International Monetary Policy

5 Interest Rate [1]

Michele Piffer

London School of Economics

[1] Course prepared for the Shanghai Normal University, College of Finance, April 2012

Lecture topic and references

- In this lecture we learn how central banks can influence the market of reserves and the interbank interest rate
- Mishkin, Chapter 15; D. Thorthon, *The Fed, Liquidity, and Credit Allocation*, Fed paper, 2009

Review from previous lecture

- $M^s = C + D$, but it is endogenous since not fully controlled by central bank
- $MB = C + R$, which can be changed via
  1. T-bonds on primary market
  2. OMOs
  3. Discount window
  4. International reserves
- $M^s = \frac{c+1}{c+r+e} MB$

Market of Reserves

- So far you have seen how central banks can influence the money supply. In short, they have 3 instruments:

  1. OMOs: change the monetary base (through non-borrowed reserves), which will influence money supply through the multiplier

  2. Reserve requirement: influence the multiplier while leaving the monetary base unchanged

  3. Lending conditions at the discount window: affect the monetary base (through borrowed reserves), which will influence money supply through the multiplier

(there is actually a 4th possibility: intervene on foreign exchange markets by trading on foreign currency. It works only in fixed exchange regimes)

Market of Reserves

- But if you want to understand really how central banks run their monetary policy you cannot stop here. You need to understand how the market of reserves works and how the above 3 instruments influence it.

Market of Reserves

- We saw that commercial banks have an account at the central bank, which they use to deposit reserves
- This is the account used on interbank payments through the payment system. If one person makes a bank payment to another who has a bank account in a different bank, the operation goes through the banks accounts of these banks by the central bank
- This is also the account used by banks to borrow and lend from each other any excess reserves that they might have

Market of Reserves

- We saw that banks have to hold a minimum required amount of reserves proportional to their deposits. Any amount in excess could be held for (?) [ ] , or could be lent to other banks
- The market of reserves is the interbank market on which banks trade these reserves at the interbank interest rate
- This is an important interest rate in the economy. Since it affects the entire yield curve in the economy (i.e. longer term rates), if the central bank can influence this rate it can influence the economy

Market of Reserves

- We saw that banks have to hold a minimum required amount of reserves proportional to their deposits. Any amount in excess could be held for precautionary reasons, or could be lent to other banks
- The market of reserves is the interbank market on which banks trade these reserves at the interbank interest rate
- This is an important interest rate in the economy. Since it affects the entire yield curve in the economy (i.e. longer term rates), if the central bank can influence this rate it can influence the economy

Market of Reserves

- But of course CBs cannot dictate an interbank interest rate! Market players are free to interact and trade at the rate that they prefer
- The only way CBs have is to influence market players *(?)* [ ]. Let's see how

Market of Reserves

- But of course CBs cannot dictate an interbank interest rate! Market players are free to interact and trade at the rate that they prefer
- The only way CBs have is to influence market players *incentives*. Let's see how

Market of Reserves

- The first thing to understand is that the CB can create a *corridor* of fluctuation for the interbank rate
- We saw that the CB promises to make loans on the discount window. Call i_d this discount rate. Will the equilibrium interbank rate ever go above i_d?
- Of course not, nobody would (?) [ ] at that higher interest rate, they would simply go to the CB

Market of Reserves

- The first thing to understand is that the CB can create a *corridor* of fluctuation for the interbank rate
- We saw that the CB promises to make loans on the discount window. Call i_d this discount rate. Will the equilibrium interbank rate ever go above i_d?
- Of course not, nobody would borrow at that higher interest rate, they would simply go to the CB

Market of Reserves

- Similarly, call i_{er} the rate paid by the CB on excess reserves. Will i_d will ever fall short this interest rate?
- Of course not, nobody would (?) [ ] at this rate, banks would just leave their reserves on their account at the CB
- Having said this, we only have to determine the shape of the demand and supply curves for reserves. The interbank rate will be determined by equilibrium forces
- Following the textbook by Mishkin, call the interbank interest rate the Federal Funds Rate (i_{ff})

