

Advanced Monetary Economics

Tutorial 2

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Questions of lecture

1. What are reserves?
2. How does the market for reserves look like?
3. What are the tools of (conventional) monetary policy?

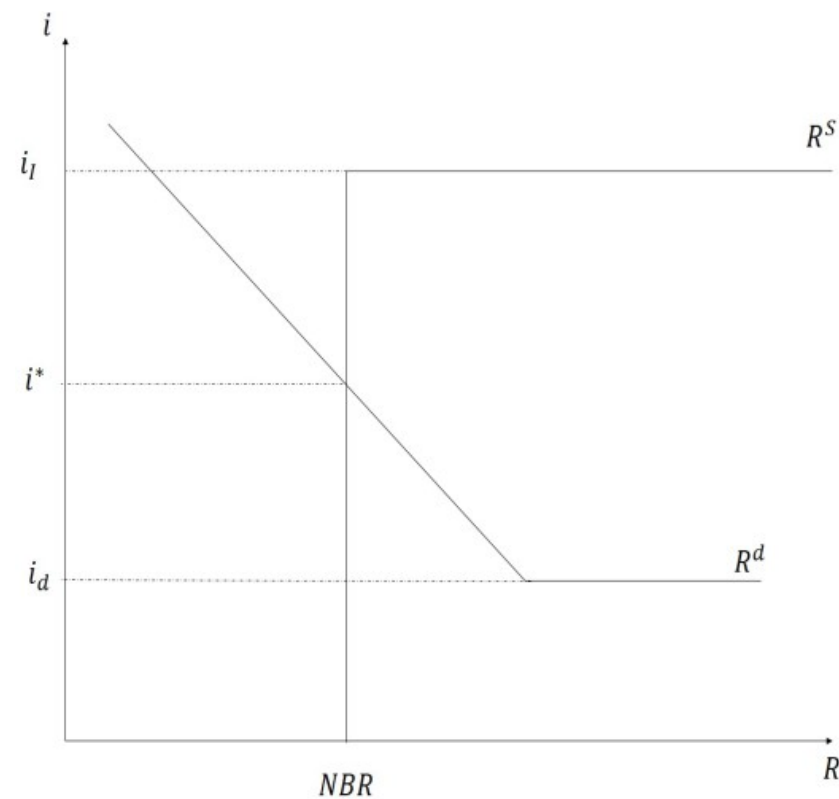
1 Exercise

Question: Name and explain the different interest rates of the central bank.

- The central bank sets the following interest rates:
 1. Main refinancing rate i ; determines the cost of overnight borrowing in the interbank market
 2. Marginal lending facility: banks can borrow reserves directly; usually: $i_l = MRR + 100$ basis points
 3. Deposit facility: banks can deposit reserves at the central bank; usually: $i_d = MRR - 100$ basis points
- A central bank tries to control i since the interbank interest rate is the decisive factor in determining credit and savings interest rates determined by the commercial banks (towards its customers).

2 Exercise

Question: Illustrate the market for reserves graphically. Explain the dependence of reserve supply and demand on the interbank interest rate.



- The central bank determines the supply of reserves:
 1. It sets the amount of non-borrowed reserves (NBR) through open market operations.
 2. It accommodates the additional reserve requirements (borrowed reserves, BR) by commercial banks at the interest rate i_l .
- If the interbank interest rate i is below i_l , the banks do not borrow further reserves from the central bank. The reserve supply of the central bank corresponds to the amount determined by open market operations (non-borrowed reserves, NBR). The reserves offered by the central bank at interest rate i_l (borrowed reserves, BR) are not lent in the event that $i < i_l$, as lending on the interbank market is cheaper ($i < i_l$ means that $\text{NBR} > 0$ and $\text{BR} = 0$).
- If the interbank interest rate is so high that $i = i_l$: Any slight increase in the interbank interest rate will cause commercial banks to borrow from the central

bank at the lower interest rate i_l and then to lend on the interbank market at the interest rate i . The reserve supply is then infinitely large or infinitely elastic (flat).

