reserves**, including required reserves and excess reserves
- **interest rate on reserves** is typically set at a fixed amount **below** the federal funds rate target (why?)
- i_{ff}: fed fund rate paid in the overnight market by lending banks
- i_{or}: rate paid by the Fed on reserves if banks deposit reserves at the Fed
- $i_{ff} - i_{or}$: opportunity cost of holding/depositing reserves at banks' accounts at the Fed
- Demand curve for reserves: how changes in **federal funds rate** affects **the quantity of reserves demanded by banks**

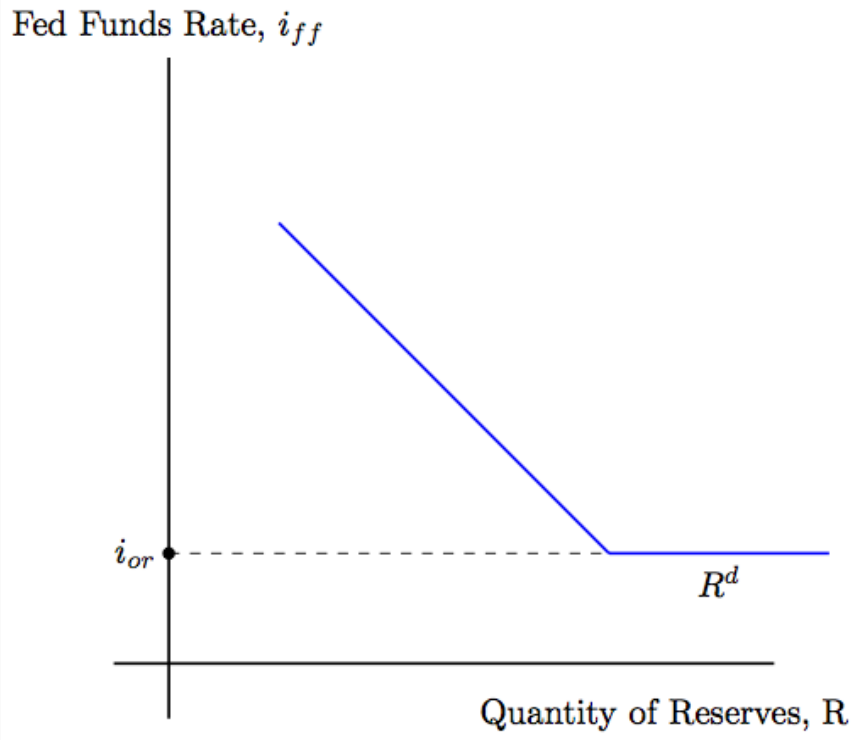
$i_{ff} > i_{or}$

- opportunity cost of holding reserves is positive: $i_{ff} - i_{or} > 0$
- $i_{ff} \downarrow \Rightarrow$ opportunity cost of holding reserves $\downarrow \Rightarrow ER \uparrow \Rightarrow R^d \uparrow$
- demand curve slopes downward when $i_{ff} > i_{or}$



$i_{ff} = i_{or}$

- opportunity cost of holding reserves: $i_{ff} - i_{or} = 0$
- no incentive to lend in the overnight market; banks can hold infinite excess reserves
- demand curve is flat exactly at i_{or}



Supply Curve

2 components of quantity of reserves supplied: $R^s = NBR + BR$

- NBR: open market operations conducted by the Fed
- BR: borrowing from the Fed, discount loan
  - i_d :discount rate, cost of BR

