

INTERMEDIATE MACROECONOMICS
IS-LM MODEL OF BUSINESS CYCLES
10. OMO & ZLB & MONEY MULTIPLIER

Pascal Michailat
pascalmichailat.org/c4/

WHAT THE FED REALLY DOES

- modern central banks, including the Fed in the US, typically **choose the interest rate**, not the money supply
 - the central bank then adjusts the money supply to achieve this interest rate
 - the money supply is adjusted with open market operations
- reduction in interest rate: **expansionary monetary policy**
- increase in interest rate: **contractionary monetary policy**

OPEN MARKET OPERATIONS

- central banks typically change the supply of money by open market operations (OMO)
 - OMO = buying or selling government bonds
- **expansionary OMO:** the central bank **buys bonds** from people in exchange for money, which expands the money supply and reduces the interest rate
- **contractionary OMO:** the central bank **sells bonds** to people and collects money for payment, which contracts the money supply and raises the interest rate

ZERO LOWER BOUND (ZLB)

- zero lower bound: the nominal interest rate cannot go below 0%
 - once the interest rate is negative, there is no reason to hold bonds: useless for transactions & lower returns than money
 - so the money demand cannot allow for negative interest rates
- in fact the ZLB comes from the properties of money demand:
 - if people need money for transactions, money has value compared to bonds, so people hold bonds only if the nominal interest rate > 0
 - once people have enough money for transactions, the value of money is zero, and people hold money only if its cost compared to bonds is 0: money demand is horizontal at 0%

EXTENSION TO LM SUBMODEL: FINANCIAL INTERMEDIARIES

- banks receiving funds from people use these funds to make loans to other people
 - banks are financial intermediaries
- banks must keep as **reserves** some of the funds received as checkable deposits
 - in the US, reserve requirements = 10% of the value of checkable deposits

TWO TYPES OF MONEY

- **money = currency + checkable deposit**
 - can be used for transactions
- **central-bank money = currency + bank reserves**
 - bills & coins produced by the central banks
 - bills & coins with banks: bank reserves
 - bills & coins with people: currency
- there is much more money than central-bank money because banks create a **money multiplier**

- M: money
- H: central bank money
- C: currency
- R: reserves
- D: checkable deposits
- reserve-deposit ratio: $\theta = R/D$
 - depends on regulations & bank policies
- currency-deposit ratio: $\phi = C/D$
 - depends on households' preferences

THE MONEY MULTIPLIER

- the money multiplier is $m = M / H$
 - captures amount of money created by financial intermediaries
- money: $M = C + D$
- central bank money: $H = C + R$
- then $m = (D + C) / (R + C)$
- so dividing everything by D : $m = (1 + \phi) / (\theta + \phi)$
- the reserve-deposit $\theta < 1$ because banks create money through loans and checks: hence $m > 1$

SPECIAL CASES FOR MONEY MULTIPLIER

- recall that $m = (1 + \phi) / (\theta + \phi)$
- if reserve-deposit ratio $\theta = 1$: money multiplier $m = 1$
 - if banks do not lend money and keep all the money deposited in reserves: banks play no role
- if currency-deposit ratio $\phi = \infty$: money multiplier $m = 1$
 - if people use no checks and only currency: banks play no role
- if currency-deposit ratio $\phi = 0$: money multiplier $m = 1 / \theta$
 - if people use no currency and only checks: the money multiplier takes its largest value $1 / \theta$