- Reserve demand (reserves above the minimum requirement):
 1. insurance against outflow of demand deposits
 2. commercial banks can leave reserves with central bank at interest rate i_d .
 3. commercial bank can invest short-term liquidity on the interbank market at interest rate i
 4. opportunity costs of "parking" reserves with the central bank: $i - i_d$ (lost short-term interest rate gains).
- If $i - i_d$ increases, the interbank investment becomes more attractive relative to the investment at the central bank. This means a withdrawal of reserves at the

central bank towards the interbank market (R^d decreases). If $i - i_d$ decreases, the investment at the central bank (as excess reserves) relative to investment in the interbank market is more attractive. This means a deduction of liquidity on the interbank market towards investment as central bank reserves (R^d increases).

- Should the interbank interest rate fall so far that $i = i_d$: Every smallest pressure to lower the interbank interest rate leads to an infinite accumulation of (surplus) reserves at the central bank (borrowing at interest rate i and investing at interest rate i_d): R^d is infinitely elastic (flat).
- Equilibrium
 1. $R^s = R^d$ at i^*
 2. Above i^* : excess supply of reserves, more attractive to lend out cash in the interbank market, i falls, which increases R^d until equilibrium is reached.

3. Below i^* : excess demand for reserves, i increases
4. Generally, the central bank conducts monetary policy under the condition that $i_l > i^* > i_d$ holds.

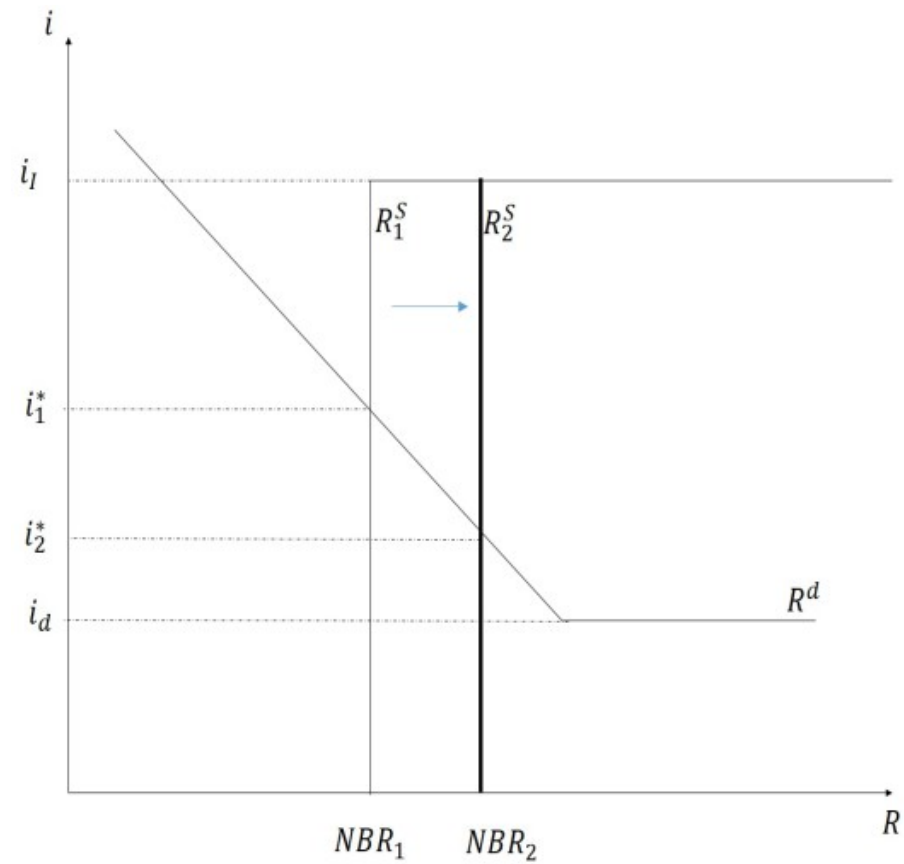
3 Exercise

Question: In the diagram of the reserve market, examine the reaction of the interbank interest rate to the following measures: (In (a) and (c): Also carry out the analysis with an initial equilibrium in the horizontal area of the demand curve. In (b): Perform the analysis also with an initial equilibrium in the horizontal range of the supply curve).