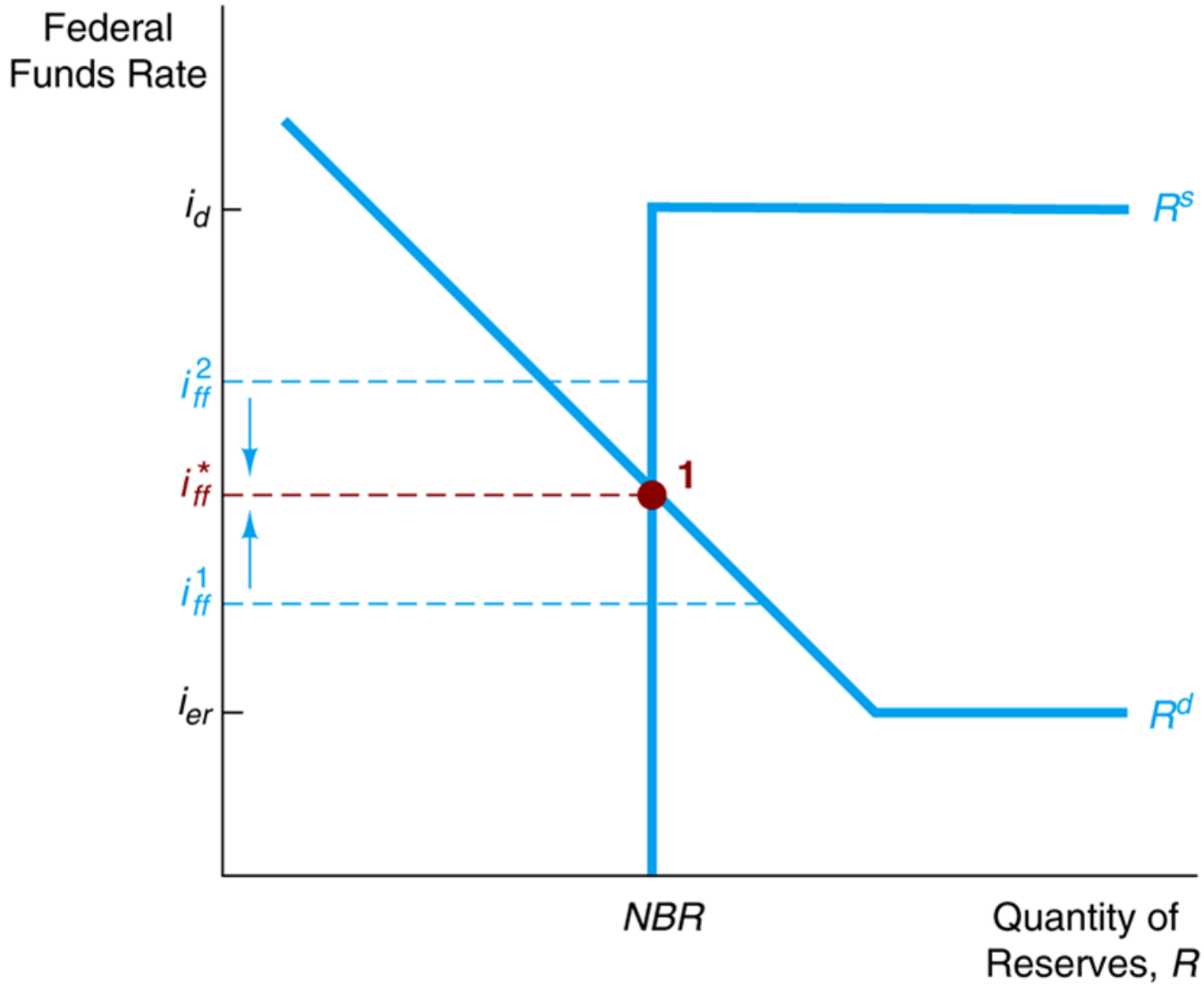
Market of Reserves

- Similarly, call i_{er} the rate paid by the CB on excess reserves. Will i_d will ever fall short this interest rate?
- Of course not, nobody would lend at this rate, banks would just leave their reserves on their account at the CB
- Having said this, we only have to determine the shape of the demand and supply curves for reserves. The interbank rate will be determined by equilibrium forces
- Following the textbook by Mishkin, call the interbank interest rate the Federal Funds Rate (i_{ff})

Market of Reserves

- By lending excess reserves, banks earn the fed funds rate and loose the rate on excess reserves offered by the CB
- The demand for reserves is decreasing in i_{ff}, until rate i_{er}, where it becomes flat
- The supply of reserves coincides with the amount of money that the CB has issued as non-borrowed reserves (via OMO)
- For an interbank rate lower than the discount window nobody borrows from the CB. If $i_{ff} = i_d$ then any supply of reserves is possible through the discount window (depending on how much banks will borrow)

Market of Reserves



Monetary Policy and the Interbank Rate

- Now that you see how the equilibrium on the market of reserves is determined, let's see how CBs can influence the equilibrium interest rate
- Different monetary policy operations will impact on either the supply curve or the demand curve, moving the equilibrium interest rate
- Let's consider the 3 instruments of monetary policy one at the time

