





## Money definition and money functions

Money, used for transactions, pays no interest. Two type of money: Currency (coins and bills); checkable deposits. Money is different to Bonds that pay a positive interest rate.

### Medium of Exchange

Money is a medium of exchange in the sense that we all agree to accept it in making transactions. Merchants agree to accept money in exchange for their goods; employees agree to accept money in exchange for their labor.

### Unit of accounting

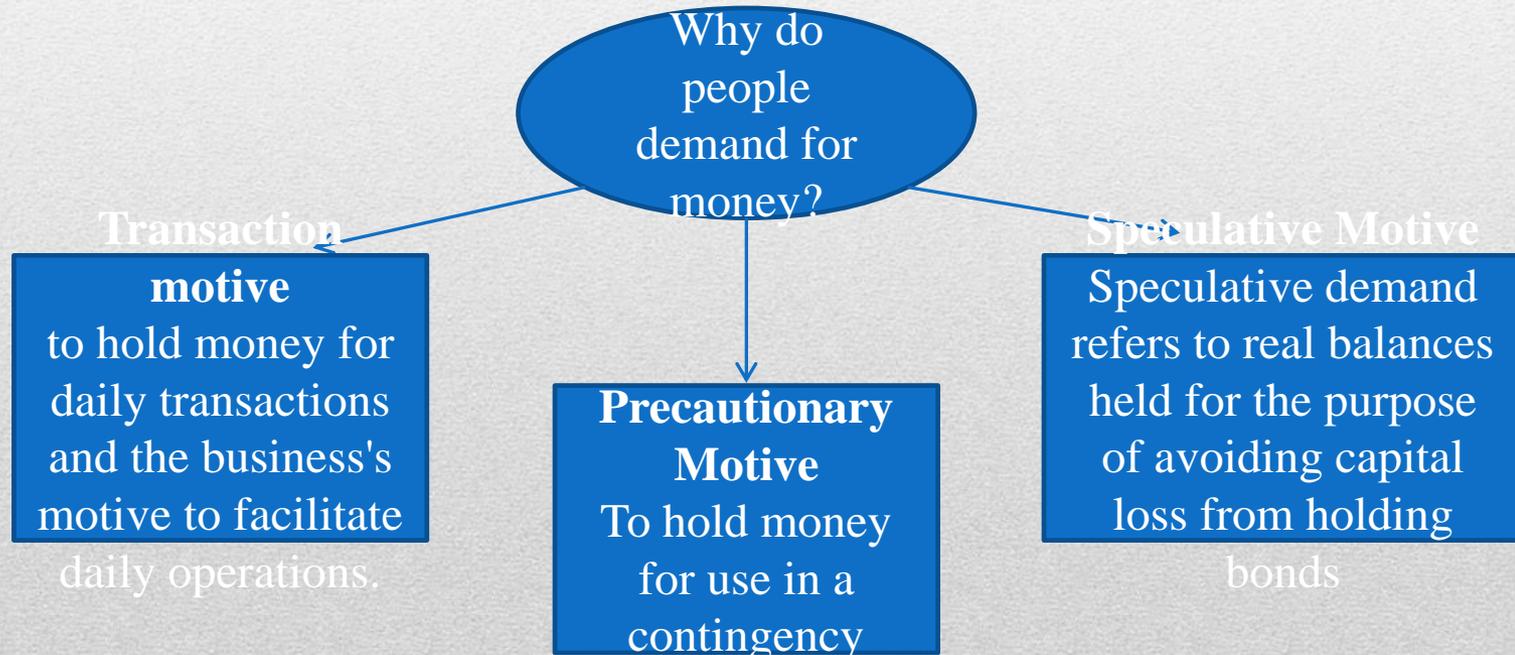
As a unit of accounting, money provides a simple device for identifying and communicating value.

### Store of Value

Money serves as a store of value in that it allows us to store the rewards of our labor or business in a convenient tool. In other words, money lets us store the value of a long, hard week of work in a tidy little stack of cash.