(a) Open market purchases of government securities

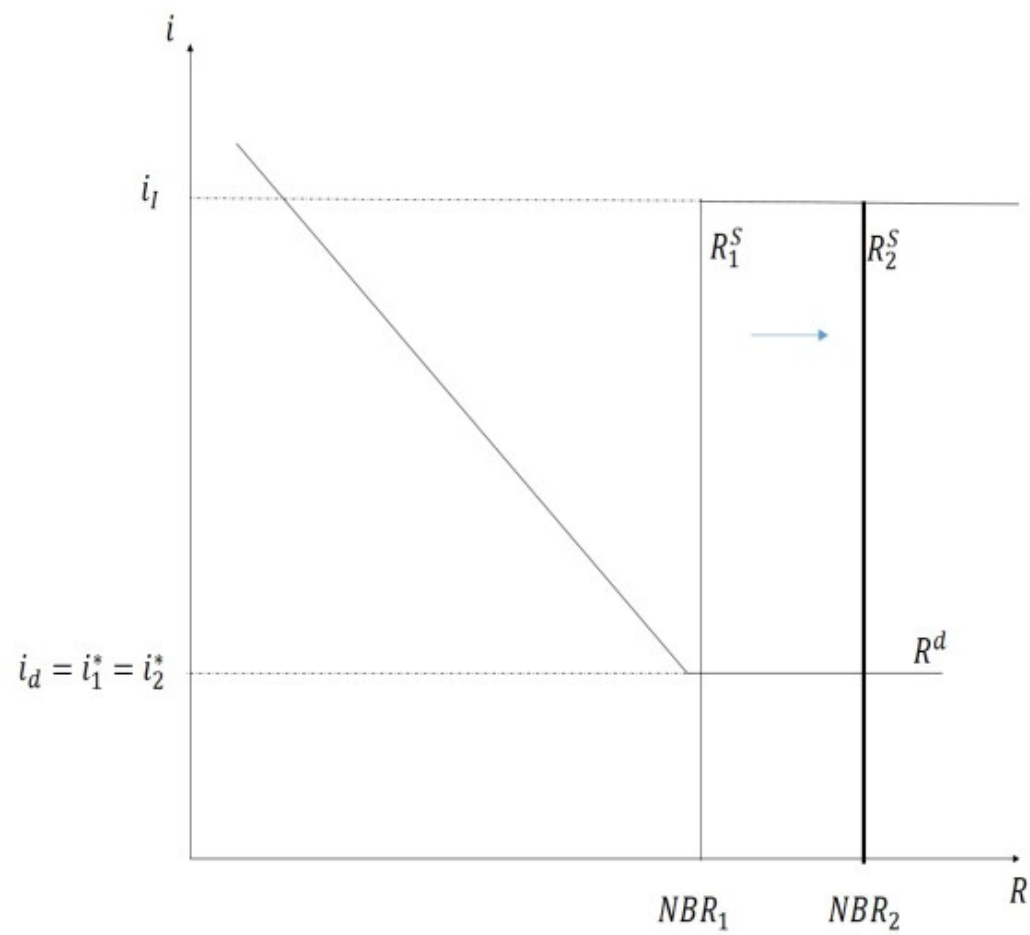
- An open market purchase of securities increases the amount of offered (not lent through facilities) reserves NBR. This reserve increase occurs for each given interbank interest rate i : The vertical range of R^s shifts parallel to the right.
- In the event that the central bank sets the interbank interest rate above the deposit rate (normal situation), the open market purchases lead to:
 - an increase in the volume of reserves traded
 - a decrease in the interbank interest rate.

