

Chapter 14

Determinants of the Money Supply

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The Money Supply Model

- Define money as currency plus checkable deposits: M1
- The Fed can control the monetary base better than it can control reserves
- Link the money supply (M) to the monetary base (MB) and let m be the money multiplier

$$M = m \times MB$$



Deriving the Money Multiplier I

Assume the desired level of currency C and excess reserves ER grows proportionally with checkable deposits D

Then

$$c = \{C / D\} = \text{currency ratio}$$

$$e = \{ER / D\} = \text{excess reserves ratio}$$



Deriving the Money Multiplier II

The total amount of reserves (R) equals the sum of required reserves (RR) and excess reserves (ER).

$$R = RR + ER$$

The total amount of required reserves equals the required reserve ratio times the amount of checkable deposits

$$RR = r \times D$$

Substituting for RR in the first equation

$$R = (r \times D) + ER$$

The Fed sets r to less than 1



Deriving the Money Multiplier III

The monetary base MB equals currency (C) plus reserves (R)

$$MB = R + C = (r \times D) + ER + C$$

Reveals the amount of the monetary base needed to support the existing amounts of checkable deposits, currency, and excess reserves.

An increase in the monetary base that goes into currency is not multiplied, whereas an increase that goes into supporting deposits is multiplied.

An additional dollar of MB that goes into excess reserves ER does not support any additional deposits or currency



Deriving the Money Multiplier IV

$$c = \{C / D\} \Rightarrow C = c \times D \text{ and}$$

$$e = \{ER / D\} \Rightarrow ER = e \times D$$

Substituting in the previous equation

$$MB = (r \times D) + (e \times D) + (c \times D) = (r + e + c) \times D$$

Divide both sides by the term in parentheses

$$D = \frac{1}{r + e + c} \times MB$$

$$M = D + C \text{ and } C = c \times D$$

$$M = D + (c \times D) = (1 + c) \times D$$

Substituting again

$$M = \frac{1 + c}{r + e + c} \times MB$$

The money multiplier is then

$$m = \frac{1 + c}{r + e + c}$$



Intuition Behind the Money Multiplier

r = required reserve ratio = 0.10

C = currency in circulation = \$400B

D = checkable deposits = \$800B

ER = excess reserves = \$0.8B

M = money supply (M1) = $C + D$ = \$1,200B

$$c = \frac{\$400B}{\$800B} = 0.5$$

$$e = \frac{\$0.8B}{\$800B} = 0.001$$

$$m = \frac{1 + 0.5}{0.1 + 0.001 + 0.5} = \frac{1.5}{0.601} = 2.5$$

This is less than the simple deposit multiplier

Although there is multiple expansion of deposits,
there is no such expansion for currency



Factors that Determine the Money Multiplier

- Changes in the required reserve ratio r
 - The money multiplier and the money supply are negatively related to r
- Changes in the currency ratio c
 - The money multiplier and the money supply are negatively related to c
- Changes in the excess reserves ratio e
 - The money multiplier and the money supply are negatively related to the excess reserves ratio e



Factors that Determine the Money Multiplier (cont'd)

- The excess reserves ratio e is negatively related to the market interest rate
- The excess reserves ratio e is positively related to expected deposit outflows