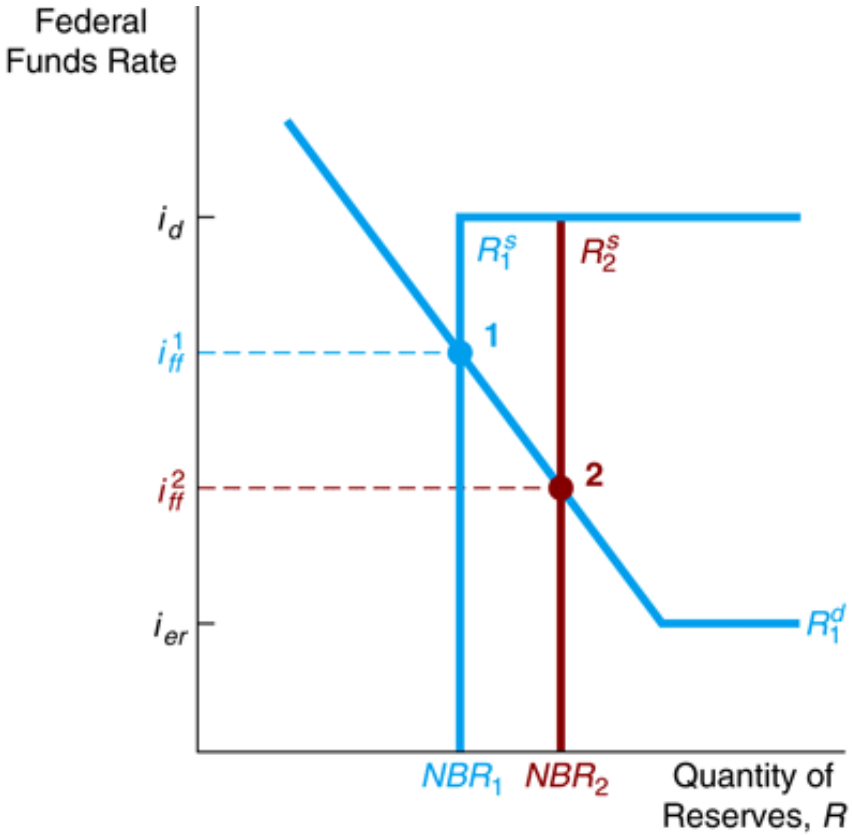
1. OMOs and the Interbank Rate

- OMOs affect the amount of non-borrowed reserves available in the system
- Consider a monetary policy expansion, where the CB (?) [ ] securities from the market and increases the monetary base in exchange
- The supply curve will shift to the right. But the effect on the equilibrium interest rate depends on the initial condition