# The demand for money

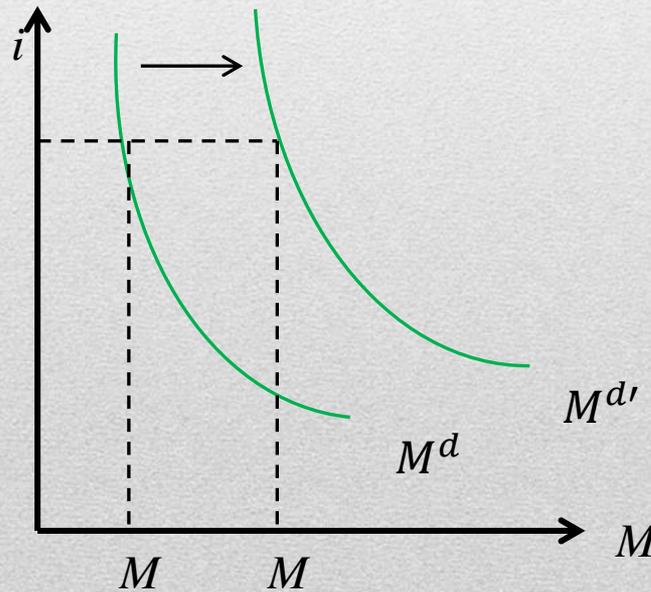
The demand for money,  $M^d$ , is just the sum of all the individual (impresa, famiglia)



# The demand for money

The demand for money depends on transactions demand for money, nominal income and interest rate

$$M^d = \epsilon Y L(i)^{(1)}$$



# Main Assumption

**1° Hypothesis:** We assume there are not deposits (De), as consequence we have only currency



The money offered by CB is equal to the demand for money

$$M^s = M \Rightarrow M^s = M^d$$

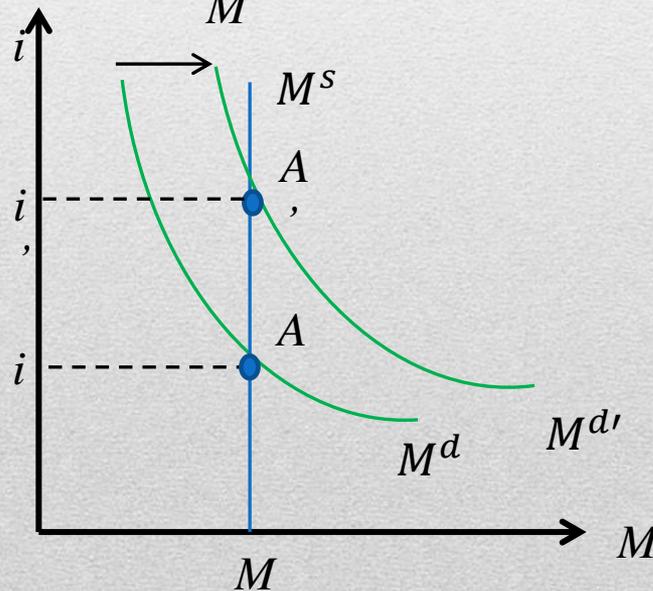
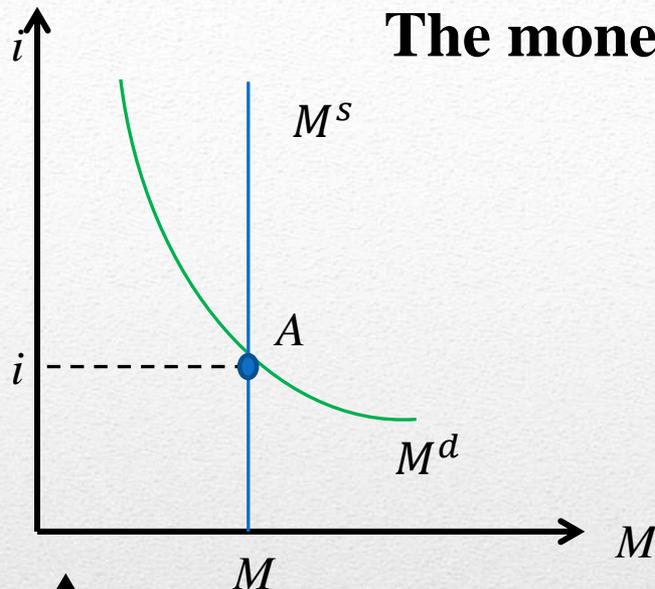