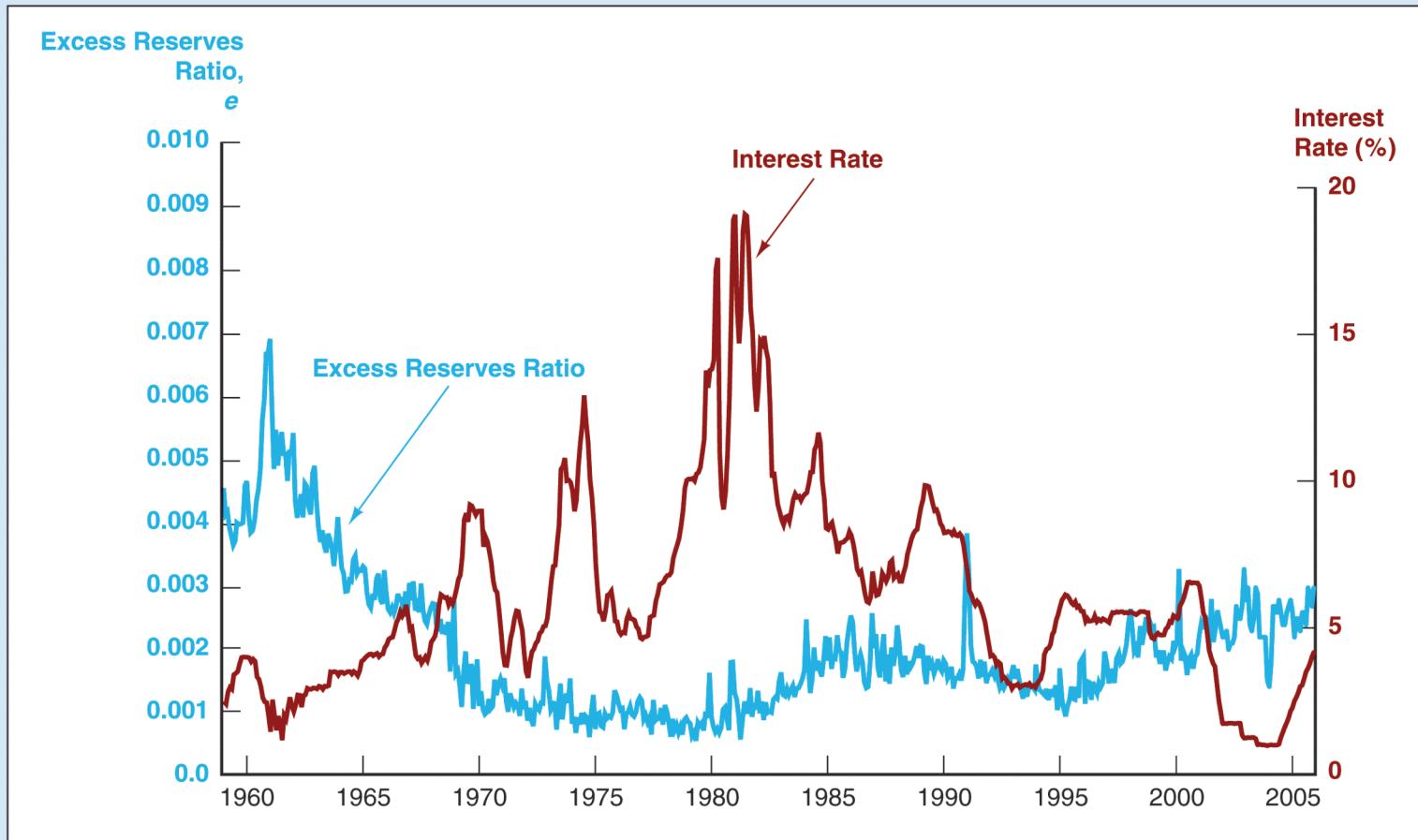


FIGURE 1 The Excess Reserves Ratio e and the Interest Rate (Federal Funds Rate)

Source: Federal Reserve: www.federalreserve.gov/releases/h3/hist/h3hist2.txt.



Additional Factors

- Open market operations are controlled by the Fed
- The Fed cannot determine the amount of borrowing by banks from the Fed
- Split the monetary base into two components
 - $MB_n = MB - BR \Rightarrow M = m(MB_n + BR)$
- The money supply is positively related to both the non-borrowed monetary base MB_n and to the level of borrowed reserves, BR , from the Fed

SUMMARY

TABLE 1 Money Supply (M1) Response

Player	Variable	Change in Variable	Money Supply Response	Reason
Federal Reserve System	Required reserve ratio, r	↑	↓	Less multiple deposit expansion
	Nonborrowed monetary base, MB_n	↑	↑	More MB to support checkable deposits, D , and currency, C
	Borrowed reserves, BR	↑	↑	More MB to support D and C
Depositors	Currency ratio, c	↑	↓	Less multiple deposit expansion
Depositors and banks	Expected deposit outflows	↑	↓	Excess reserves, e , ↑ so fewer reserves to support D
Borrowers from banks and the other three players	Interest rate, i	↑	↑	$e \downarrow$ so more reserves to support D

