

Chapter 7

Money and Assets

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Nominal Rigidities and Market Power

- › The next section of the course deals with frictions that arise from nominal variables
- › As we move into GE, we'll see the impact of monopolistic pricing on inflation
- › We will study the fundamentals of New Keynesian analysis

Scenario

- › Imagine you are a vegetable farmer
- › You need a new pair of shoes
- › How do you get your shoes?

Double Coincidence of Wants

- › If the shoemaker is willing to accept vegetables, we have a **double coincidence of wants**
 - Two parties individually want what the other is offering

- › This example is one of a **barter economy**
 - Goods and services are traded for each other directly
 - NOT with money
 - Further, a **gift economy** is one where HHs gift each other resources with a social thought of reciprocity

So, What is Money?

- › **Money** is any resource that can be *readily* exchanged for goods and services
- › “Readily” is vague, but also meaningful
 - I can trade some oranges for pencils, but most people won't readily accept oranges as payment
 - Almost everyone in the U.S. will accept dollars

Extended scenario

- › The shoemaker is willing to accept wine for shoes
 - You have to go to a vineyard to see what they'll trade for wine
 - Assuming that's successful, the shoemaker has to go to their dye suppliers and find what they want as compensation...

- › Voluntary trade increases total surplus (Ricardian model)
 - Do we want to rely on double coincidence of wants to facilitate trade?

Yap (Waqab)

- › Small island group in the Pacific
 - First European contact in 1500's
 - Used limestone deposits on an island hundreds of miles away as money (rai)
 - Carved into stone discs & sailed back on small boats



Yap Proper: Rumung, Maap, Gagil-Tamil, and Marbaa'.

Credit

- › Given the inconvenience of moving stone, it became more abstract
 - Development of a credit system
 - People would keep score of who paid whom and tallies of limestone stock, making it easier to use for smaller transactions
 - "They often talk about the stones themselves not changing hands at all. In fact, most of the time they wouldn't." – Dr. Fitzpatrick
 - (Goldstein & Kestenbaum, 2010), (Fitzpatrick, 2004)

Value of Money

- › Society *must* buy into the item used as money
 - If enough people decide to stop valuing the stone, it becomes worthless

- › But the opposite is also true
 - If enough people value something, it can become money
 - Ex: Kent cigarettes in the final decade of communism in Romania
 - (Thurow, 1986)

3 Properties of Money

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

Medium of Exchange

- › Money can be exchanged for goods and services
 - \$20 can buy many peanuts



"Boy-Scoutz 'n the Hood." *The Simpsons*, 1993.

Unit of Account

- › Provides a denomination to judge value
 - Numeraire property
 - Apple = \$1, melon = \$2
 - Melon is worth 2x as much as an apple
- › If apples were the **numeraire good**, the [relative] price of melons would be 2
 - Transactional reference point

Store of Value

- › Value holds in the future
 - \$10 today is \$10 tomorrow
 - The number 10 does not change
 - Not a perfect store of value if inflation exists...

Real and Nominal Variables

- › In Ch. 3 we laid out the basics of real and nominal GDP
- › Now, we'll see how the two concepts are connected
- › Ex: savings accounts do not quote your interest in units of apples today vs apples tomorrow, but in a percent of money saved
 - This is a nominal variable

The Link to Real

- › Variables: r = real interest, i = nominal interest, π = inflation
- › Let's “factor out” inflation from nominal interest to get real:

$$1+r = \frac{1+i}{1+\pi'}$$

- $(1 + \pi')$ is the factor of how much prices will change at end of loan

- › Then: $i = r + \pi' + r\pi'$

The Fisher Equation

- › With $i = r + \pi' + r\pi'$, in modern economies $r\pi'$ is very small
 - Around 0.001
 - Just drop it
- › Fisher Equation for nominal interest rate:

$$i = r + \pi'$$

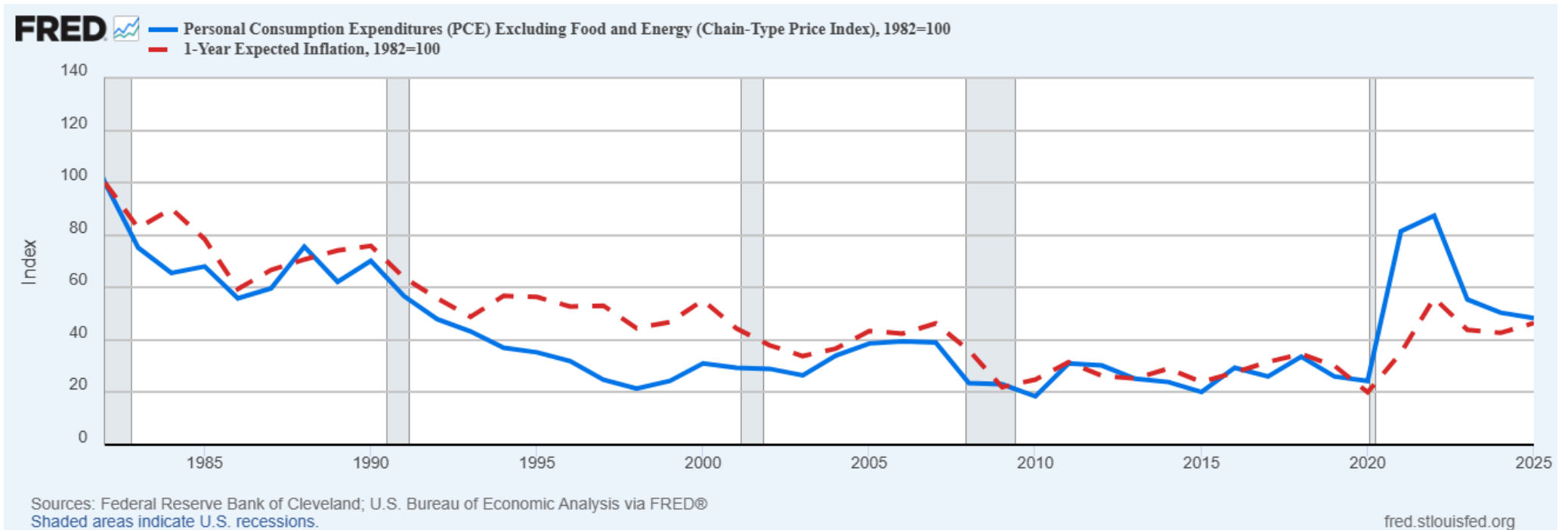
- › Which is great, but doesn't really get at HH behavior...

Expected Inflation

- › People write contracts for what they *expect* inflation to be
 - Expected inflation = $E[\pi]$
 - Expected inflation Fisher Equation: $i = r + E[\pi]$
- › Captures idea that people are “forward looking”
 - But are they accurate?

π

Expected Inflation Data



Does This Change Anything We've Done?

- › Nope! - HH's view π' of takes a little time to update
 - Initial change is just i
 - SE and WE still hold

- › Type of **adaptive expectations**
 - HH relies of pervious info to form future expectations

- › Firms still invest less when i increases
 - Cost of borrowing still goes up

But What about ***MB=MC***?

- › Convenience of single-output economy:
 - Multiply quantities by P to get their nominal value
 - $P \times Y$ = nominal value of output
 - $P \times MPN$ = nominal MPN (Marginal Revenue Product, $MRPN$)