$$M^s = \epsilon YL(i) \quad (2)$$

Supply

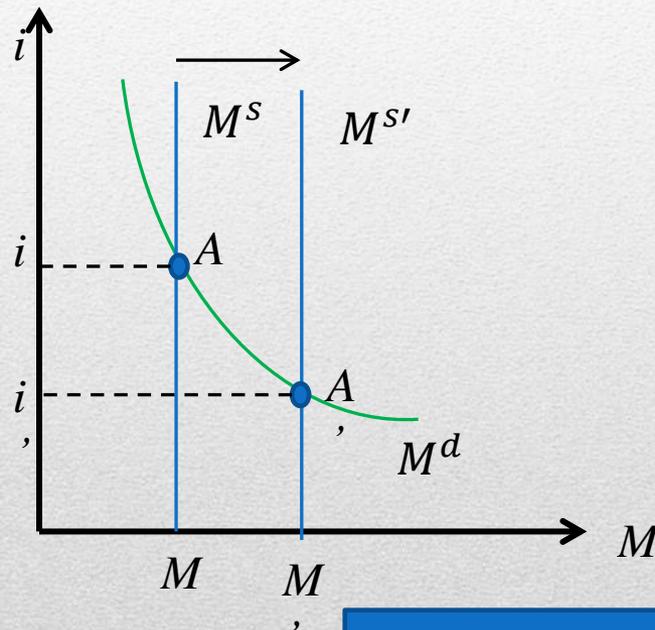
Demand

# The money supply



If the nominal income increases, the transactions grows proportionally, then the demand for money increases for every level of interest rate. In  $i$ ,  $M^{d'}$  exceeds  $M^s$ , so, to reduce the consumers' demand for money, the Central Bank increases the interest rate so that  $i' > i$