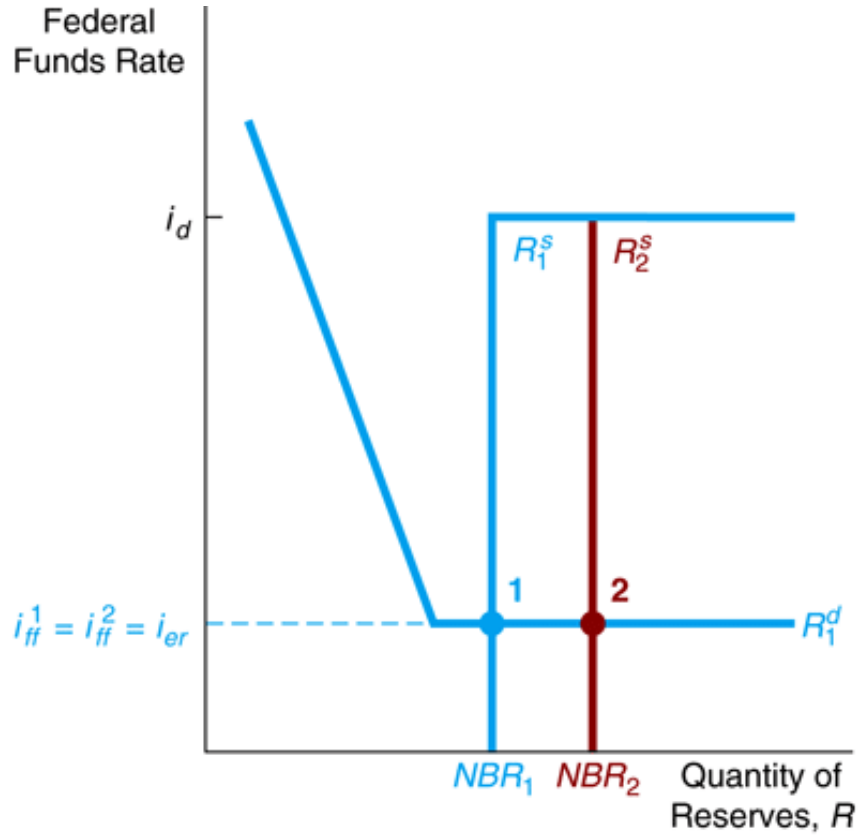
1. OMOs and the Interbank Rate

- OMOs affect the amount of non-borrowed reserves available in the system
- Consider a monetary policy expansion, where the CB buys securities from the market and increases the monetary base in exchange
- The supply curve will shift to the right. But the effect on the equilibrium interest rate depends on the initial condition

1. OMOs and the Interbank Rate



(a) Supply curve initially intersects demand curve in its downward-sloping section



(b) Supply curve initially intersects demand curve in its flat section

1. OMOs and the Interbank Rate

- An open market purchase causes the interbank rate to (?) [ ] , unless it has already hit the minimum rate of i_{ef}
- An open market sale causes the interbank rate to (?) [ ] , unless it has already hit the maximum rate of i_d

1. OMOs and the Interbank Rate

- An open market purchase causes the interbank rate to fall, unless it has already hit the minimum rate of i_{ef}
- An open market sale causes the interbank rate to increase, unless it has already hit the maximum rate of i_d

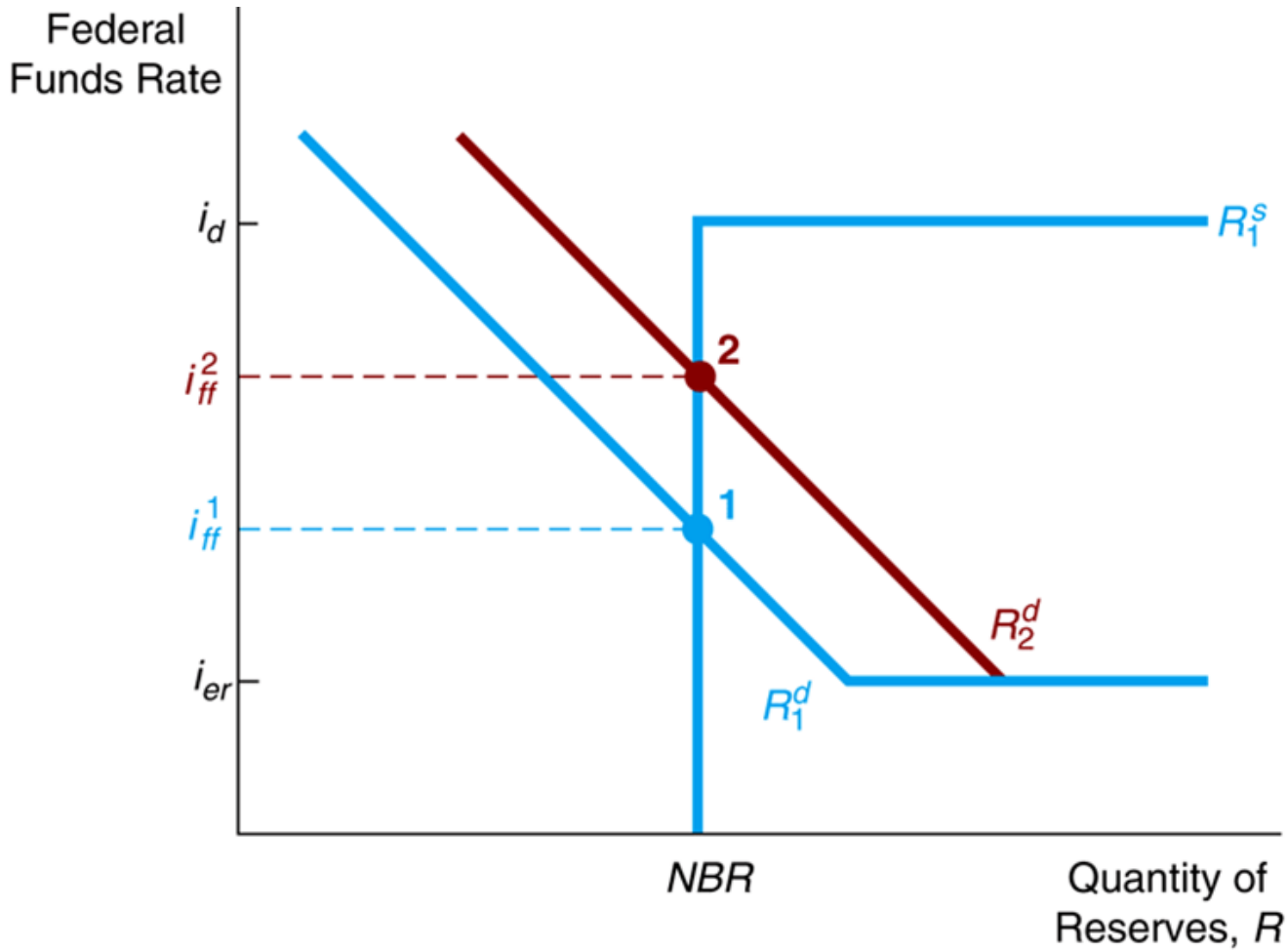
2. Reserve Requirement and the Interbank Rate