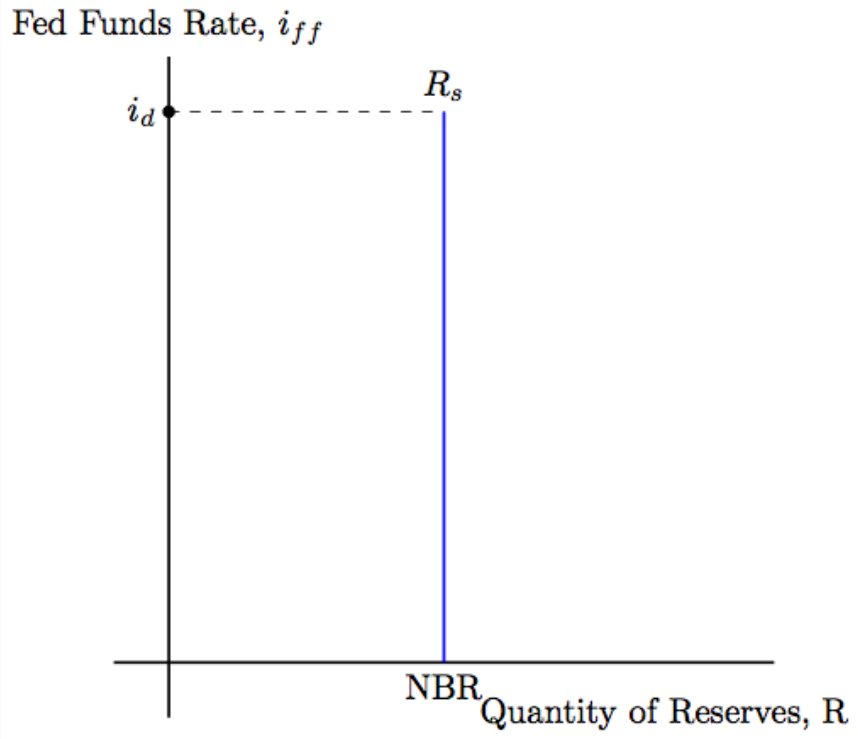
- borrowing from other banks in the fed funds market is a substitute for borrowing from the Fed, BR

- Since 2003, the Fed has kept the discount rate at a fixed amount **above** the fed funds rate target (why?)

- Supply curve for reserves: how changes in **federal funds rate** affects **the quantity of reserves supplied by the Fed**

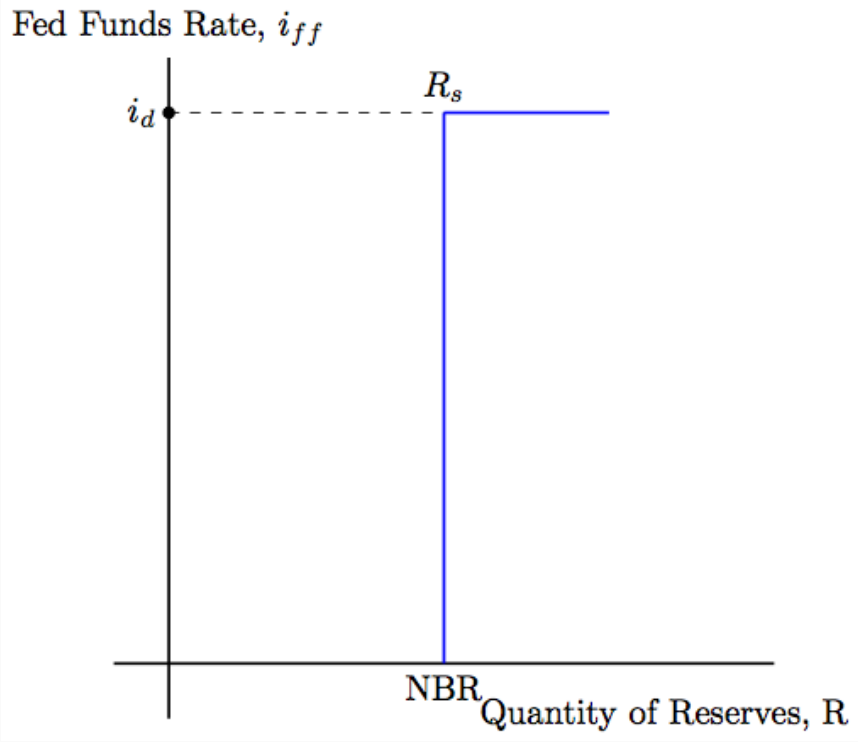
$i_{ff} < i_d$

- no banks will borrow from the Fed, and all banks will borrow in the overnight market
- $i_{ff} < i_d : BR = 0, R^s = BR + NBR = NBR$
- supply curve will be vertical at NBR