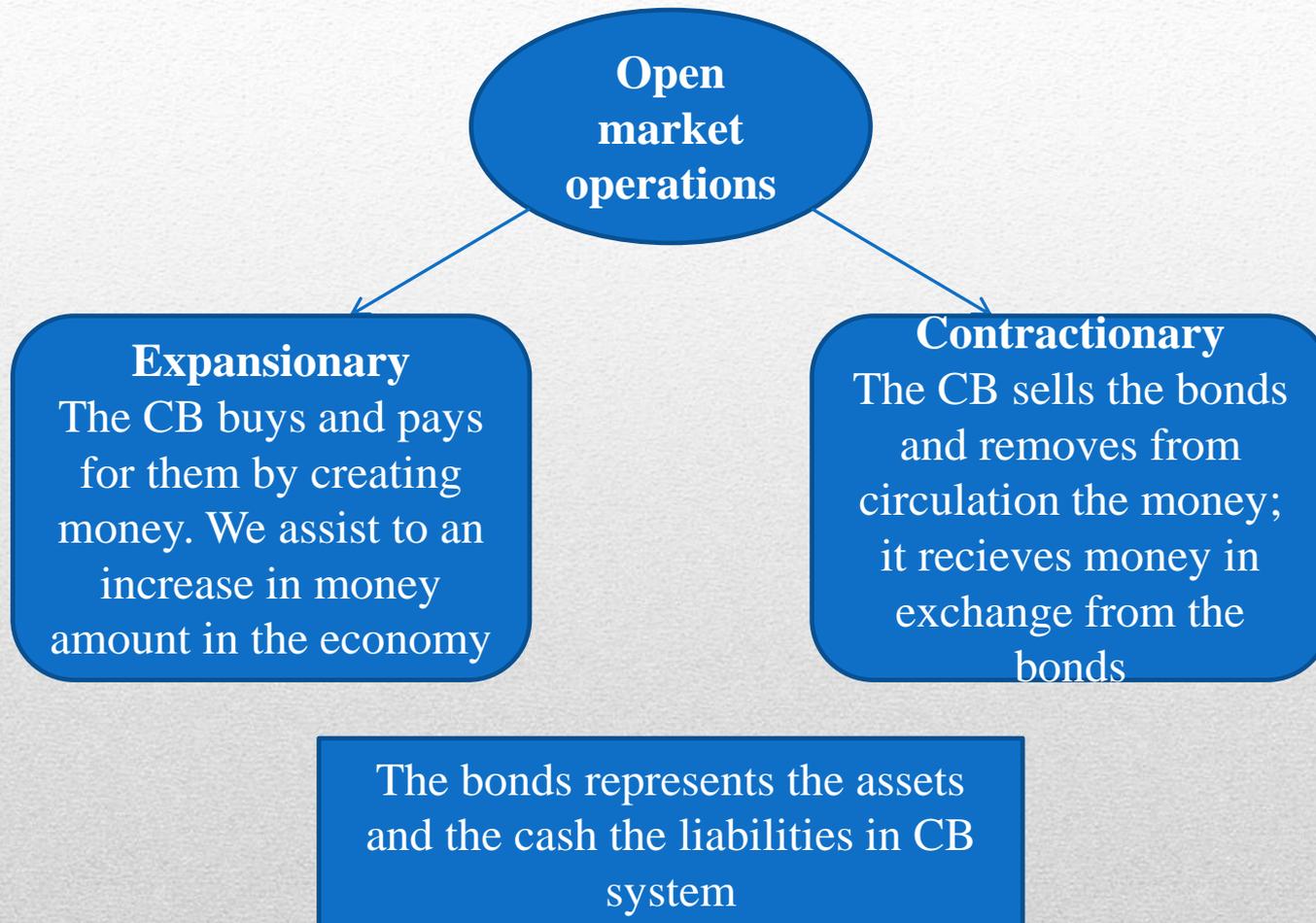
# The supply of money



An increase in  $M^S$  leads to a decrease in the interest rate,  $i' < i$ , the equilibrium moves from  $A$  to  $A'$ , and so the interest rate decreases to  $i$  to  $i'$

Variations in the supply of money are called *open market operations*

# Open market operations



# The interest rate

the interest rate (bond yield)  
is not determined in the bonds markets  
but its price.

$$i = \frac{\text{€}P_{B_1} - \text{€}P_{B_0}}{\text{€}P_{B_0}}$$
$$\text{€}P_{B_0} = \frac{\text{€}P_{B_1}}{(1 + i)}$$

$\text{€}P_{B_1}$ , is the final price promised by the  
bond a year from now (B);  
 $\text{€}P_{B_0}$ , is bonds today price;  
 $i$ , is the return of payment at the end of a  
given time.

Exists an inverse  
relationship between  
the bond price and the  
interest rate



Which is the effect of the inversal relationship between price and interest rate?



**Expansionary OMO by  
CB**

As the CB buys bonds, the demand for bond goes up increasing the price,  $\text{€}P_{B_0}$ , and the interest rate goes down

**Contractionary OMO by  
CB**

As the CB sells the bonds, the demand for bonds goes down reducing the price,  $\text{€}P_{T_0}$  and increasing the interest rate  $i$

# The Supply and Demand for Central

The demand for central bank money ( $M$ ) is equal to the demand for currency ( $CU$ ) and checkable deposits ( $D$ ) by people plus the demand for reserves by banks

$$M^d = \epsilon Y L(i)$$

$$CU^d = cM^d \quad (4)$$

$$D^d = (1 - c)M^d \quad (5)$$

$$c = \frac{CU}{D} \quad (4.a)$$

and

$$(1 - c) = \frac{D^d}{M^d} \quad (5.a)$$

People  
Demand



If the demand for checkable deposits goes up, the banks need to increase their reserves, then the banks demand for reserves to CB goes up

# The demand for reserves

Reserves are linked to the demand for checkable deposits.

$$R = F(D)$$

Introduce the reserve ratio ( $\theta$ ), this is the bank's propensity to hold reserves,  $R$ , for an unit increase of the demand for checkable deposits,  $D$ .

So...