- The reserve requirement affects the demand for reserves
- Consider a monetary policy contraction, where the reserve requirement is (?) [ ]
- The demand for reserves will shift to the right. But the effect on the equilibrium interest rate depends on the initial condition

2. Reserve Requirement and the Interbank Rate

- The reserve requirement affects the demand for reserves
- Consider a monetary policy contraction, where the reserve requirement is increased
- The demand for reserves will shift to the right. But the effect on the equilibrium interest rate depends on the initial condition

2. Reserve Requirement and the Interbank Rate



2. Reserve Requirement and the Interbank Rate

- An increase in the reserve requirement causes the interbank rate to (?) [ ] , unless it has already hit the maximum rate of i_d
- A decrease in the reserve requirement causes the interbank rate to (?) [ ] , unless it has already hit the minimum rate of i_{ef}

2. Reserve Requirement and the Interbank Rate

- An increase in the reserve requirement causes the interbank rate to increase, unless it has already hit the maximum rate of i_d
- A decrease in the reserve requirement causes the interbank rate to decrease, unless it has already hit the minimum rate of i_{ef}

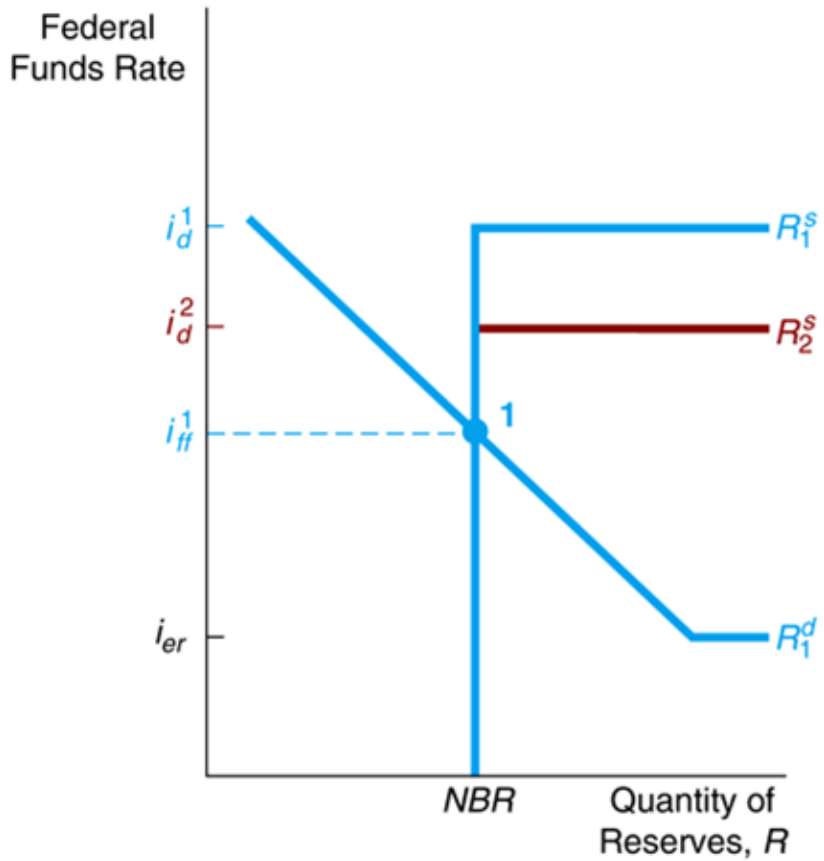
3. Discount Lending and the Interbank Rate

- The discount lending affects the condition of lending on the discount window
- Consider an expansionary monetary policy, where the CB (?) [ ] the discount rate
- The supply curve or reserves will shift down. But the effect on the equilibrium interest rate depends on the initial condition

