Interest Rate determination w/ Ms = CU + D

- Role of commercial banks: financial intermediaries
  - Banks receive funds from the public that they use to make loans or to buy government bonds
  - Public depositing own funds at banks can use these bank balances to write checks used to make payments
- Funds in form of checkable deposits = money
- Banks must also hold reserves so that they are always able to meet demand (flows in and out not necessarily equal on a daily basis)
  - By law banks must hold a specific proportion (≥10%) of the total deposits in an account at the Fed
## Balance sheets of Fed and comm. banks

<table>
<thead>
<tr>
<th>Fed</th>
<th>Commercial banks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td><strong>Liabilities</strong></td>
</tr>
<tr>
<td>Bonds</td>
<td>[Reserves ( R + )]</td>
</tr>
<tr>
<td></td>
<td>Currency ( CU )</td>
</tr>
<tr>
<td></td>
<td>( = ) monetary base ( H ) or central bank money</td>
</tr>
</tbody>
</table>

Fed

- Bonds
  - Reserves \( R + \)
  - Currency \( CU \)

Commercial banks

- Reserves Loans
- Bonds
- Deposits \( D \)
Supply and demand for CB money H

- Supply H: determined by the Fed
- Demand H\(d\): demand for reserves and for currency
- \(S=D\) determine the equilibrium interest rate \(i\)

Demand for money derived above as \(M^d = PYL(i)\) corresponds to the total demand for CU and D

We need to know what how much is held as CU and how much as D or proportion \(c\) held as CU

In the US: \(c = \frac{CU^d}{M} = 40\%\)

So demand for currency: \(CU^d = cM^d\)

demand for deposits: \(D^d = (1-c)M^d\)
Demand for reserves $R^d$ depends on reserve ratio requirement as $R = \square D$ - replacing $D$ by $(1-c)M^d$.

**Demand for reserves:** $R^d = \square (1-c)M^d$

Finally the demand for CB money $H$ is

$$H^d = CU^d + R^d = cM^d + \square (1-c)M^d = [c + \square (1-c)]M^d = [c + \square (1-c)]PYL(i)$$
Interest rate determination

• In equilibrium $H = H^d$
  
  i.e. $H = [c + q(1-c)]PYL(i)$

  Case 1: people only hold CU so $c = 1$

  Equilibrium $i$ determined by $H = PYL(i)$
  
  -earlier case: no money creation-

  Case 2: people only hold deposits so $c = 0$

  Then $H = qPYL(i)$ and $H$ represents 10% of total money supply
• In general we have \( 0 < c < 1 \) and \( H \) represents between 10% and 100% of the total money in the economy.

\[
H^d = C^d + R^d = [c + \ell(1-c)]PYL(i)
\]

• If either \( P \) or \( Y \) increase, the impact on \( H^d \) is the same as the impact on \( M^d \)
Money multiplier $mm$

- We derived $H = [c + q(1-c)]M$
  with $c = C U^d / M$ and $q = R / D$

so $mm = M / H = \frac{1}{c + q(1 - c)}$

If $c = 40\%$ and $q = 10\%$
the money multiplier is 2.17
Money multiplier: step by step

Open market purchase of $100 assuming \[ q = .1 \] and \[ c = 0 \] (no currency, only deposits)
- Fed pays $100 to Mr A who deposits the money in his account in Bank X
- Bank X redeposits $10 as reserve in its Fed account and lends $90 to Ms B
- Ms B deposits $90 in her account in Bank Y
- Bank Y redeposits $9 as reserve in its Fed account and lends $81 to Sir C

Etc…
How much money has been added in the economy up to now?
$100 + $90 + $81 etc…
Total increase in the money supply is:
$100(1 + .9 + .9^2 + ...) = 100[1/(1-.9)]
= 100(1/.1) = $1000

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<tbody>
<tr>
<td>A</td>
<td>L</td>
</tr>
<tr>
<td>Bonds $100</td>
<td>Reserves RE = $100</td>
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