- Graphically



- In the event that the interbank interest rate has already fallen to the level of the deposit rate:
 - constant interbank interest rate at the lower interest limit i_d and
 - increase in the amount of reserves (but fully absorbed into excess reserves).
- i cannot fall below i_d . Every slightest downward pressure to i leads to an infinitely large desired accumulation in excess reserves. The excess supply of reserves is completely absorbed as excess reserves held.

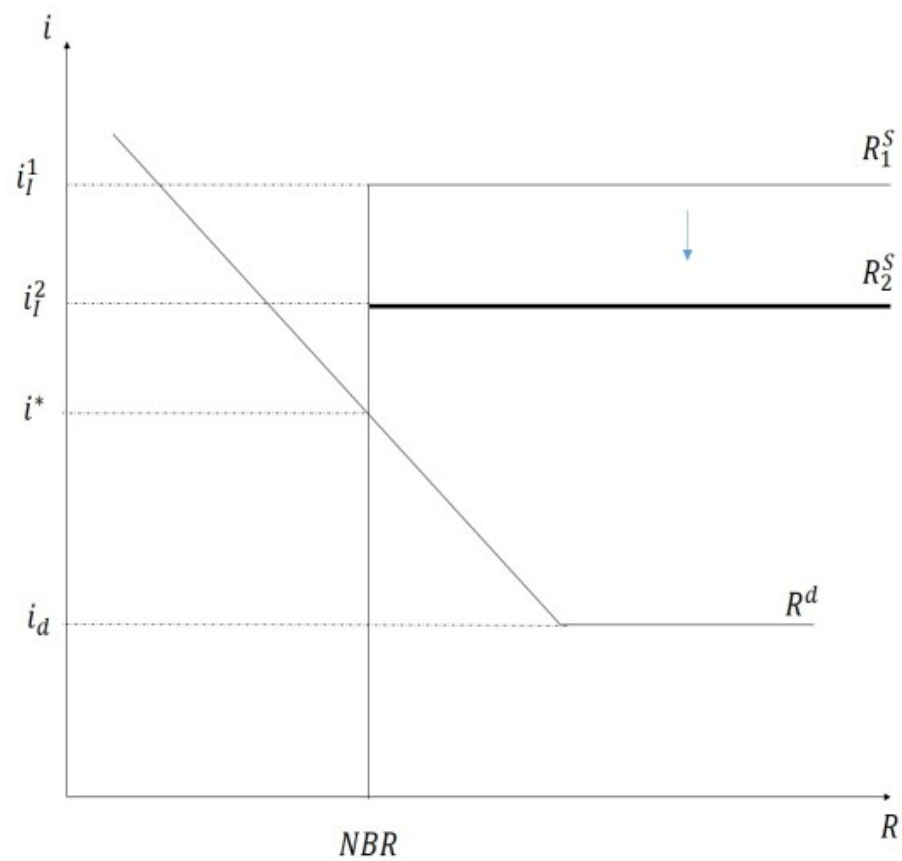
- Graphically



(b) Reduction of the marginal lending rate i_l .