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

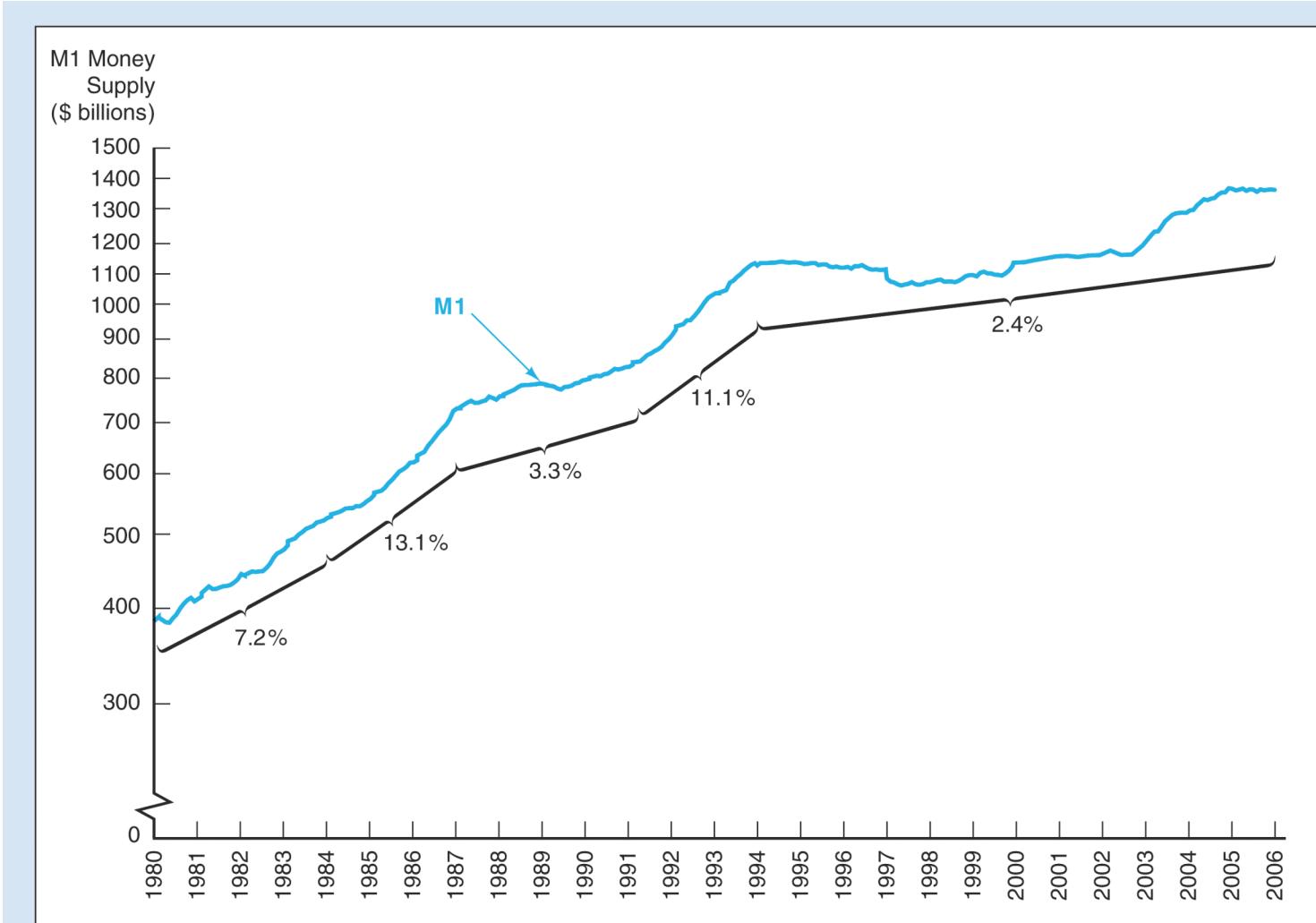


FIGURE 2 Money Supply (M1), 1980–2005

Source: Federal Reserve: www.federalreserve.gov/releases/h6/hist/h6hist1.txt.

