Appendix to Chapter 16

The M2+ Money Multiplier

The derivation of a money multiplier for the M2+ definition of money requires only slight modifications to the analysis in the chapter. The definition of M2+ is

$$M2+ = C + D + T + MMF$$

where
C = currency in circulation
D = all chequable deposits
T = all time and savings deposits
MMF = money market mutual funds

We again assume that all desired quantities of these variables rise proportionally with chequable deposits so that the equilibrium ratios

c = currency ratio, C/D
t = time deposit ratio, T/D
f = money market fund ratio, MMF/D

set by depositors and the desired reserve ratio r set by banks are treated as constants. Replacing C by $c \times D$, T by $t \times D$, and MMF by $f \times D$ in the definition of M2+ just given, we get

$$M2+ = (c \times D) + D + (t \times D) + (f \times D)$$
$$= (1 + c + t + f) \times D$$

Substituting in the expression for D from equation 2 in the chapter,[1] we have

$$M2+ = \frac{1 + c + t + f}{c + r} \times MB$$

To see what this formula implies about the M2+ money multiplier, we continue with the same numerical example in the chapter, with the additional information

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[1]From the derivation here it is clear that the quantity of chequable deposits D is unaffected by the depositor ratios t and f even though time deposits and money market mutual funds are included in M2+. This is just a consequence of the fact that the desired reserve ratios on time deposits and money market mutual funds are zero (because they are not payable on demand), so T and MMF do not appear in any of the equations in the derivation of D in the chapter.

that $T = \$320$ billion and $MMF = \$80$ billion so that $t = 2$ and $f = 0.5$. The resulting value of the multiplier for M2+ is

$$m = \frac{1 + 0.25 + 2 + 0.5}{0.25 + 0.05} = \frac{3.75}{0.3} = 12.5$$

An important feature of the M2+ multiplier is that it is substantially above the M1+ multiplier of 4.2 that we found in the chapter. The crucial concept in understanding this difference is that a lower desired reserve ratio for time deposits or money market mutual funds means that they undergo more multiple expansion because fewer reserves are needed to support the same amount of them. Time deposits and *MMF*s have a lower desired reserve ratio than chequable deposits—zero—and they will therefore have more multiple expansion than chequable deposits will. Thus the overall multiple expansion for the sum of these deposits will be greater than for chequable deposits alone, and so the M2+ money multiplier will be greater than the M1+ money multiplier.

FACTORS THAT DETERMINE THE M2+ MONEY MULTIPLIER

Changes in *c* and *r*

The economic reasoning analyzing the effect of changes in the desired reserve ratio and the currency ratio on the M2+ money multiplier is identical to that used for the M1+ multiplier in the chapter. An increase in the desired reserve ratio *r* will decrease the amount of multiple deposit expansion, thus lowering the M2+ money multiplier. An increase in *c* means that depositors have shifted out of chequable deposits into currency, and since currency has no multiple deposit expansion, the overall level of multiple deposit expansion for M2+ must also fall, lowering the M2+ multiplier.

We thus have the same results we found for the M1+ multiplier: ***the M2+ money multiplier and M2+ money supply are negatively related to the desired reserve ratio* r *and the currency ratio* c**.

Response to Changes in *t* and *f*

An increase in either *t* or *f* leads to an increase in the M2+ multiplier because the desired reserve ratios on time deposits and money market mutual funds are zero and hence are lower than the desired reserve ratio on chequable deposits.

Both time deposits and money market mutual funds undergo more multiple expansion than chequable deposits. Thus a shift out of chequable deposits into time deposits or money market mutual funds, increasing *t* or *f*, implies that the overall level of multiple expansion will increase, raising the M2+ money multiplier.

A decline in *t* or *f* will result in less overall multiple expansion, and the M2+ money multiplier will decrease, leading to the following conclusion: ***the M2+ money multiplier and M2+ money supply are positively related to both the time deposit ratio* t *and the money market fund ratio* f**.

The response of the M2+ money supply to all the depositor and desired reserve ratios is summarized in Table 16A-1.

TABLE 16A-1 Response of the M2+ Money Supply to Changes in MB_n, A, r, c, t, and f

Variable	Change in Variable	M2+ Money Supply Response	Reason
MB_n	↑	↑	More MB to support C and D
A	↑	↑	More MB to support C and D
r	↑	↓	Less multiple deposit expansion
c	↑	↓	Less overall deposit expansion
t	↑	↑	More multiple deposit expansion
f	↑	↑	More multiple deposit expansion

Note: Only increases (↑) in the variables are shown; the effects of decreases in the variables on the money supply would be the opposite of those indicated in the "Response" column.