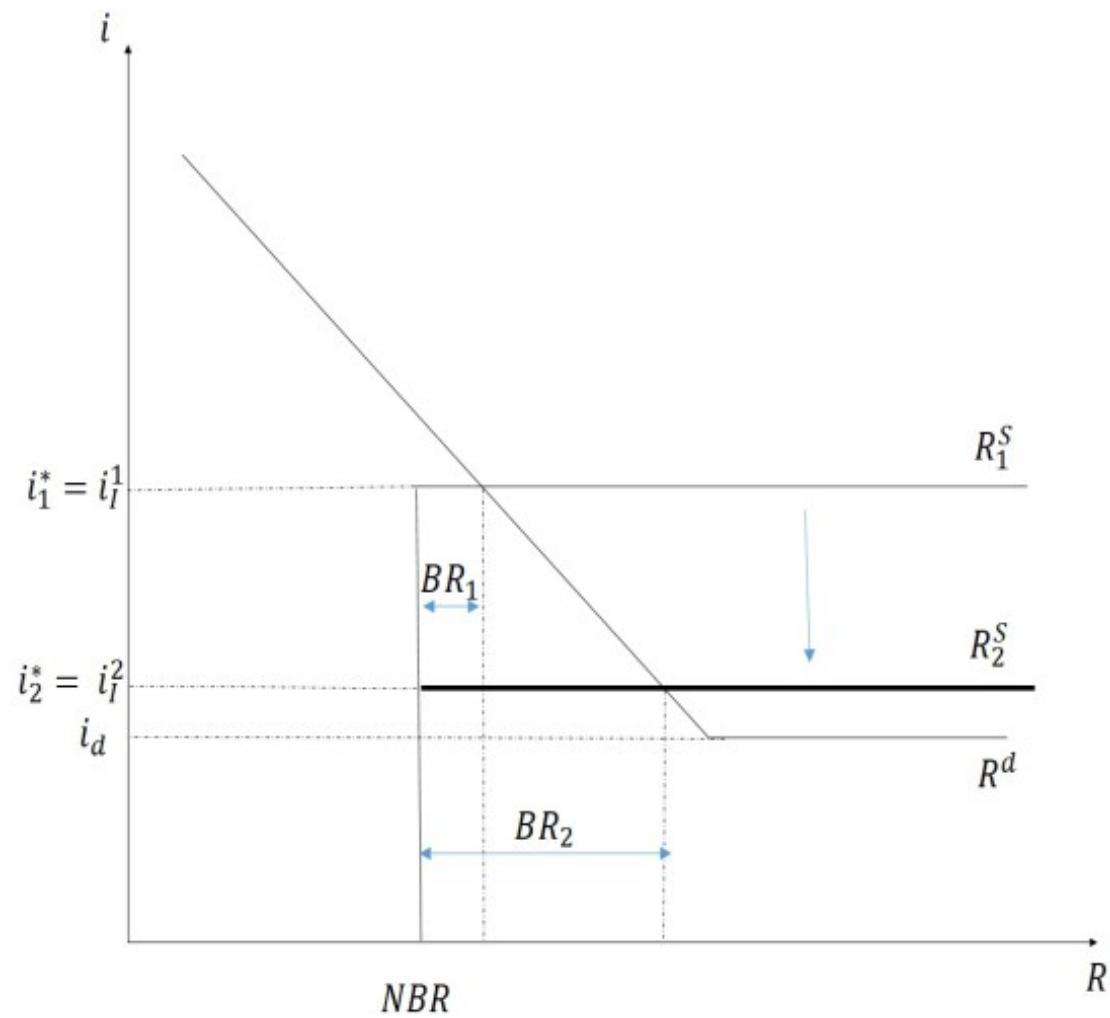
- A reduction in the marginal lending rate means that the central bank now offers its facilities at a lower interest rate.
- In the event that the central bank keeps the interbank interest rate below the refinancing rate i_l (normal situation), this results in
 - constant traded reserve quantity
 - constant interbank interest rate.
- Changes in the marginal lending rate generally have no effect on the interbank interest rate. Lending of reserves in the interbank sector remains relatively attractive. No directly borrowed reserves ($BR = 0$), still $NBR > 0$.

- Graphically



- In the event that the central bank keeps the marginal lending rate very low, the interbank interest rate will be based exactly on this level, $i_l = i$: Short-term loans on the interbank market cannot be cheaper than short-term central bank loans (see second point below). Reserves are partly lent directly ($BR > 0$), and $NBR > 0$ still applies. In this situation, a reduction of i_l leads to
 - an increase in the amount of borrowed reserves (BR). This increase means, if the interbank interest rate is initially fixed, an excess supply of reserves.
 - The excess supply of reserves lowers the interbank interest rate so that finally the interbank interest rate followed the lower interest rate for marginal lending ($i_l^2 = i_2^*$).