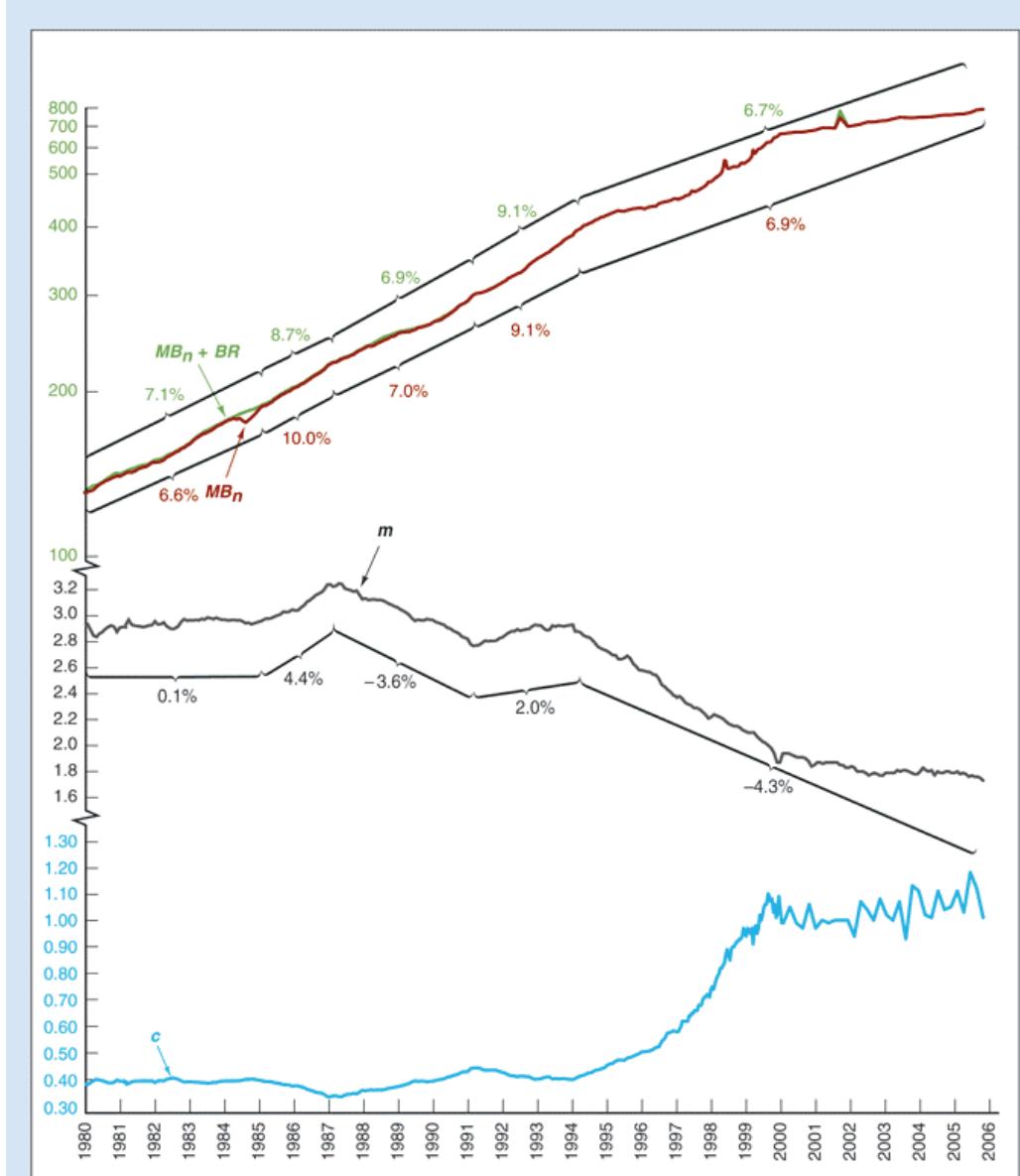


FIGURE 3 Determinants of the Money Supply, 1980–2005

Source: Federal Reserve: www.federalreserve.gov/releases.



