Money Multiplier

\[ M = m \square MB \]

Deriving Money Multiplier

\[ R = RR + ER \]
\[ RR = r_D \square D \]
\[ R = (r_D \square D) + ER \]

Adding \( C \) to both sides

\[ R + C = MB = (r_D \square D) + ER + C \]

1. Tells us amount of \( MB \) needed support \( D \), \( ER \) and \( C \)

2. \$1 of \( MB \) in \( ER \), not support \( D \) or \( C \)

\[ MB = (r_D \square D) + (\{ER/D\} \square D) + (\{C/D\} \square D) \]
\[ = (r_D + \{ER/D\} + \{C/D\}) \square D \]

\[ D = \frac{1}{r_D + \{ER/D\} + \{C/D\}} \square MB \]
\[ M = D + (\{C/D\} \square D) = (1 + \{C/D\}) \square D \]

\[ M = \frac{1 + \{C/D\}}{r_D + \{ER/D\} + \{C/D\}} \square MB \]

\[ m = \frac{1 + \{C/D\}}{r_D + \{ER/D\} + \{C/D\}} \]

\( m < 1/r_D \) because no multiple expansion for currency and because as \( D \uparrow \) \( ER \uparrow \)

Full Model

\[ M = m \square (MB_n + DL) \]
Excess Reserves Ratio

Determinants of \( \{ER/D\} \)
1. \( i \uparrow \), relative \( RET_e \) on \( ER \) (opportunity cost \( \uparrow \)), \( \{ER/D\} \)
2. Expected deposit outflows, \( ER \) insurance worth more,
\( \{ER/D\} \uparrow \)

Discount Loans and Interest Spread

Determinants of \( DL \)
1. \( i \uparrow , i - i_d \uparrow , DL \uparrow \)
2. \( i_d \uparrow , i - i_d \downarrow , DL \downarrow \)

Factors Determining Money Supply

<table>
<thead>
<tr>
<th>Player</th>
<th>Variable</th>
<th>Change in Variable</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Reserve System</td>
<td>( r_D )</td>
<td>( \uparrow )</td>
<td>Less multiple deposit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>expansion</td>
</tr>
<tr>
<td></td>
<td>( MB_n )</td>
<td>( \uparrow )</td>
<td>More ( MB ) to support</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>currency and checkable deposits</td>
</tr>
<tr>
<td></td>
<td>( i_d )</td>
<td>( \uparrow )</td>
<td>( DL \downarrow ) so less ( MB ) to support</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>( D ) and ( C )</td>
</tr>
<tr>
<td>Depositors</td>
<td>( CD )</td>
<td>( \uparrow )</td>
<td>Less multiple deposit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>expansion</td>
</tr>
<tr>
<td>Depositors and banks</td>
<td>Expected deposit outflows</td>
<td>( \uparrow )</td>
<td>( {ER/D} \downarrow ) so fewer reserves to support ( D )</td>
</tr>
<tr>
<td>Borrowers from banks and the other three players</td>
<td>( i )</td>
<td>( \uparrow )</td>
<td>( {ER/D} \uparrow ) so more reserves to support ( D, DL )</td>
</tr>
</tbody>
</table>

Note: Only increases (\( \uparrow \)) in the variables are shown. The effects of decreases on the money supply would be the opposite of those indicated in the “Response” column.