

Lecture 3: Money and Its Variants

ECON 43370: Financial Crises

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What is Money?

Money is something that is widely accepted as payment for goods and services or in the repayment of debts

Milton Friedman: “Money is whatever is generally accepted in exchange for goods and services – *accepted not as an object to be consumed but as an object that represents a temporary abode of purchasing power to be used for buying still other goods and services.*”

What gives money value is the belief that other people will accept in the future

Stock vs. Flow, Asset vs. Liability

Money is a stock concept – something you accumulate and carry across time

- We frequently misuse the word as a flow concept (e.g., “how much money do you make?”)

Modern money is a financial asset or claim

It is an asset to the holder, and a liability to the issuer

It can be publicly or privately created

Privately issued money is designed to trade at par with the unit of account

Functions of Money

Three textbook functions of money:

1. Medium of exchange
2. Unit of account
3. Store of value

Medium of Exchange

Any asset can serve as a store of value (e.g., house, land, stocks)

Unit of account is important (particularly in a highly diverse economy), but we could measure prices according to some non-money good

Medium of exchange role is really what is important:

- Eliminates need for barter, reduces transactions costs associated with exchange, and allows for greater specialization

Evolution of Money and Payments

Commodity-based money: made up of precious metals or other commodities

- Potentially difficult to transport, store, or divide
- Price may fluctuate due to demand-supply forces independent of role in exchange

Currency: pieces of paper (or coins) that may be “backed” by some commodity

- Easily stolen, difficult to track/trace, difficult to transport in large volumes

Demand deposits: write checks against, with instructions for holder of money to transfer to another person or institution

- Processing is potentially costly, relies on soundness of financial institution that “holds” your funds

Electronic Payment and Digital Money

Electronic payment and e-money are really payment technologies, not “money” per se

Instead of writing a check, can use a debit card, and transfer happens instantaneously

The “money” is still the demand deposit; what is different is the technology used to exchange

Most money is now digital

Credit cards are not money, they are a payments technology. Same as Venmo, Paypal, etc.

- Money is the asset in which debts are settled. These are technologies for accomplishing that

Fiat Money

Prior to 1971, every major currency had been linked directly or indirectly to a commodity. No more.

Fiat money: money that is not backed by anything concrete, other than a government declaring that it is acceptable in settlement of debts, both public and private

To the extent to which fiat money is “backed” by anything, it is backed by the “full faith and credit” of a government

Fiat Money and “Fundamental” Value

Fiat money has no “fundamental” value as a commodity: it provides no future flow benefits, other than that other people will accept it in exchange

For this reason, sometimes people say fiat money is a “bubble”

Is this a bad thing? Not necessarily:

- Easily divisible, can be fully electronic or not, value doesn't fluctuate due to normal demand-supply forces of a commodity, easy for government to expand or contract if needed
- Of course, may be too easy to manipulate quantity, leading to inflation.

Measuring the Money Supply

Let C denote currency in circulation and D denote demand deposits

The most basic measure of money supply is $M1 = C + D$

- This and what follows is somewhat stylized, as what is counted as a deposit changed in 2020

The monetary base (MB) includes currency in circulation and reserve balances banks hold with the central bank

- A central bank is kind of like a bank for banks
- Reserve balances are like demand deposits for banks
- Central banks often regulate how many reserves banks must hold

The money multiplier is the ratio of the money supply to the monetary base

Example

I will show balance sheets for the central bank (Fed), the banking system as a whole, and households as a whole

Currency in circulation: \$600

Demand deposits: \$1900

Reserves: \$800

Monetary base: \$1400

Money supply: \$2500

Money multiplier: 1.79

Central Bank Balance Sheet

Federal Reserve: Hypothetical Balance Sheet

All figures in billions of dollars

Assets		Liabilities and capital	
Treasury securities	1,200	Currency in circulation	600
Mortgage-backed securities	200	Reserve balances of banks	800
Loans to banks	100	Capital	100
Total assets	1,500	Total liabilities and capital	1,500