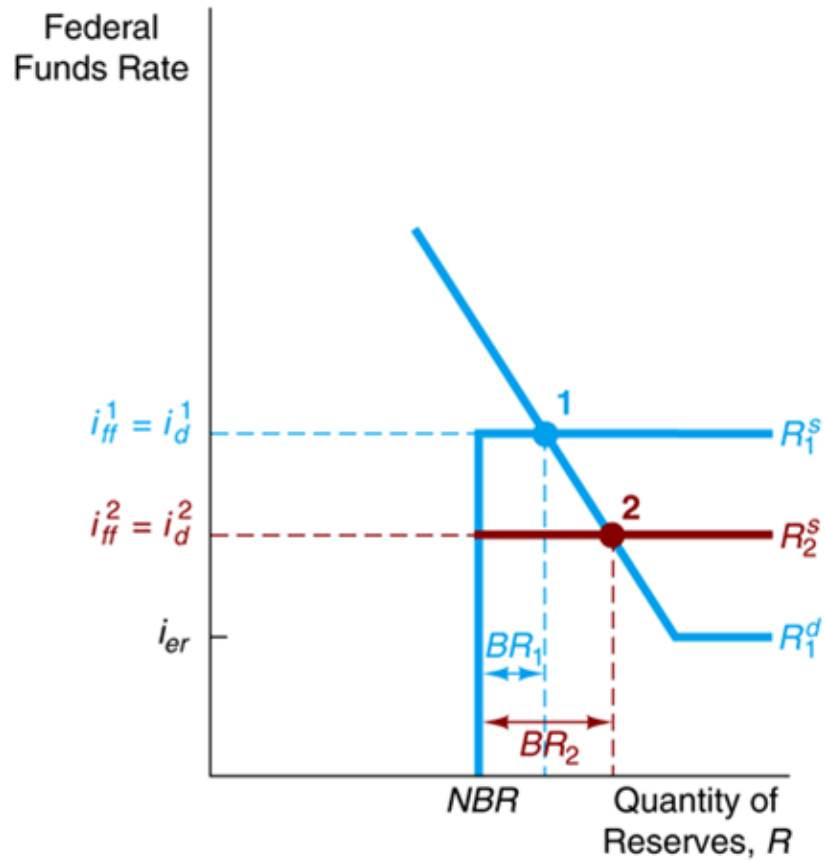
3. Discount Lending and the Interbank Rate

- The discount lending affects the condition of lending on the discount window
- Consider an expansionary monetary policy, where the CB decreases the discount rate
- The supply curve or reserves will shift down. But the effect on the equilibrium interest rate depends on the initial condition

3. Discount Lending and the Interbank Rate



(a) No discount lending ($BR = 0$)



(b) Some discount lending ($BR > 0$)

3. Discount Lending and the Interbank Rate

- An increase in the discount rate causes no effect on the interbank rate, unless it has already hit the maximum rate of i_d
- A decrease in the reserve requirement causes no effect on the interbank rate, unless it has already hit the maximum rate of i_d

Exercise 1 on Market of Reserves

- Consider a situation where the interbank rate has hit the maximum level. Discuss the following propositions:
- Any reduction in the non-borrowed monetary base through OMOs will increase the interbank rate. True or false?
- Any expansion in the non-borrowed monetary base through OMOs will decrease the interbank rate. True or false?

Monetary Policy in Practice

- The analysis so far shows that central banks can use their instrument on money supply to affect the interbank interest rate
- In practice, the reserve requirement is not active for many banks, so that channel is hardly used nowadays
- Similarly, the discount window is used more for lending of last resort capacities and for imposing an (?) [ ] bound to the market rate
- This leaves OMOs, which is in fact what is constantly used by central banks (at least in normal times)

Monetary Policy in Practice

- The analysis so far shows that central banks can use their instrument on money supply to affect the interbank interest rate
- In practice, the reserve requirement is not active for many banks, so that channel is hardly used nowadays
- Similarly, the discount window is used more for lending of last resort capacities and for imposing an upper bound to the market rate
- This leaves OMOs, which is in fact what is constantly used by central banks (at least in normal times)

Monetary Policy in Practice

- There is actually a fourth instrument that central banks use to influence the interbank market: *communication*
- By announcing that it is targeting an interest rate of, say 2 % the CB is implicitly committing to run all the necessary OMOs in order to achieve that target

