Discussion of

Monetary Policy Implementation in a Negative Rate Environment

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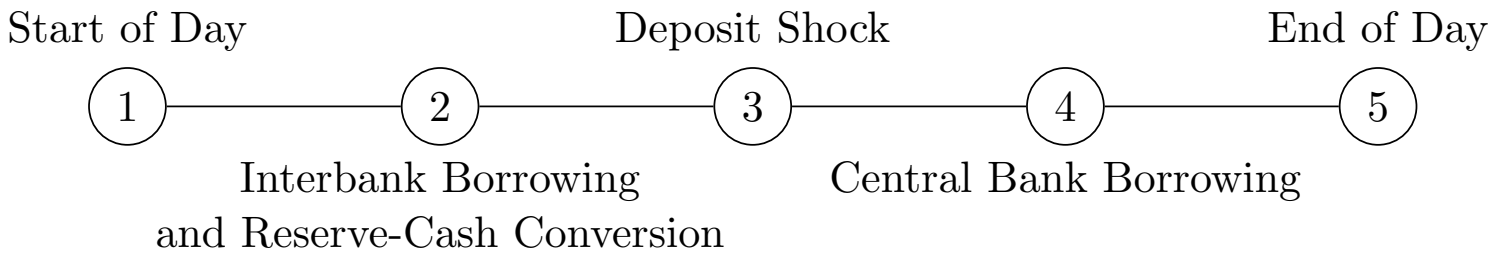
Main Insights

- Deposit rate is not constraint by an effective lower bound
- Money market rate has an effective lower bound at the costs of holding cash

- But this lower bound can be avoided by increasing (shadow) costs of cash conversions
- This can be achieved by dynamically adjusted exemption thresholds for reserve remunerations

Summary 1: Set-up

- Banks hold heterogenous amounts of bonds, cash, and reserves
- Banks refinance to different extent by equity and deposits
- Timeline:

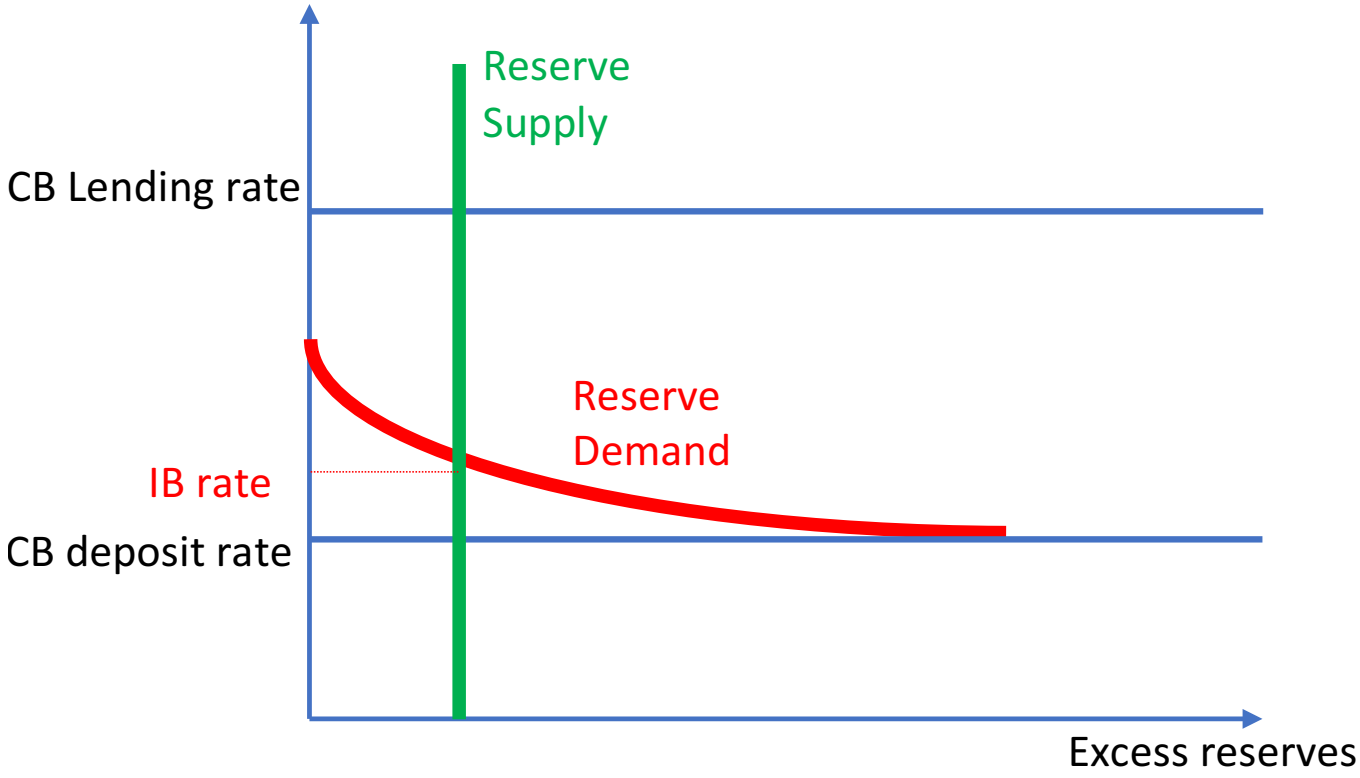


- Deposit shock materialises after IB trading and cash conversion
- If deposit shock results in positve reserve balance bank deposits with CB
- If deposit shock results in negative reserve balance bank borrows from CB