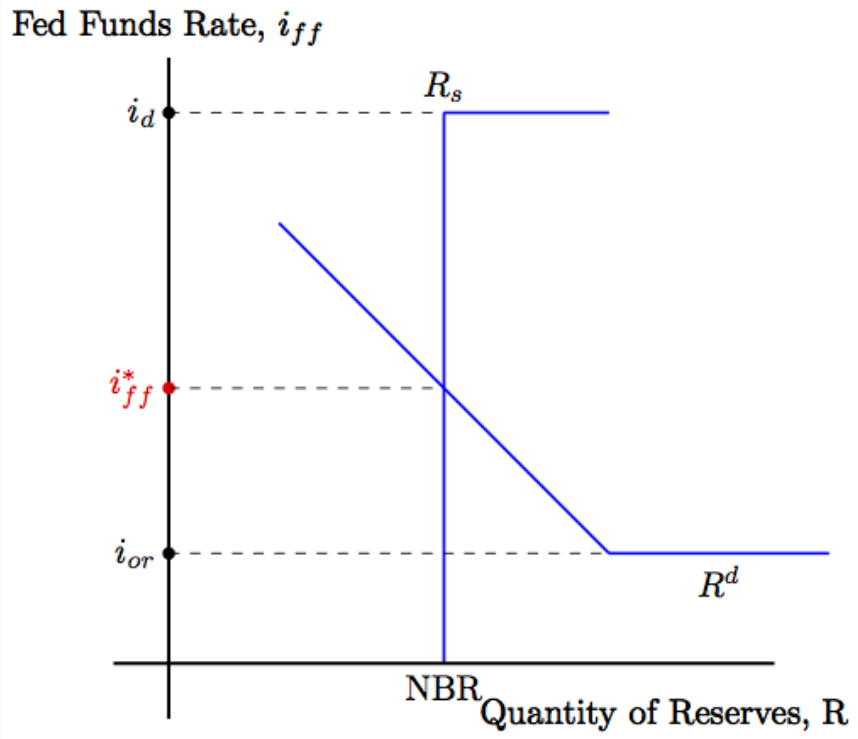
$i_{ff} = i_d$

- $i_{ff} = i_d$: banks have no incentive to borrow in the overnight market; banks can hold infinite excess reserves
- supply curve is flat exactly at i_d