Commercial Bank Balance Sheet

Commercial Banking System: Hypothetical Balance Sheet

All figures in billions of dollars

Assets		Liabilities and equity	
Reserves at the Federal Reserve	800	Deposits	1,900
Loans to households	1,000	Other liabilities	200
Securities	500	Equity	200
Total assets	2,300	Total liabilities and equity	2,300

Household Balance Sheet

Households: Hypothetical Balance Sheet

All figures in billions of dollars

Assets		Liabilities and net worth	
Currency	600	Loans owed to banks	1,000
Bank deposits	1,900	Net worth	3,000
Bank equity shares	200		
Houses and other real assets	1,300		
Total assets	4,000	Total liabilities and net worth	4,000

Multiple Deposit Creation

In this example (as in the real world), most of what constitutes money is privately created (bank deposits)

A central bank can influence the money supply, but imperfectly.
Relies on behavior of banks and depositors

Open market operations and multiple deposit creation:

- Central bank purchases securities from banks. Funds this via creating reserves
- This leaves banks with more reserves. They may want to extend credit (i.e., make loans), which involves creating new deposits
- Assume banks are required to hold 20 percent of deposits in the form of reserves. They wish to hold no more than this
- Assume further that households don't wish to hold any more currency

Open Market Purchase

Multiple Deposit Creation: Step 1 — Open-Market Purchase

Changes from initial balance sheets; all figures in billions of dollars

Reserve requirement = 20%; banks desire zero excess reserves in the long run.

Federal Reserve		Commercial Banking System	
Assets	Liabilities and capital	Assets	Liabilities and equity
+100 Treasury securities	+100 Reserve balances of banks	+100 Reserves at the Federal Reserve	No change
		-100 Securities	
Total change +100	Total change +100	Total change 0	Total change 0

The Fed buys \$100 of securities from commercial banks and pays with newly created reserves. Deposits do not change yet.

More Reserve = More Lending and Deposit Creation

Multiple Deposit Creation: Step 2 – First Round of Lending

Cumulative changes from initial balance sheets; all figures in billions of dollars

Federal Reserve				Commercial Banking System			
Assets		Liabilities and capital		Assets		Liabilities and equity	
+100 Treasury securities	100	+100 Reserve balances of banks	100	+100 Reserves at the Federal Reserve	100	+100 Deposits	100
				-100 Securities	-100		
				+100 Loans	100		
Total assets	+100	Total liabilities and capital	+100	Total assets	+100	Total liabilities and equity	+100

Required reserves = $20\% \times 100 = 20$

Excess reserves remaining = 80

Banks begin lending against the new reserves. The first \$100 loan creates a new \$100 deposit.

This Continues

Multiple Deposit Creation: Step 3 – Continued Rounds

Cumulative changes from initial balance sheets; all figures in billions of dollars

Federal Reserve		Commercial Banking System		Round-by-round deposit creation
Assets	Liabilities and capital	Assets	Liabilities and equity	
+100 Treasury securities	+100 Reserve balances of banks	+100 Reserves at the Federal Reserve -100 Securities +180 Loans	+180 Deposits	Round 1: +100 deposits, +100 loans Round 2: +80 deposits, +80 loans Next round starts with +64
Total assets +100	Total liabilities and capital +100	Total assets +180	Total liabilities and equity +180	Required reserves = $20\% \times 180 = 36$ Excess reserves remaining = 64

Each round is smaller because 20% of each new deposit must be held as required reserves.

The Final Result

Multiple Deposit Creation: Step 4 – Final Outcome

Cumulative changes after the full money-creation process; all figures in billions of dollars

Federal Reserve		Commercial Banking System	
Assets	Liabilities and capital	Assets	Liabilities and equity
+100 Treasury securities 100	+100 Reserve balances of banks 100	+100 Reserves at the Federal Reserve 100	+500 Deposits 500
		-100 Securities -100	
		+500 Loans 500	
Total assets 100	Total liabilities and capital 100	Total assets 500	Total liabilities and equity 500

$$\text{Deposit multiplier} = \frac{1}{0.20} = 5$$

$$\begin{aligned}\text{Total increase in deposits} \\ &= 5 \times 100 = 500\end{aligned}$$

$$\begin{aligned}\text{Required reserves} &= 20\% \times 500 = 100 \\ \text{Excess reserves} &= 0\end{aligned}$$

Because banks hold no excess reserves and there is no currency drain, the initial \$100 reserve injection supports a total \$500 increase in deposits and loans.