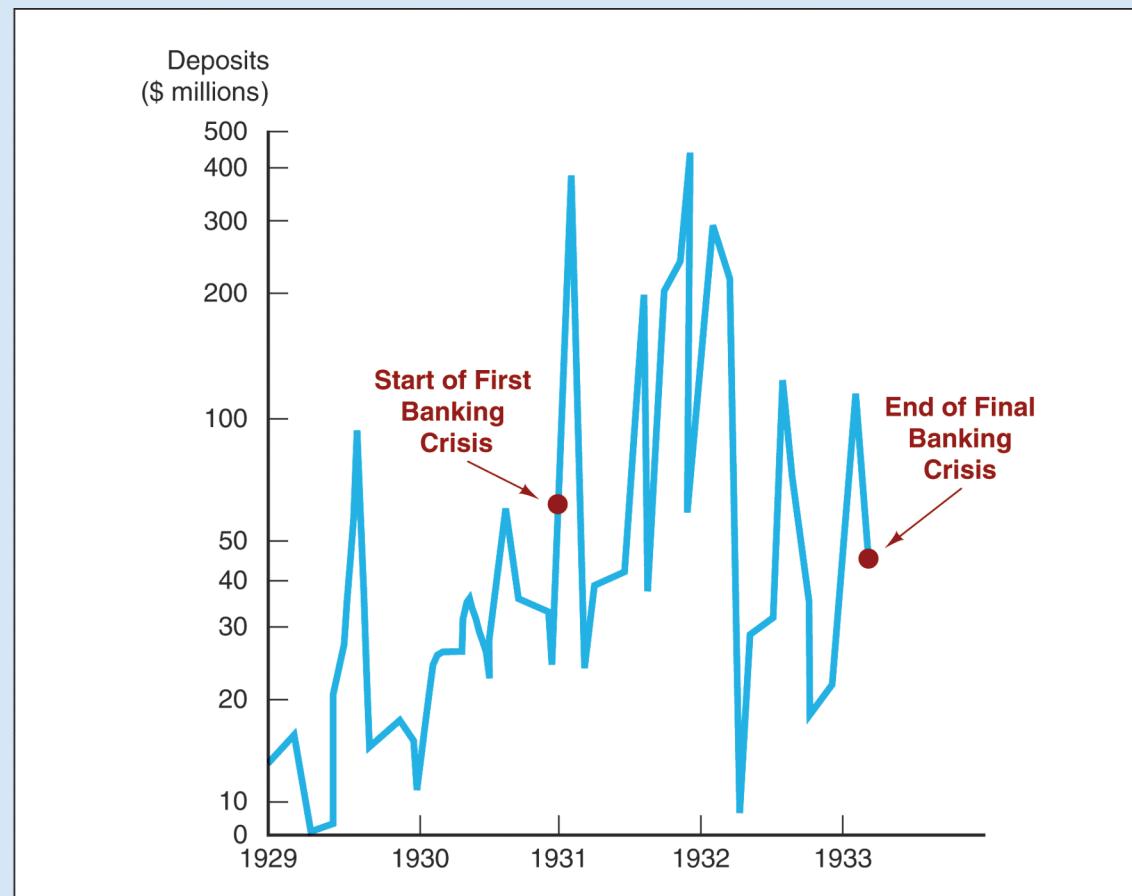
Explaining Movements in the Money Supply

- Over long periods, the primary determinant of movements in the money supply is the nonborrowed monetary base, which is controlled by the Fed's open market operations



FIGURE 4
Deposits of Failed Commercial Banks, 1929–1933

Source: Milton Friedman and Anna Jacobson Schwartz, *A Monetary History of the United States, 1867–1960* (Princeton, N.J.: Princeton University Press, 1963), p. 309.