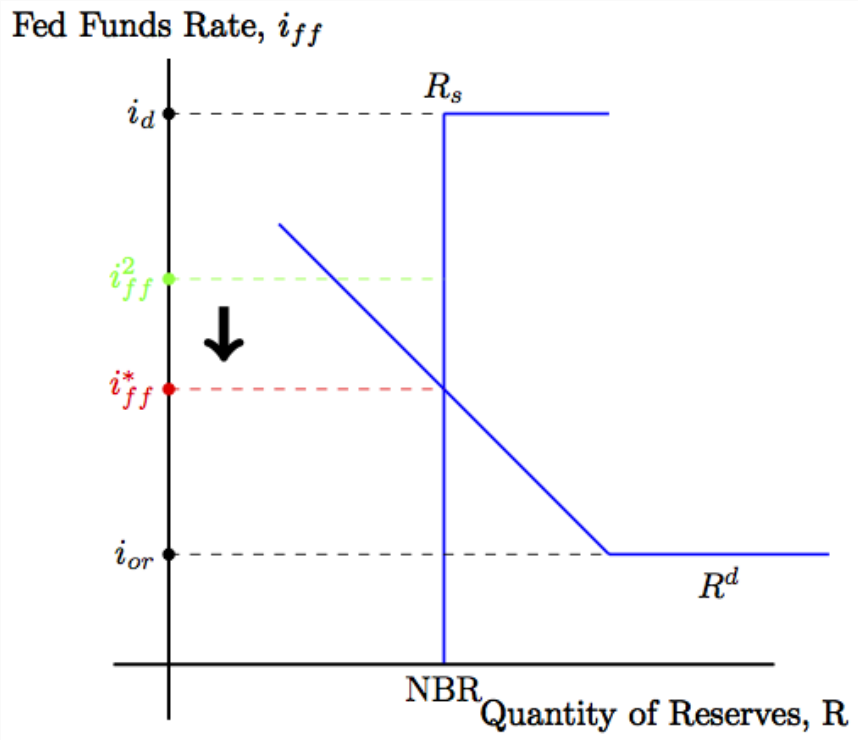
Reserves Market Equilibrium

- Reserves market equilibrium: $R^s = R^d$
- equilibrium federal funds rate: i^*_{ff} , also called **fed fund rate target**



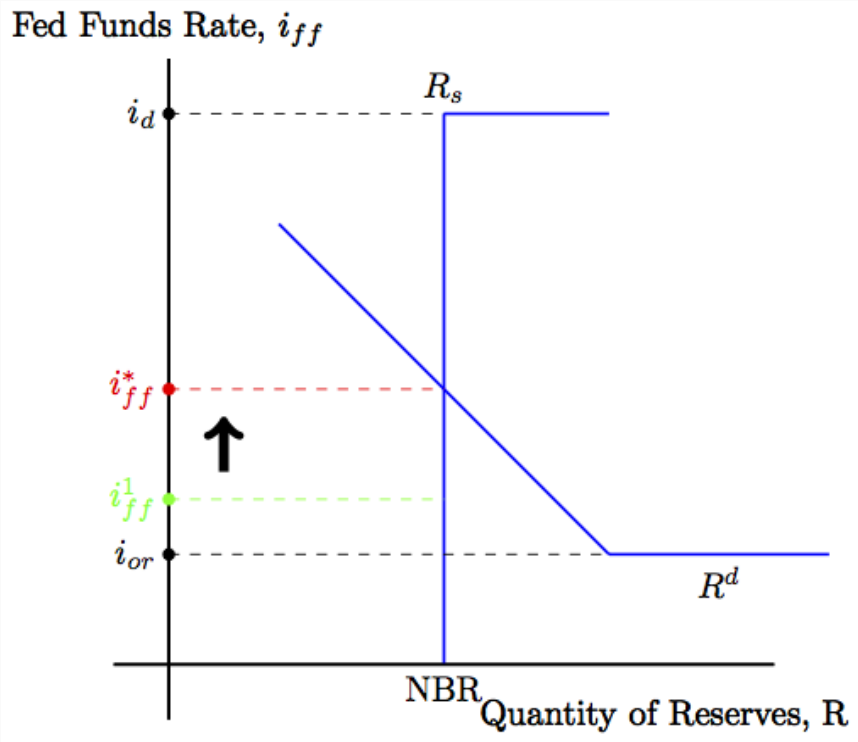
Reserves Market Equilibrium

- excess supply: when $i_{ff} > i^*_{ff}$ (e.g. i^2_{ff})
- i_{ff} will fall until it reaches i^*_{ff}



Reserves Market Equilibrium

- excess demand: when $i_{ff} < i^*_{ff}$ (e.g. i^1_{ff})
- i_{ff} will rise until it reaches i^*_{ff}



Tools of Monetary Policy

Tools of Monetary Policy

- tools of monetary policy used by the Fed to control the money supply
  - open market operations
  - discount policy
  - reserve requirements
  - interest paid on reserves
- How Changes in the Tools Affect the Federal Funds Rate Target?