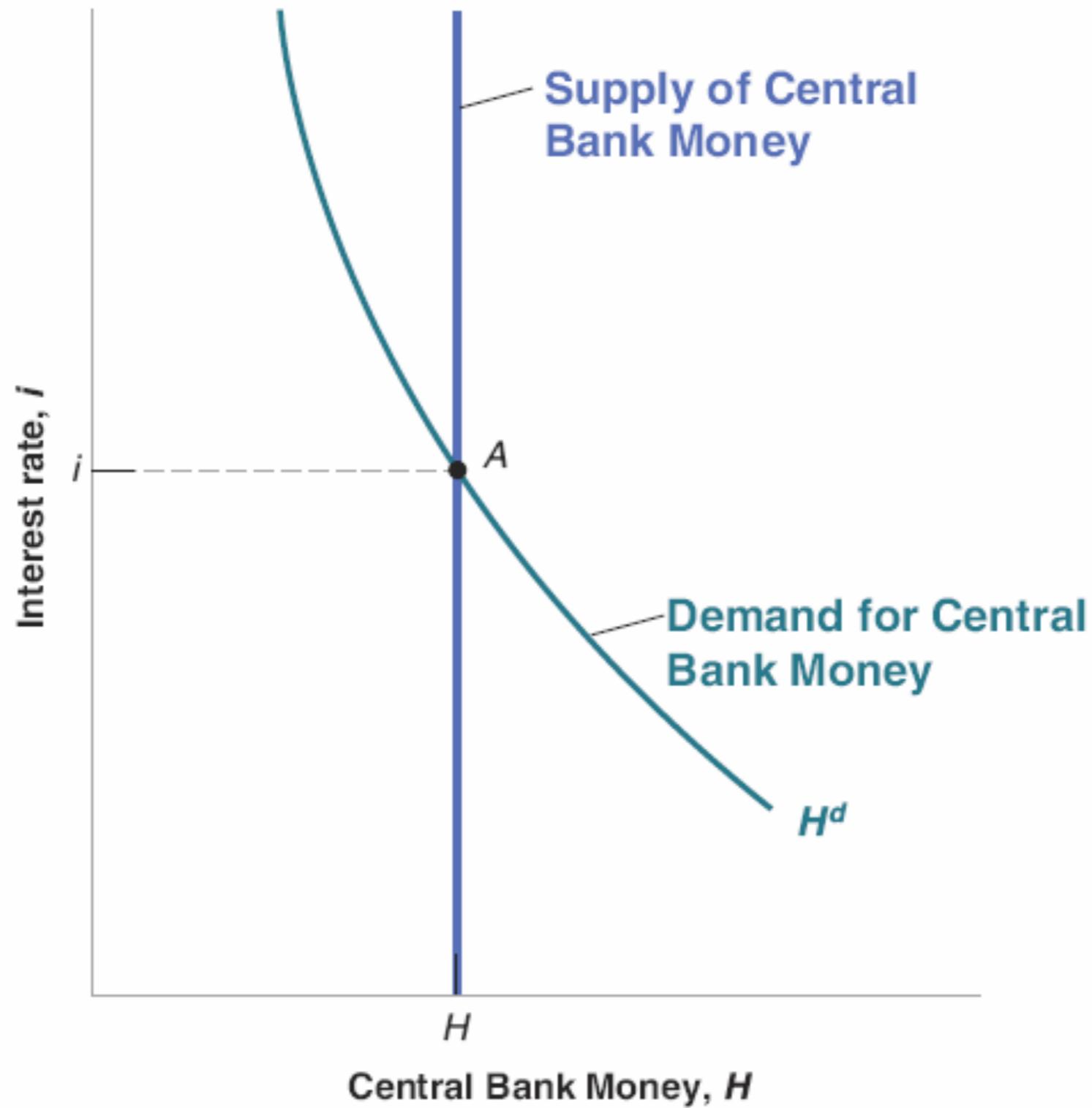
DEMAND FOR CENTRAL BANK MONEY

- simplifying assumption: people hold no currency, only deposits
 - then money $M =$ checkable deposits
 - and central bank money $H =$ reserves
- demand for checkable deposits = demand for money
 - $M^d(i) = Y \times L(i)$
- demand for reserves by banks depends on the demand for money and reserve-deposit ratio (θ)
 - $H^d(i) = \theta \times M^d(i) = \theta \times Y \times L(i)$

CENTRAL BANK MONEY: MARKET-CLEARING CONDITION

- the central bank supplies central bank money: $H^s = H$
- market clearing condition:
 - supply of central bank money = demand for central bank money by banks
 - $H^s = H^d(i)$ so $H = \theta \times Y \times L(i)$
- market clearing condition determines interest rate i

MARKET FOR CENTRAL-BANK MONEY



FEDERAL FUNDS RATE

- main indicator of US monetary policy
- interest rate determined in the federal funds market
 - federal funds market: the market for bank reserves
 - the Fed chooses the federal funds rate by changing the supply of central-bank money
- with financial intermediaries, the Fed does not control the money supply, only the supply of central-bank money
- this is why we analyzed the market for central-bank money instead of the market for money