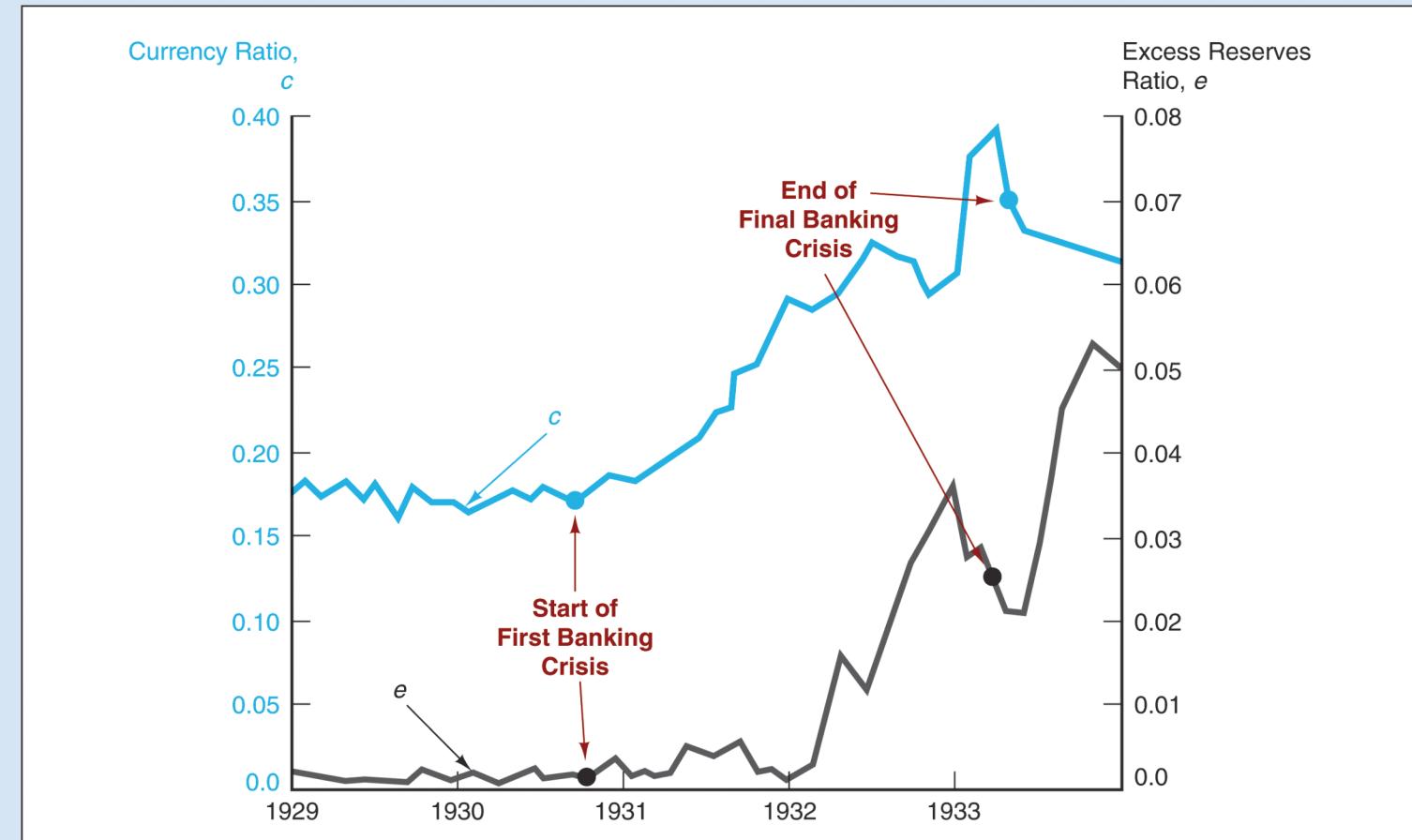


FIGURE 5 Excess Reserves Ratio and Currency Ratio, 1929–1933

Sources: Federal Reserve *Bulletin*; Milton Friedman and Anna Jacobson Schwartz, *A Monetary History of the United States, 1867–1960* (Princeton, N.J.: Princeton University Press, 1963), p. 333.