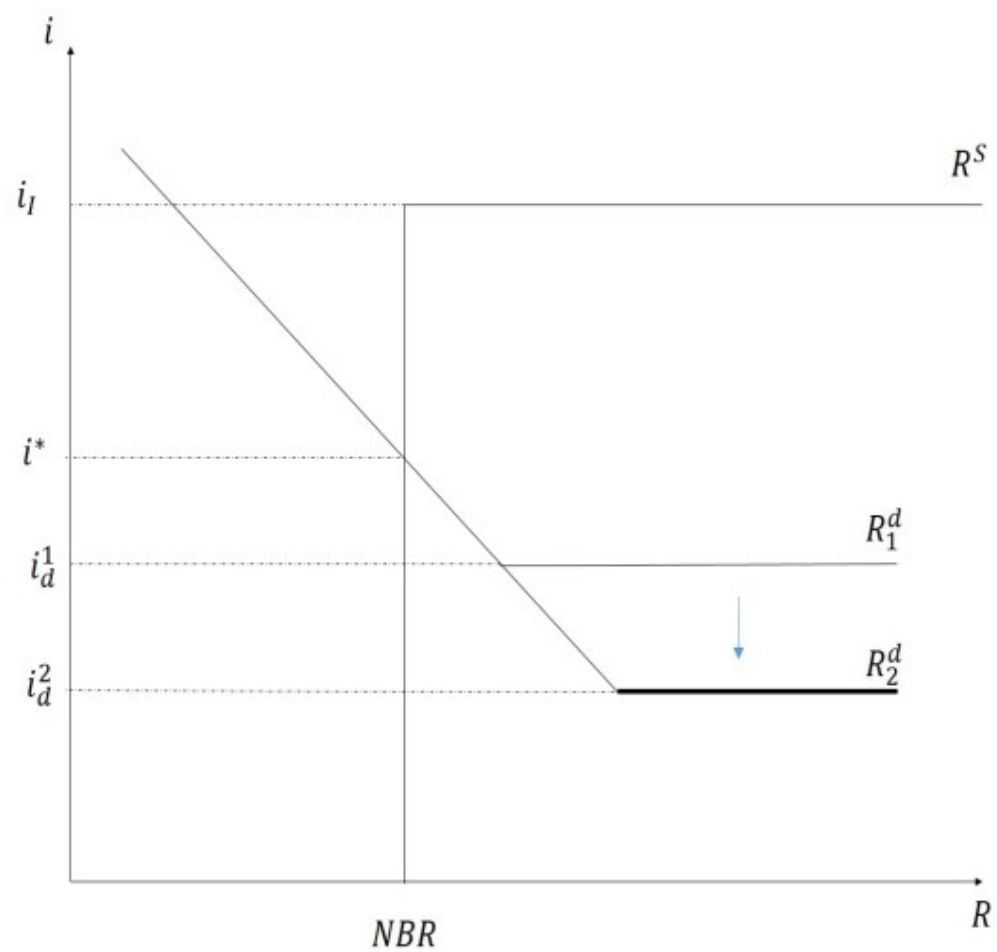
- Graphically



(c) Reduction of the deposit interest rate i_d .