$$P \times MPN = P \times w$$

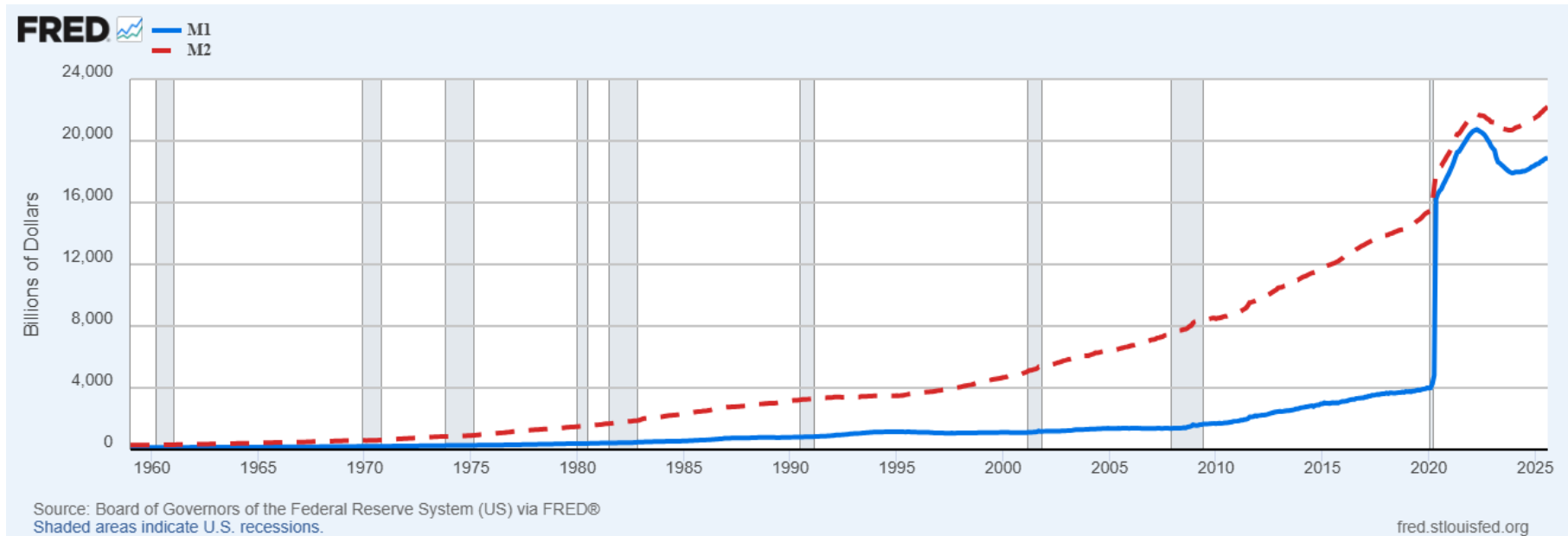
Two Types of Money

1. **Fiat money:** established by some central authority
 - Has no value on its own; basically just paper
 - Value based on trusting issuer and national economy
 - U.S. dollar is a fiat currency, printed by the Treasury

2. **Commodity money:** value comes from a commodity
 - Gold standard is the most well known
 - Incredibly useful commodity beyond jewelry
 - U.S. dollars represented a fixed amount of gold (and silver)
 - › 1933: U.S. removed gold standard domestically
 - › 1971: U.S. removed gold backing for international exchanges

The Money Supply

- › The **Federal Reserve (Fed)** controls the money supply
 - **M1**: Cash + liquid deposits (easily converted to cash)
 - **M2**: M1 + money market funds + time deposits



The Federal Reserve

- › The Fed is the monetary authority of the U.S.
- › The Fed influences the money supply and interest rates by:
 1. Open market operations (OMO) – today (Ch. 7)
 2. Setting reserve requirements – Ch. 8
 3. Quantitative easing – Ch. 8
 4. Simply picking an interest rate – Ch. 8

Open Market Operations

- › The Fed uses printed money to:
 - Increase M^s by purchasing assets from the public
 - Decrease M^s by selling assets to the public

- › Simply moves M^s left or right depending on what they want

Nominal Money Demand

- › Demand for money M^d in nominal terms is a function of:
 - Price level (P)
 - Nominal interest rate (i)
 - Lifetime resources (Ω)

$$M^d = P \times L(\Omega, i)$$

- where $L()$ is a preference function for Liquid money

Lifetime Resources

› Lifetime resources (Ω) are divided into:

1. Value of non-liquid assets: qB

› q is the price of a composite (basket) asset, B

▪ HH can choose B

2. Value of lifetime income: $h(Y, r)$

▪ HH cannot choose Y (or at least has negligible influence over)

› Similar to borrowing against future income in last chapter

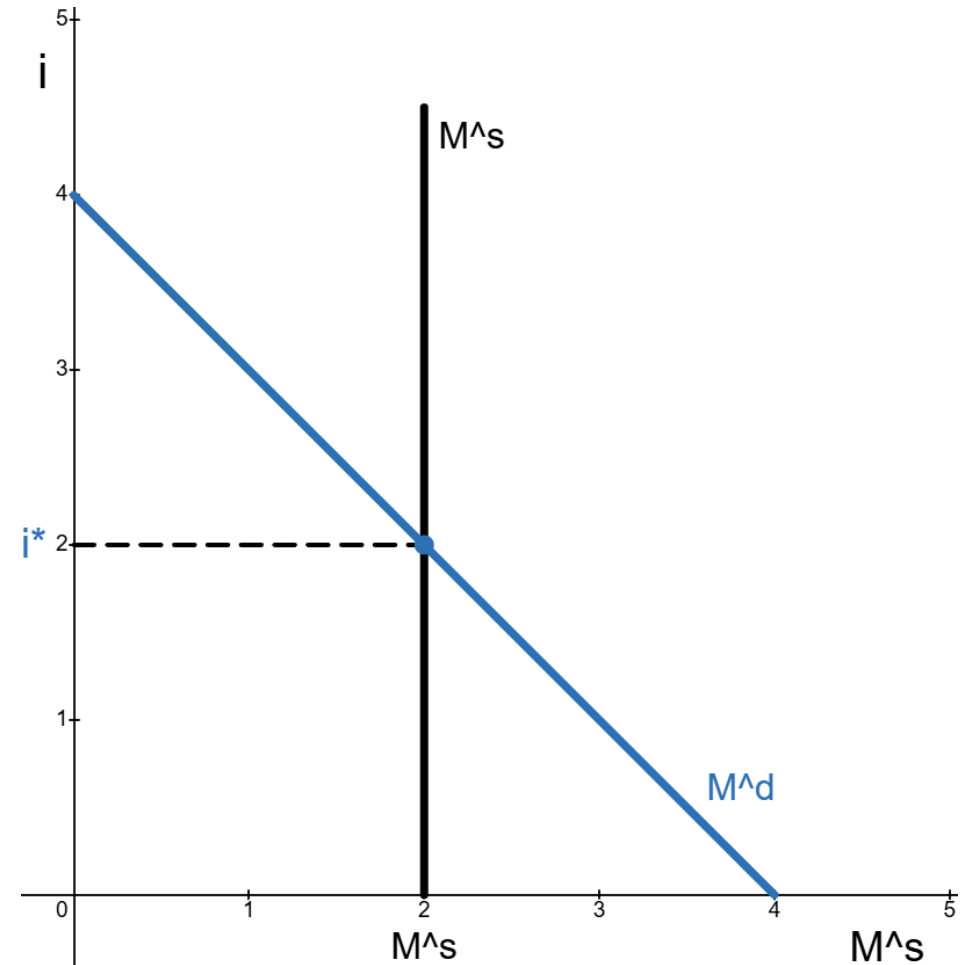
› **$\Omega = qB + h(Y, r)$**

The Effect of Ω on M^d

- › When the HH's resources, Ω , grow so does M^d
- › If $Y \uparrow$, then $\Omega \uparrow$:
 - $M^d \uparrow$ since HHs use cash for c (medium of exchange)
 - M^d is therefore a **derived demand**
 - › Comes from demand of another good (c)
 - Wealth effect encouraging $c \rightarrow$ HH needs more cash