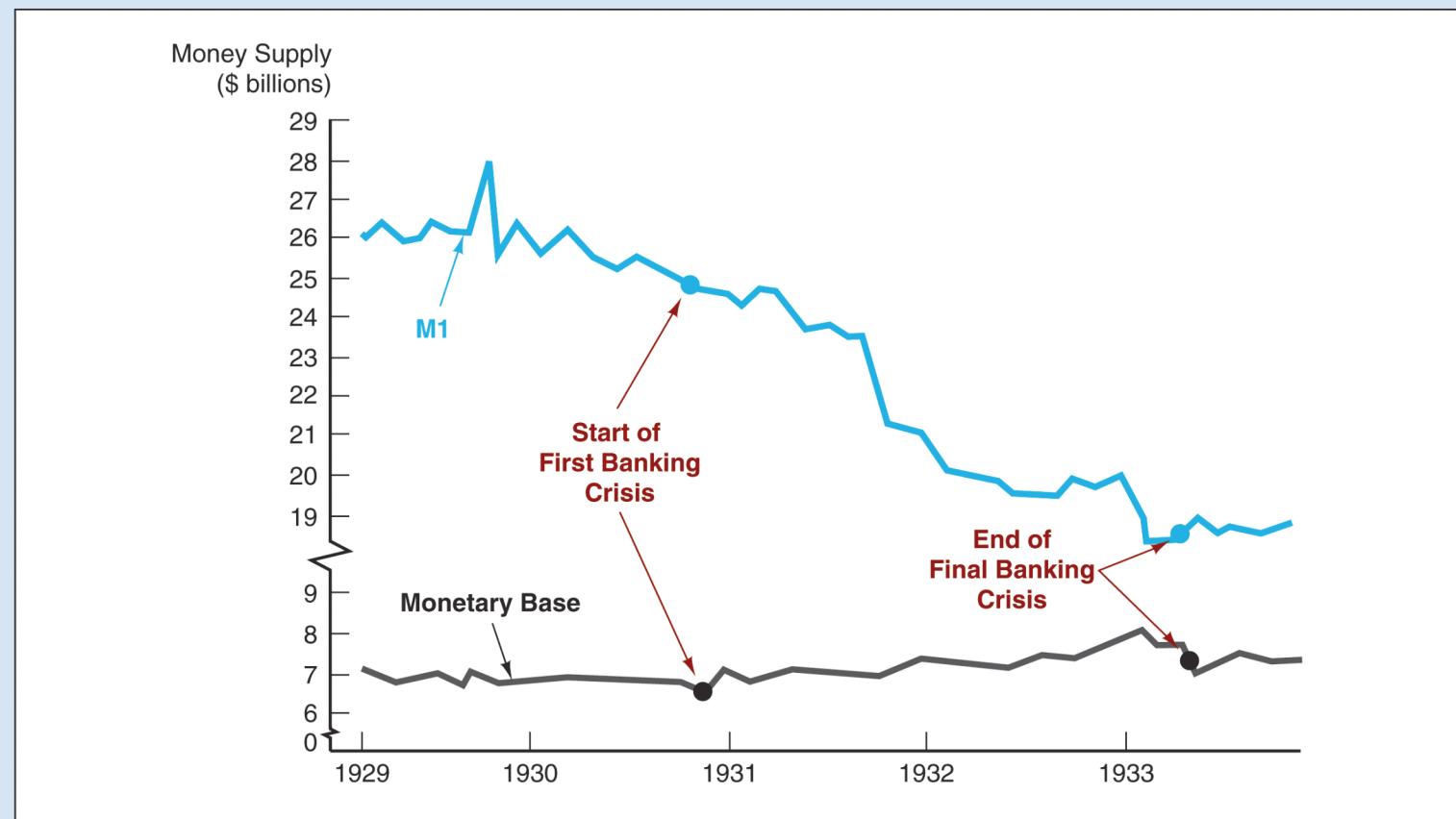


FIGURE 6 M1 and the Monetary Base, 1929–1933

Source: Milton Friedman and Anna Jacobson Schwartz, *A Monetary History of the United States, 1867–1960* (Princeton, N.J.: Princeton University Press, 1963), p. 333.