Simple Deposit Multiplier

In this example, deposits (the money supply) expand by a multiple of five relative to the initial open-market purchase ($1/rr$), where $rr = 0.2$ is the required reserve ratio

Just using definitions, the money multiplier is:

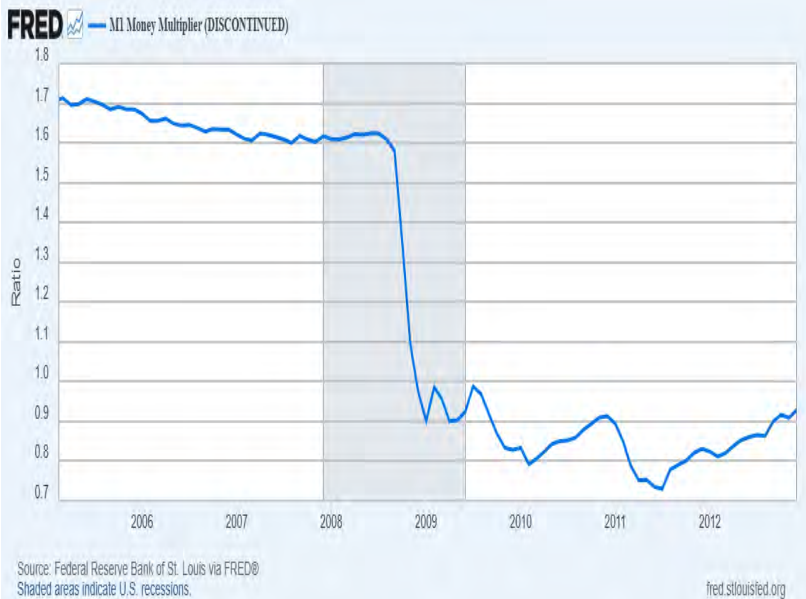
$$\frac{M}{MB} = \frac{1 + c}{c + r}$$

Where $c = C/D$ and $r = R/D$. If no one holds cash and banks hold no excess reserves, $r = rr$

Central bank can set rr , and it can set MB , but it cannot control c and r , so M is jointly determined by central bank, commercial banks, and households

Money multiplier tends to decrease during crises

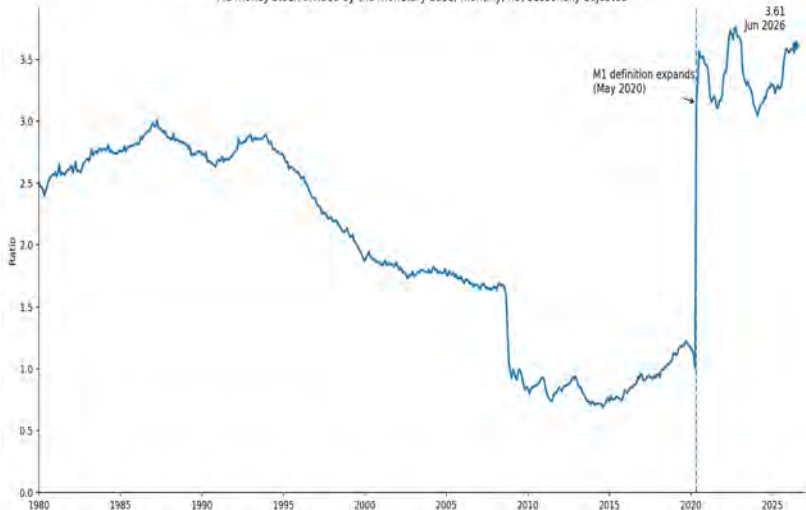
M1 Money Multiplier



M1 Money Multiplier: 2020 Modification of Definition

U.S. M1 Money Multiplier, January 1980-June 2026

M1 money stock divided by the monetary base; monthly, not seasonally adjusted



Note: Beginning in May 2020, M1 includes savings deposits and other liquid deposits; the resulting break is definitional.