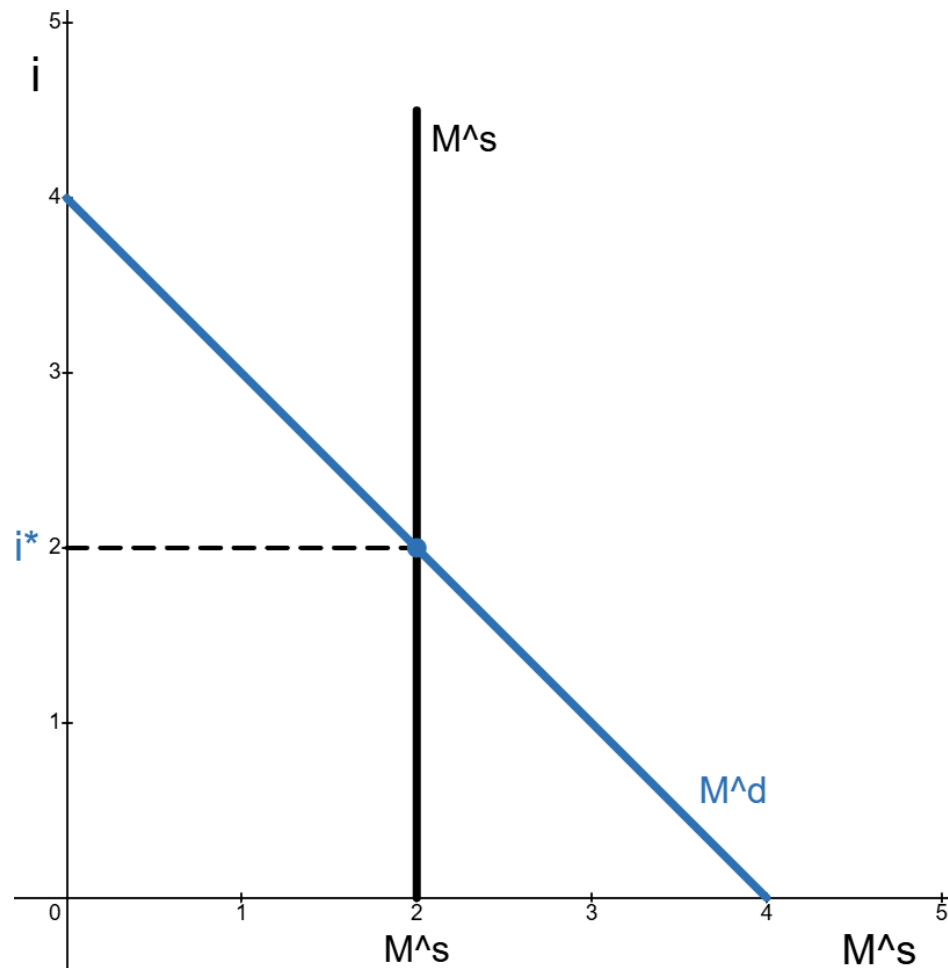
Graphing the Money Market

- › M^s is simply set by the Fed
- › M^d is decreasing in i
 - Why?



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Increase in M^s



Inflation and Real Money Demand

- › Inflation adds onto the substitution effect
 - Increases opportunity cost of holding money
 - Value choice: \$3 gallon of milk today or \$4 gallon of milk tomorrow
 - Real money demand falls with higher expected inflation