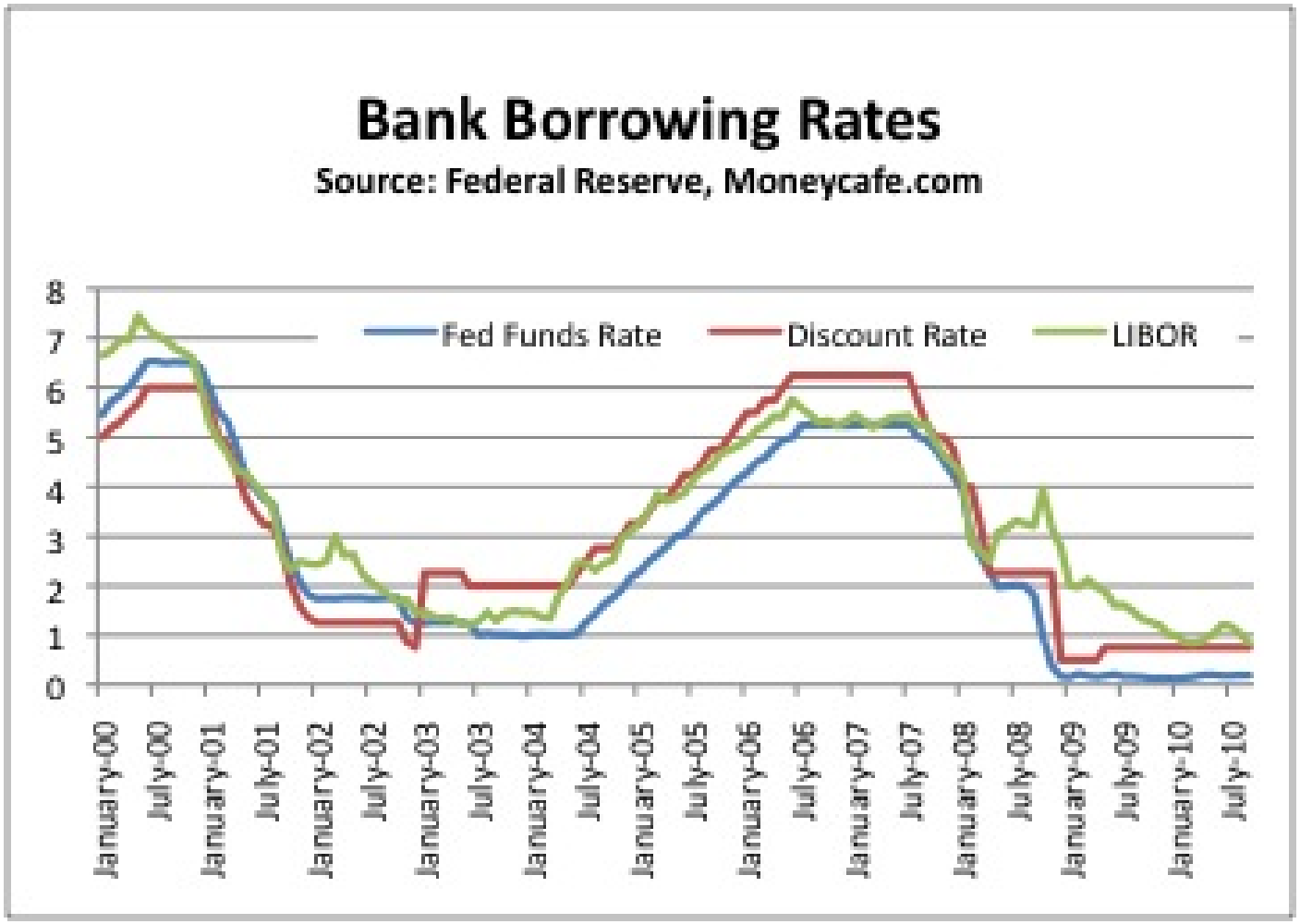
Monetary Policy in Practice

- Knowing this, market players react to the announcement by moving the contractual interest rate towards the new target (think of this as a shift of the demand for reserves)
- This means that the CB ex post will have to run even less OMOs to achieve its goal!
- This is usually what you see in practice when you read that the central bank has decreased the interest rate. It usually means the TARGET rate on the interbank market

Monetary Policy in Practice

- Well, this is what happens in normal times: CB announces a target on the interbank rate, markets adjust, and eventually CB runs OMO to achieve the target
- During the subprime crisis this turned out to be far from enough. The biggest problem is that financial institutions in need for extra finance did not want to borrow from the discount window, in order not to signal to the market that they were in troubles
- The interbank market went even above the discount rate. The Fed had to invent alternative funding facilities to overcome this problem

Some Real Data



FED vs. Subprime crisis: what happened

1. August 2007: decreased discount rate to 50 basis points above fed funds rate

2. September 2007: extended discount condition from overnight to 30-90 days

3. December 2007: Term Auction Facility allows banks to borrow through an auction instead via discount windows, to overcome stigma problem