Source: Board of Governors of the Federal Reserve System, H.6 Data Download Program. Latest available observation: June 2026.

Historical and Current Monetary Policy

Historically, the Fed (and other central banks) operated according to a scarce reserves framework

- Adjusted the money supply by adjusting the monetary base via open-market operations
- With stable currency-deposit and reserve-deposit ratios, this would lead to predictable changes in the money supply
- Changes in the money supply would lead to changes in short-term interest rates, which would filter through to economic activity

In 2008, the Fed flooded the banking system with reserves (ample reserves), and began paying interest on excess reserves

Now, to change short-term rates, they don't really do open-market operations, they adjust the interest rate on reserve balances (IORB). This affects the money supply via the money multiplier (r)

Moving Beyond M1

M1 includes currency and deposits, which are both used as media of exchange

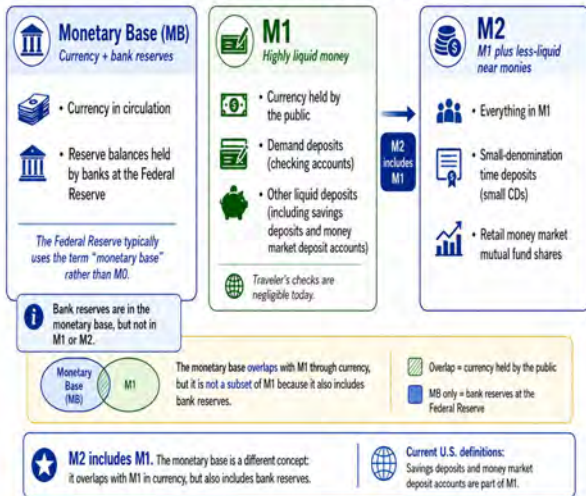
There are lots of other assets that are “like” deposits, though with limited transactions abilities

Think of these as “near monies”: highly liquid financial assets that are costly (or impossible) to transact directly with, but which can easily be converted into the medium of exchange without much price uncertainty

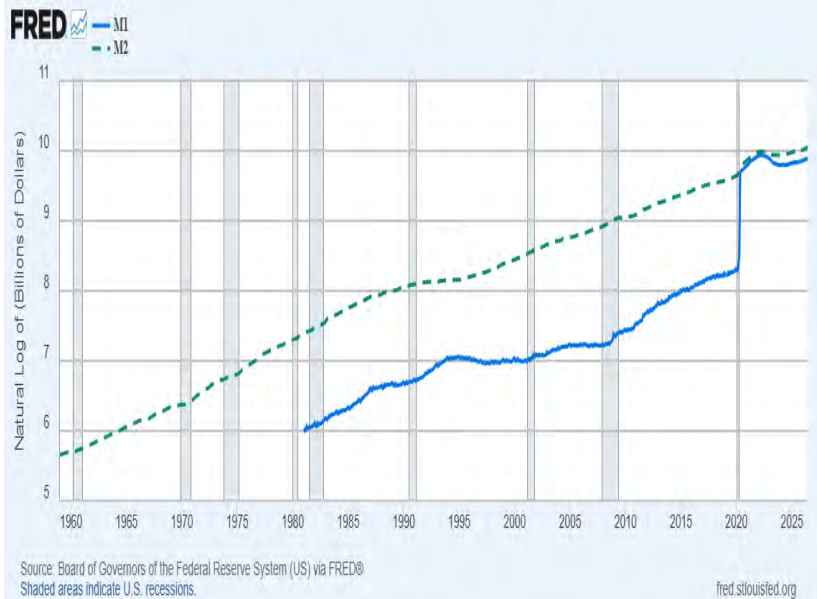
- Savings accounts
- Money market deposit accounts
- Short-term certificates of deposit (CDs)
- Treasury bills

MB, M1, and M2

What Constitutes the Monetary Base, M1, and M2 in the United States?



M1 and M2



Money Demand

Why do people hold money?