Summary 2: Set-up

- Continuum of banks with iid deposit shock
- This means a) no aggregate liquidity shock and b) all banks have same voluntary reserve holdings prior to shock
- Banks choose voluntary reserve holdings (prior to deposit shock) such that marginal expected costs (benefits) from recourse to CB facilities equal to the interbank rate
- Aggregate demand for (voluntary) reserve holdings increases as the interbank rate declines

Summary 3: Results w/o cash conversion

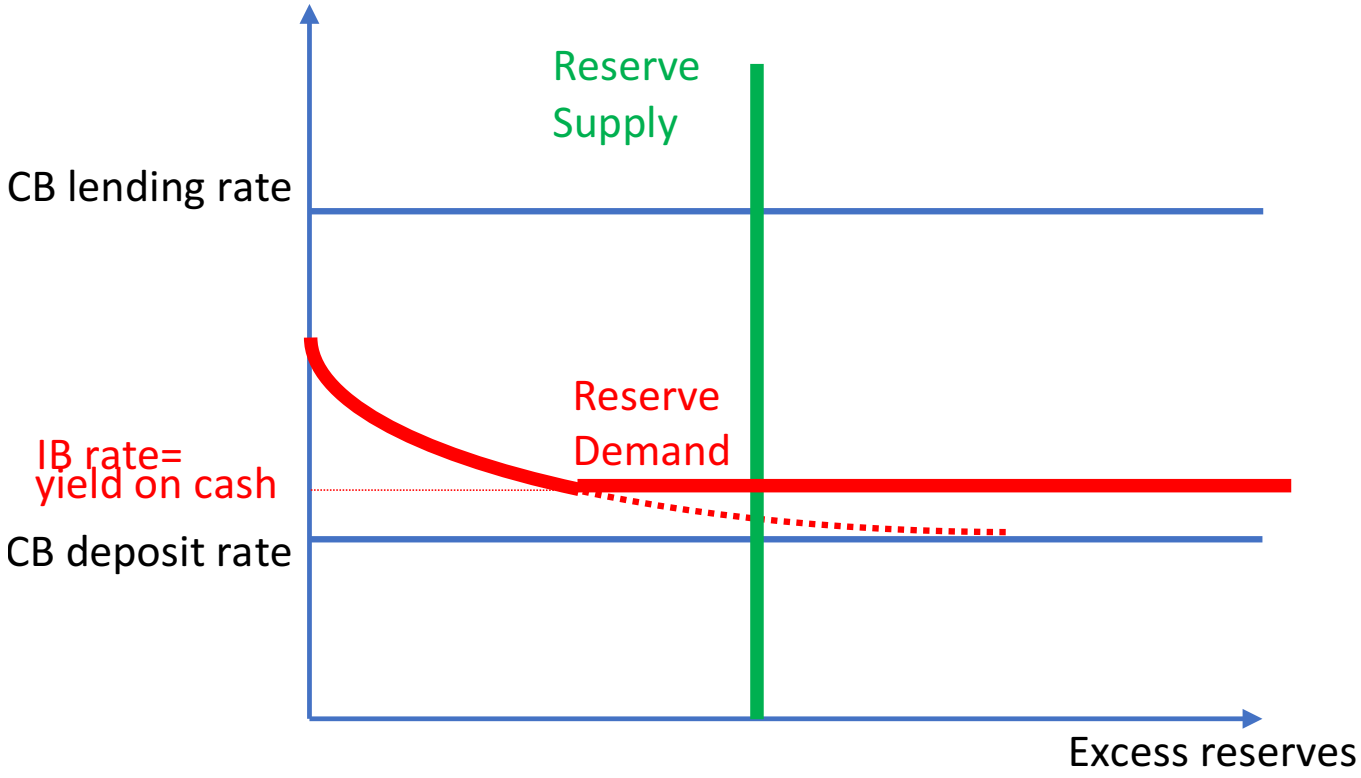


- As average excess reserves increase, banks have lower expected benefits from holding marginal unit of reserves