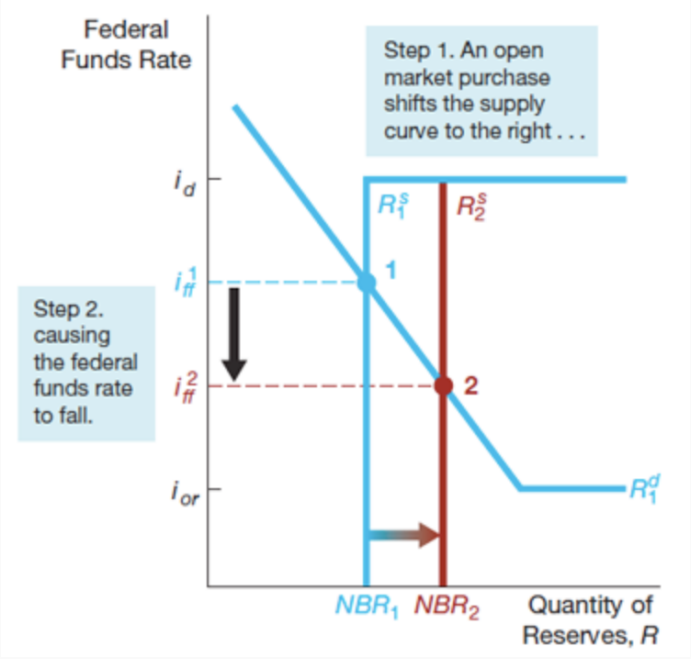
I. Open Market Operations

- the Fed purchases and sells U.S. Treasury securities, especially U.S. Treasury bills (the most liquid)
- the trading desk at the Federal Reserve Bank of New York conduct the actual execution by a computer system called TRAPS (Trading Room Automated Processing System)

I. Open Market Operations

(1) intersecting the downward-sloped section of the demand curve

- open market purchase: $NBR \uparrow \Rightarrow$ supply curve shifts to the right $\Rightarrow$ fed funds rate $\downarrow$, and equilibrium level of reserves increases from NBR_1 to NBR_2



I. Open Market Operations

(1) intersecting the downward-sloped section of the demand curve

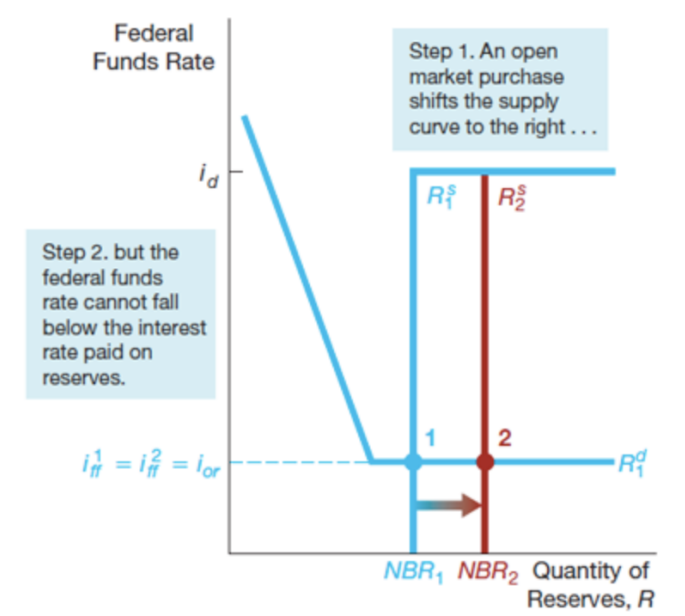
- open market sale: $NBR \downarrow \Rightarrow$ supply curve shifts to the left $\Rightarrow$ fed funds rate target $\uparrow$, and equilibrium level of reserves decreases
- **Participation #10** Exercise: graphically show the impact on fed funds rate of an open market sale, when vertical section of supply curve initial intersects demand curve at downward-sloped section