Money (M_1) is a crummy store of value – it pays no (or very little) interest relative to other assets

But people need money to conduct transactions and value liquidity

Generic money demand function:

$$\frac{M_t}{P_t} = L \left(\begin{matrix} i_t, & Y_t \\ - & + \end{matrix} \right)$$

M_t/P_t : real money balances (how many goods can be purchased with a given stock of money)

Demand for liquidity: decreasing in opportunity cost of holding liquid money (i_t) and increasing in transaction volume (Y_t)

Quantity Theory

The quantity equation (or equation of exchange) states:

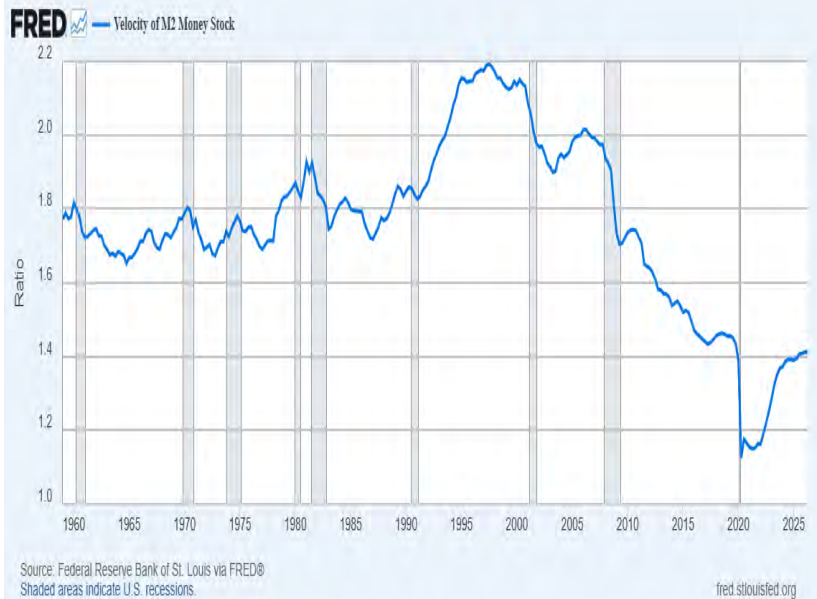
$$M_t V_t = P_t Y_t$$

This defines velocity as the avg. # of times each unit of money is used to support transactions

Quantity theory (monetarists) assume velocity is roughly constant

This is a theory of money demand: that $L_i(i_t, Y_t) = 0$ and $L_Y(i_t, Y_t)$ is a constant

Velocity (M2)



Crises

During crises, the money multiplier declines and velocity declines

Money multiplier declining means money supply is decreasing
(holding the base fixed)

Velocity declining means money demand is increasing (holding interest rates and expenditure constant)

Basically, this is all a flight to safety dynamic

- Banks want reserves, fewer loans/deposits (higher r)
- Households want cash, fewer deposits, fewer illiquid assets (increase in c)

Central Banking 101

Central banks (like the Fed) were designed with the primary purpose of serving as a lender of last resort

Basically, to elastically supply money during crises

Discount window: standing facility where banks can borrow reserves to meet cash and other demands

In modern times, lots of other temporary “facilities”

Things like open-market operations and quantitative easing to flood system with liquidity and keep interest rates down

Central Bank Digital Currency (CBDC)

Most money in the US is already digital (deposits)

Deposits are (digital) liabilities of commercial banks

Reserves are (digital) liabilities of the Fed and assets of commercial banks, but reserves aren't used to transact

CBDC: basically proposal to allow households and firms to have deposits with the Fed

- Pros: maybe more efficient payments, potentially could target the “underbanked” population
- Cons: disintermediation, privacy

Cryptocurrency

Crypto (e.g., Bitcoin) is a digitally transferable asset whose transactions are recorded on a ledger called a blockchain

Supply may be restricted (as with Bitcoin) in how the “rules of the game” are designed

- Blockchain is a way to record and pseudo-anonymize transactions without a central actor

Is crypto good money?

- Good store of value? No, prices fluctuate widely
- Unit of account? No, most goods aren't priced this way
- Medium of exchange? No, it is not widely accepted