$$R^d = \theta D^d \quad (6)$$

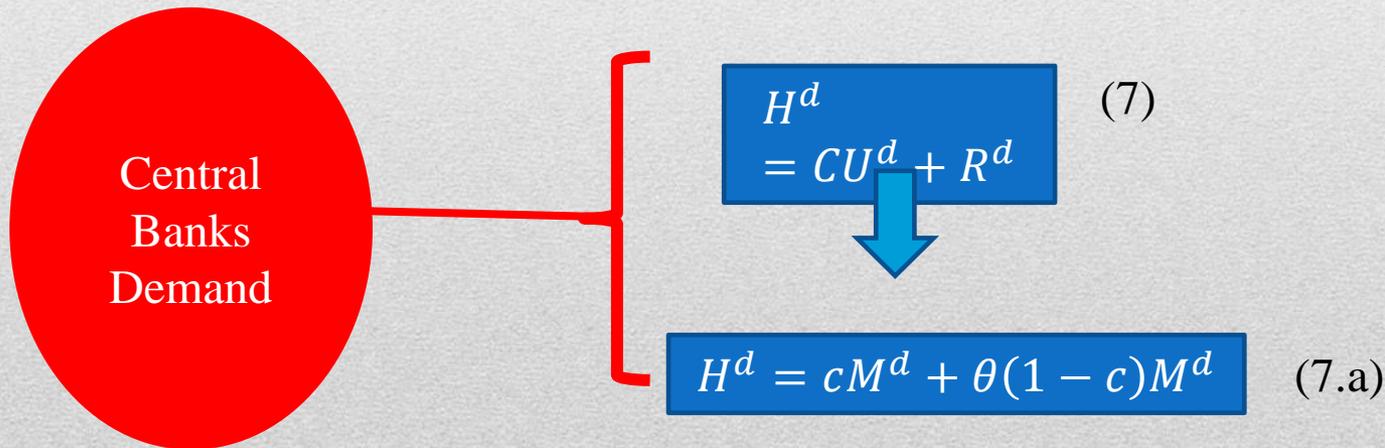
or

$$R^d = \theta(1 - c)M^d \quad (6.a)$$

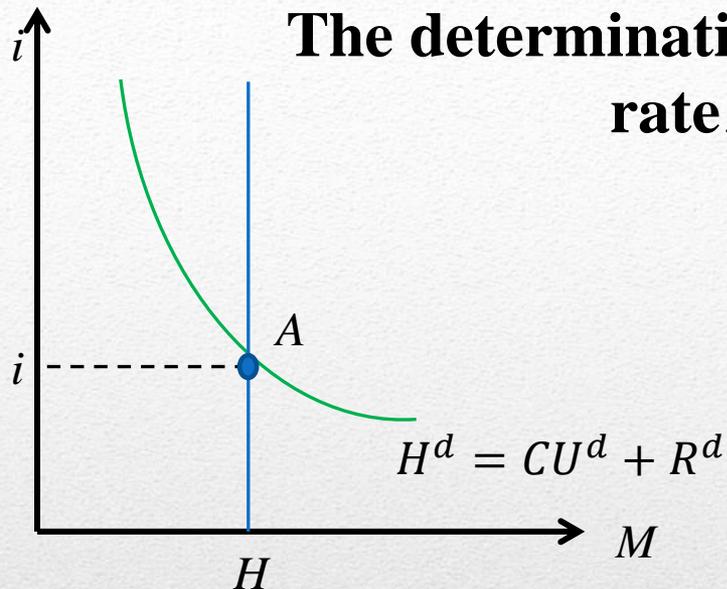
Banks  
Demand

# The demand for central banks money

Recall the previous hypothesis in which we assume that the demand for central bank money depends to the demand for currency and for checkable deposits by consumers and plus the demand for reserves by banks

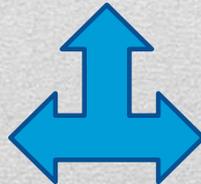


## The determination of interest rate...



An higher level of the interest rate produces a contraction of the demand for money. Why?

The  $CU^d$  goes down



The  $D^d$  goes down and it leads a contraction of  $R^d$

# The Money multiplier

Referring to eq. (7.a), there is an identity between the demand for and supply of money.

Deriving  $CU$  from eq. (4.a) and considering eq. (6) we assume that


$$CU = cD \quad (4.b)$$



Substituting the eq. (4.b) and eq. (6) to the (7), we have



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$$H = Ci + R = cD + \theta D = (c + \theta)D \quad (7.a)$$

# The Money Multiplier

If we consider the supply of money ( $M$ ), as the sum of the demand for currency and the demand of checkable deposits,

$$M = Ci + D \quad (8)$$

And substituting to  $CU$  the eq. (4.7), we have

$$M = cD + D = (1 + c)D \quad (8.a)$$



Considering the equation 7.a and the 8.a in function of  $D$ , we have the following equilibrium equation:

$$M = \frac{(1+c)}{(c+\theta)} H = \alpha H \quad (9)$$

$$\frac{H}{[c + \theta(1 - c)]} = \epsilon YL(i)$$



The  
Money  
Multiplier