$\Rightarrow$ Arbitrage free interbank rate declines

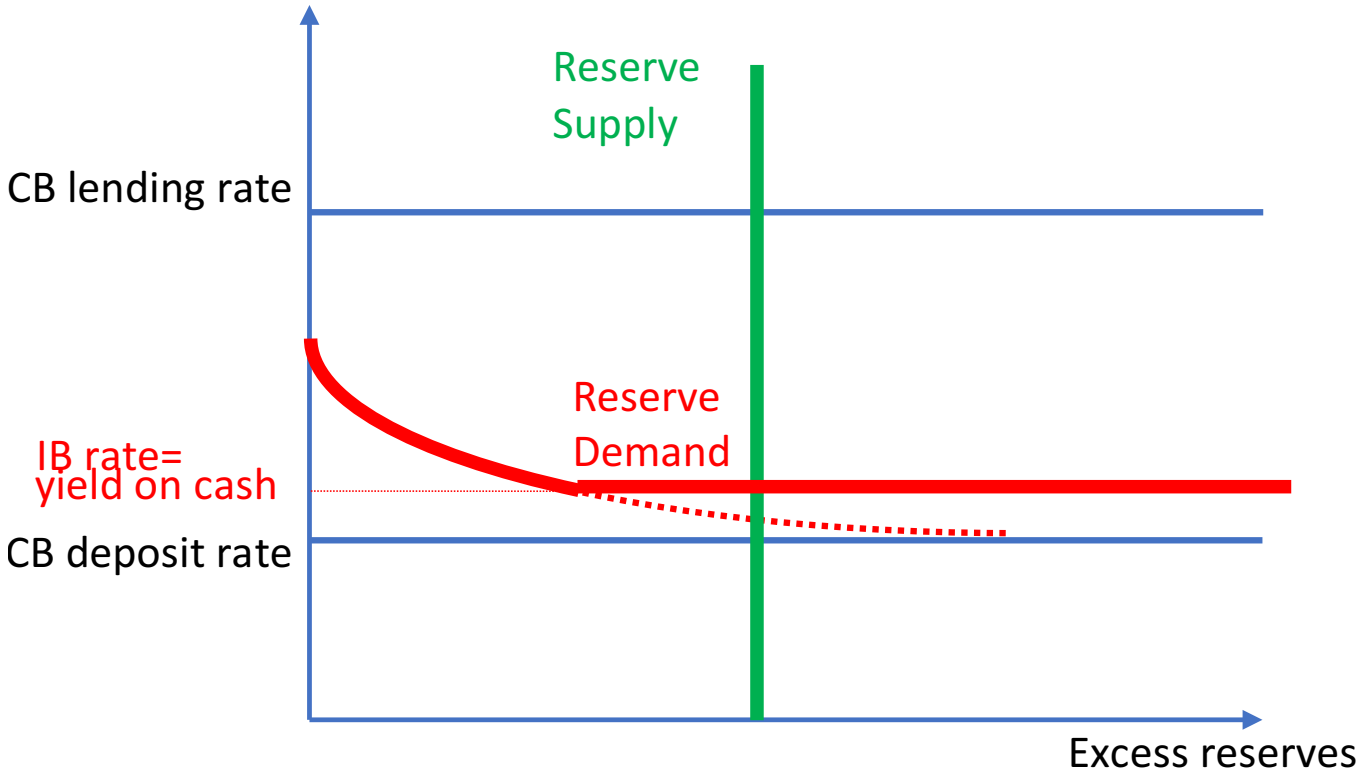
$\Rightarrow$ Arbitrage free interbank rate equals expected costs/benefits from recourse to CB facilities

Summary 4: Results with cash conversion



- Banks can also convert involuntary reserves into cash
- Yield on cash $>$ CB deposit rate
- Rather then accepting a very low IB rate banks with involuntary reserve holdings can convert into cash

Summary 5: Results with cash conversion



- For large excess reserves 'yield on cash' is the effective lower bound for the target rate (IB rate)
- The deposit rate can be significantly lower

Summary 6: Tiered reserve remuneration

- Reserves up to a threshold remunerated at target rate (IB rate)
- Only reserve holdings exceeding the threshold pay deposit rate

$\Rightarrow$ This only changes the level of the reserve demand function

- BUT: If bank specific threshold is reduced by bank's cash conversions further shadow costs of cash conversion introduced
- Shadow costs offset banks benefits from cash conversion over IB lending at lower IB rates
- Such dynamically adjusted thresholds eliminate the effective lower bounds of the target rate (IB rate)

$\Rightarrow$ CB has full control over target rate

Comment 1: Transaction costs of cash conversion

- In the model yield on cash is the cost of storing cash
- But cash conversion also creates transaction costs:
  Both for converting reserves in cash and cash in reserves
- Cash holdings in the morning cannot be costlessly converted into voluntary reserve holdings

$\Rightarrow$ Taking this into account banks face richer optimisation problem

Comment 2:
Role of balance sheet restrictions

- Each bank can meet any voluntary reserve holding by borrowing unlimitedly in the IB market
- There is no equity or leverage ratio
- Incorporating this might allow to make predictions about which banks are more likely to to convert to cash

- Together with transaction cost on conversion balance sheet restriction foster incentives to hold voluntary reserves

Comment 3:
Dynamic adjustment of exemption threshold

- High cash conversion today increase tomorrow's cash holdings and reduce tomorrows involuntary reserve holdings
- Taking this into account suggest that a bank's cash HOLDINGS (not its conversion) must be penalised (i.e. affect exemption threshold)
- But how to keep track of each bank's cash holdings?

Conclusion

- Very interesting paper
- Great to read
- Handy extension of the Poole model
- Lends itself well to further extensions