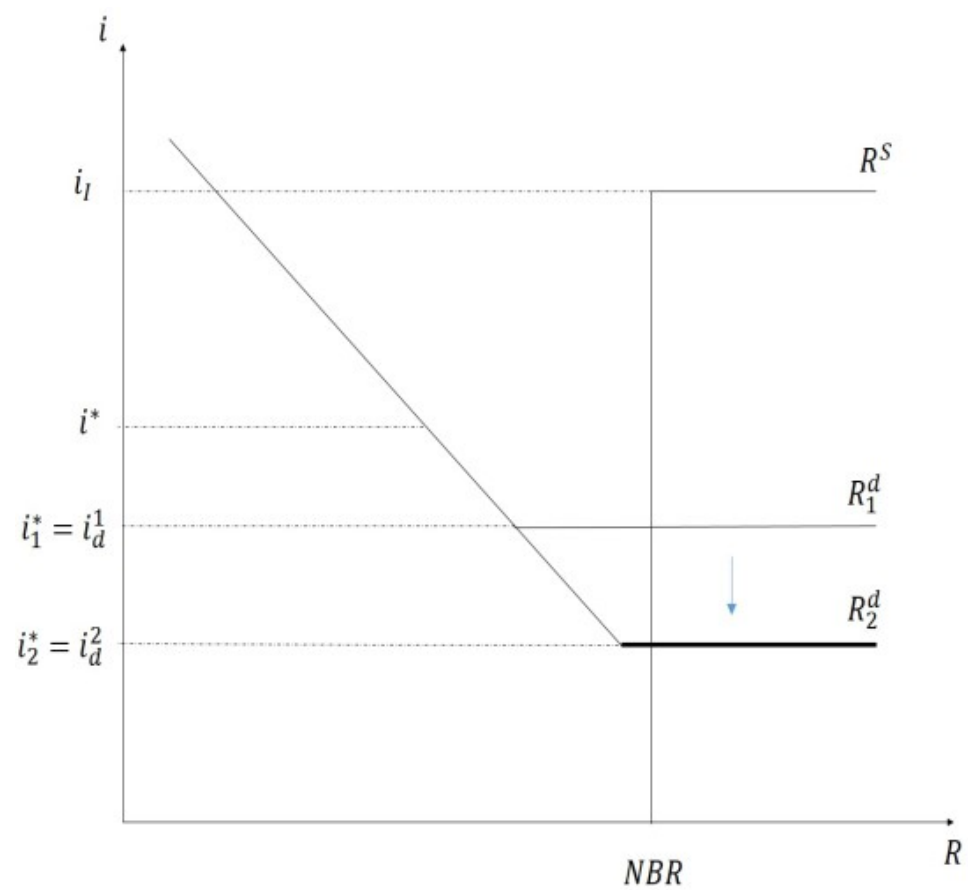
- A reduction in the deposit rate means that commercial banks can now deposit reserves with the central bank at a lower interest rate. If the central bank keeps the interbank interest rate above the deposit rate (normal situation), the deposits are zero because the reserves are invested on the interbank market. If this normal situation is to be maintained, a fall in the deposit rate will lead to
 - a constant traded reserve quantity
 - a constant interbank interest rate.
- Changes in the deposit interest rate generally have no effect on the interbank interest rate. The investment of reserves in the interbank sector remains relatively attractive. Furthermore: $BR = 0$, $NBR > 0$, and deposits equal zero.

- Graphically



- In the event that the central bank keeps the deposit rate very high, the interbank rate will be based exactly on this level $i_d = i$: Investments on the interbank market cannot be more attractive than deposits with the central bank (see second point below). Reserves are partly held at the central bank as deposits, and $NBR > 0$ continues to apply. In this situation a reduction of i_d leads to
 - a decrease in the amount of reserves deposited with the central bank. This decline in demand for reserves means that there is a surplus supply of reserves, assuming that the interbank interest rate remains fixed for the time being.
 - The surplus supply of reserves lowers the interbank interest rate, so that finally the interbank interest rate has adjusted to the lower deposit rate ($i_d^2 = i_2^*$).

- Graphically



(d) Increase of the minimum reserve requirement.

- An increase in the minimum reserve requirement increases the demand for reserves (to meet this new requirement of the central bank) for each given interbank interest rate (parallel shift of R^d to the right). This demand pressure on the interbank market increases the interbank interest rate.

- Graphically