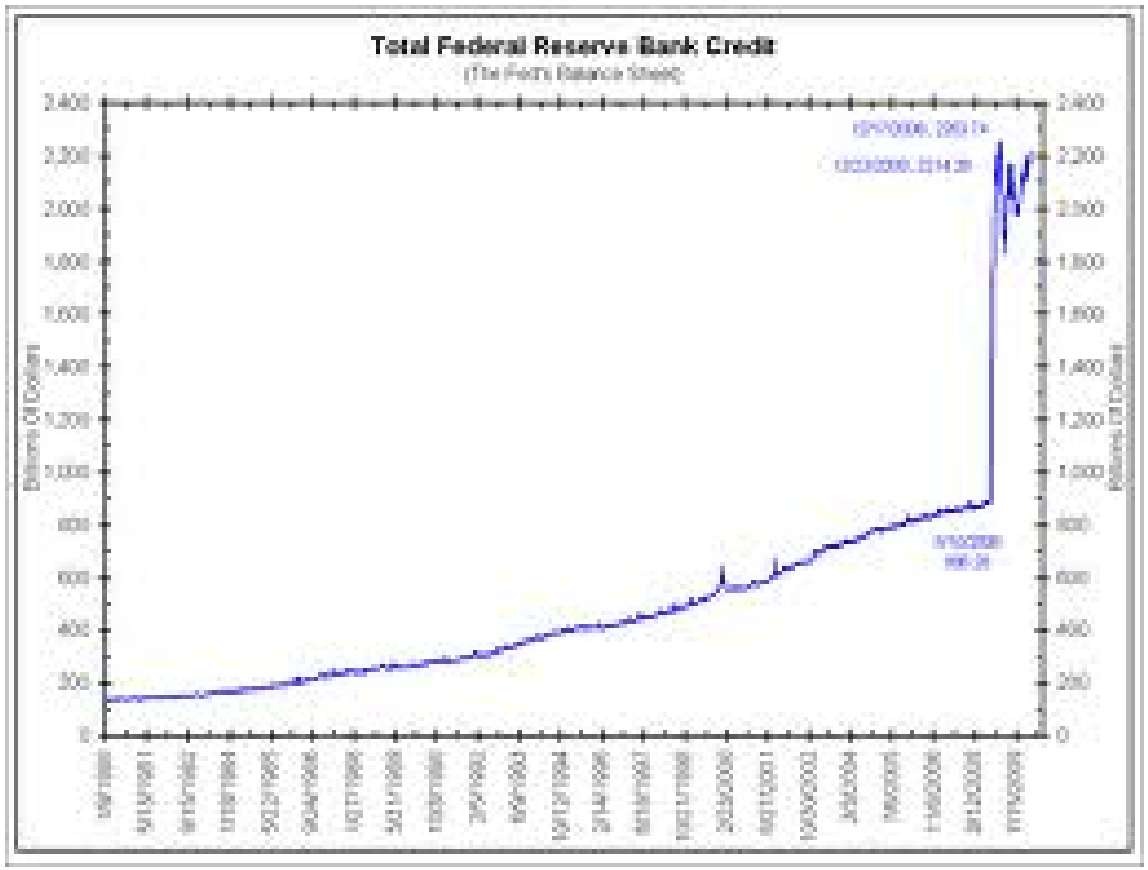
4. March 2008: decreased discount rate to 25 basis points; Terms Securities Lending Facility allows to borrow treasury securities from CB for collateral; Primary Dealer Credit Facility allows investment banks to borrow from discount window

5. (other lending facilities, for mutual funds, money market investors, government sponsored agencies,...)

FED vs. Subprime crisis: what happened

- At the beginning the Fed offset the effects of the increase in the lending facilities through OMOs of opposite sign
- This was in order to direct the extra liquidity towards targeted institutions that needed it, not to increase the money supply for the entire economy
- After summer 2008 (Lehman Brothers goes bust) the Fed decided not to intervene with contractionary OMOs and allowed the Monetary Base to explode

Some Real Data



Plan for the Future

- Ok. We have started our analysis of central banking investigating its long-run objectives, basically price stability
- We have now seen the technical issues of that central banks can control within financial markets, and how monetary policy interventions affect market players' incentive
- We are almost close to complete the puzzle and understand what happens on the long and uncertain way that goes from the instruments (OMOs, interbank target, ...) to the long term objectives (price stability, ...), at least in normal times. We first need to understand how a short-term, nominal interest rates affects long-term real interest rate