I. Open Market Operations

(2) intersecting the flat section of the demand curve

- open market purchase have no effect on the fed funds rate, which stays at i_{or}, but equilibrium level of reserves increases from $NBR1$ to $NBR2$

- the interest rate paid on reserves, i_{or}, sets a floor for the fed funds rate



I. Open Market Operations

(2) intersecting the flat section of the demand curve

- open market sale have no effect on the fed funds rate, which stays at i_{or}, but equilibrium level of reserves decreases
- **Participation #10** Exercise: graphically show the impact on fed funds rate of an open market sale, when the vertical section of supply curve initially intersects the demand curve at its flat section

I. Open Market Operations - Summary

- **supply** curve shifts to **left or right**
- if the vertical section of the supply curve initially intersects demand curve on the downward-sloped section
  - open market **purchase** causes the fed funds rate to **fall**
  - open market **sale** causes the fed funds rate to **rise**
- if the vertical section of the supply curve initially intersects demand curve on the flat section of the demand curve
  - open market purchase or sale has no effect on the fed funds rate
  - interest rate paid on reserves sets a **floor** for the fed funds rate

II. Discount Lending

- The discount rate differs from most interest rates because it is set by the Fed, whereas most interest rates are determined by demand and supply in financial markets

- discount rate is set **higher** than the federal funds rate target:

  - the discount rate is a penalty rate, as banks pay a penalty by borrowing from the Fed rather than from other banks
  - banks borrowing from the Fed are usually desperate for funds or are in trouble

II. Discount Lending

- Why does the Fed set discount rate higher than the federal funds rate target?
  - the Fed prefers that banks borrow from each other so that banks continually monitor each other for credit risk
- before the financial crisis, lending by the Fed was just a few hundred million dollars
  - increases dramatically after the collapse of Lehman Brothers in 2008
  - peaks at $993.5 billion in December 2008

II. Discount Lending

Categories of Discount Loans:

- Primary credit consists of discount loans available to healthy banks experiencing temporary liquidity problems. Use of funds is not monitored
- Secondary credit consists of discount loans to banks that are not eligible for primary credit. Use of funds is monitored
- Seasonal credit consists of discount loans to smaller banks in areas where agriculture or tourism is important

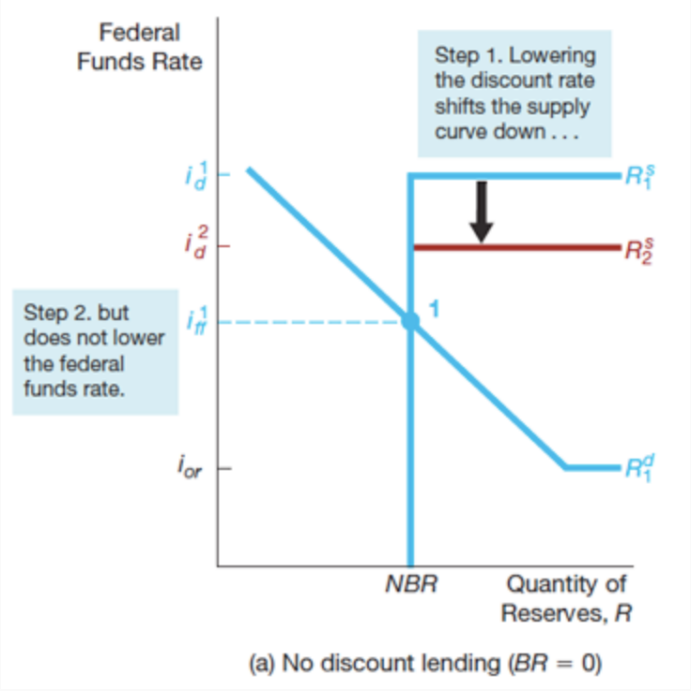
II. Discount Lending

- the Fed: lender of last resort
  - A lender that provides reserves to financial institutions when no one else is willing to do so; such lending is usually done to prevent a financial crisis
- discount loans is important in preventing and coping with financial panics
  - The Black Monday crash
  - the terrorist attacks of September 11, 2001
  - and the global financial crisis
- The Fed's lender-of-last-resort role has thus created a moral hazard problem: too big to fail

II. Discount Lending

(1) intersecting the vertical section of supply curve

- initially: no discount lending, $BR = 0$
- Fed $\downarrow$ discount rate $\Rightarrow$ supply curve shiftd down $\Rightarrow$ fed funds rate unchanged



II. Discount Lending

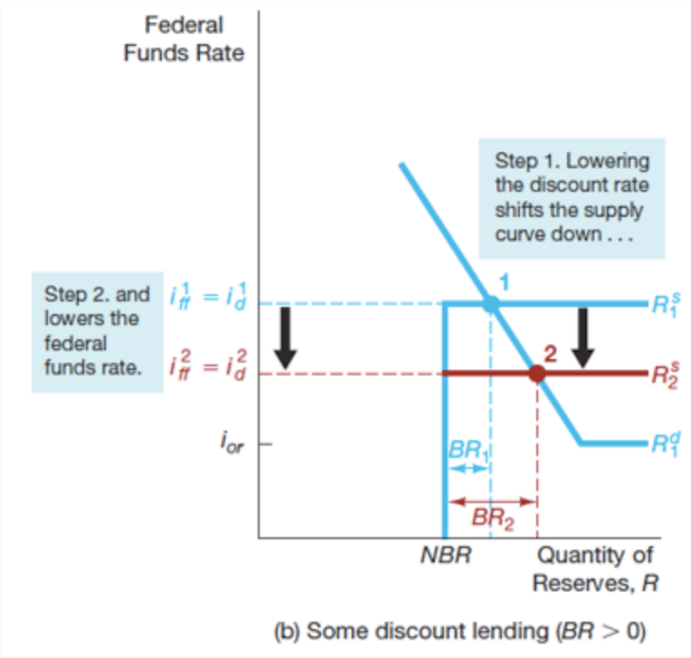
(1) intersecting the vertical section of supply curve

- initially: no discount lending, $BR = 0$
- Fed $\uparrow$ discount rate $\Rightarrow$ supply curve shiftd up $\Rightarrow$ fed funds rate unchanged
- **Participation #10** Exercise: graphically show the impact on fed funds rate of an increase in the discount rate, when the vertical section of the supply curve intersects the demand curve at the downward-sloped section

II. Discount Lending

(2) intersecting the flat section of supply curve

- initially: discount lending exists, $BR_1 > 0$, $i_{ff}^1 = {i_d}^1$
- Fed $\downarrow$ discount rate $\Rightarrow$ supply curve shiftd down $\Rightarrow$ the fed funds rate falls from ${i_d}^1$ to ${i_d}^2$, and BR increases from BR_1 to BR_2



II. Discount Lending

(2) intersecting the flat section of supply curve

- initially: discount lending exists, $BR_1 > 0$, $i_{ff}^1 = {i_d}^1$
- Fed $\uparrow$ discount rate $\Rightarrow$ supply curve shiftd up $\Rightarrow$ the fed funds rate rises, and BR falls
- **Participation #10** Exercise: graphically show the impact on fed funds rate of an increase in the discount rate, when the flat section of the supply curve intersects the demand curve at the downward-sloped section

II. Discount Lending - Summary

- **supply** curves shifts **up or down**
- if the downward-sloped section of the demand curve initially intersects supply curve on the vertical section
  - no discount lending
  - changes in discount rate have no effect on the fed funds rate
  - the Fed typically keeps discount rate above the fed funds rate target
- if the downward-sloped section of the demand curve initially intersects supply curve on the flat section
  - some discount lending
  - lower discount rate causes the fed fund rate to fall
  - higher discount rate causes the fed fund rate to rise