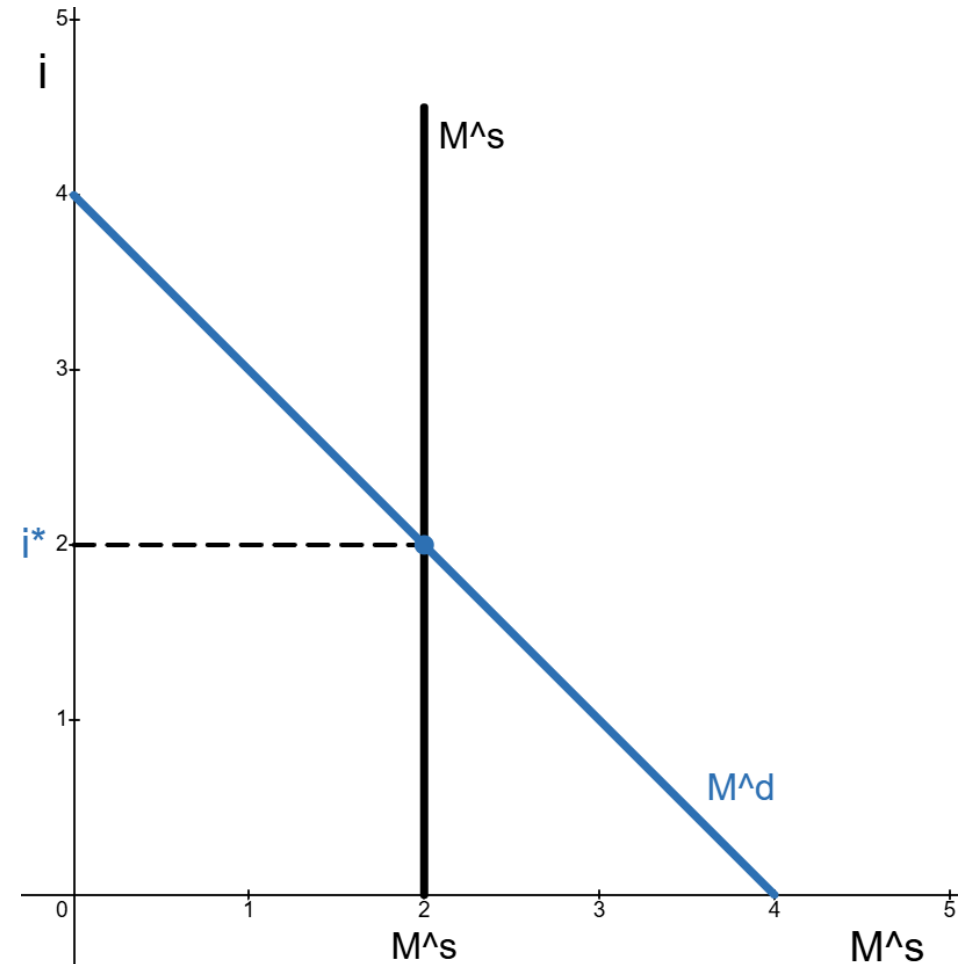
Price Level vs Inflation

- › Now that we have a function of P and π , we need to be a bit more detailed than in Ch. 3:

P	π	Definition
10.00	-	-
11.00	10%	Inflation
12.10	10%	Inflation (constant)
14.52	20%	Inflation (accelerating)
15.25	5%	Disinflation
14.94	-2%	Deflation

Changes in Y

- › Increase in Y raises demand for real money balances
- › Decreases in Y lower demand for real money balances
- › Both lead to a new equilibrium



Equilibrium in the Asset Market

- › Equilibrium in money market implies: $M^d = M^s$
 - And gives us i^*
- › HH “chooses” how much to save in B
 - But really, it’s just a residual
 - We don’t need to “solve” for B ; just falls out of HH’s budget
- › Walras Law: if $N-1$ markets clear, then N markets clear
 - (Walras, 1874)

A Note on i and q

- › Let B involve claims on the firm
- › Assume M^s increases so that i falls
 - Firms invest more; a share of the firm becomes *more* valuable
 - q rises when i falls
- › Therefore, i and q move in opposite directions
 - Further reading on related, but not identical concept, “Tobin’s q ”
 - In aggregate: ratio of market value to replacement cost
 - (Tobin & Brainard, 1976)

But Doesn't That Mean M^d Changes?

- › Yes! There are some feedback effects happening here
- › Just not enough to change our qualitative answer

References (1/2)

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 12. U.S. Bureau of Economic Analysis, Personal Consumption Expenditures Excluding Food and Energy (Chain-Type Price Index) [PCEPILFE], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/PCEPILFE>, .
 13. Walras, Léon. "Elements of Pure Economics." (1874).
- A. All non-cited graphs for this course made by me on [Desmos](#).

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APPENDIX

Real Money Demand and Equilibrium

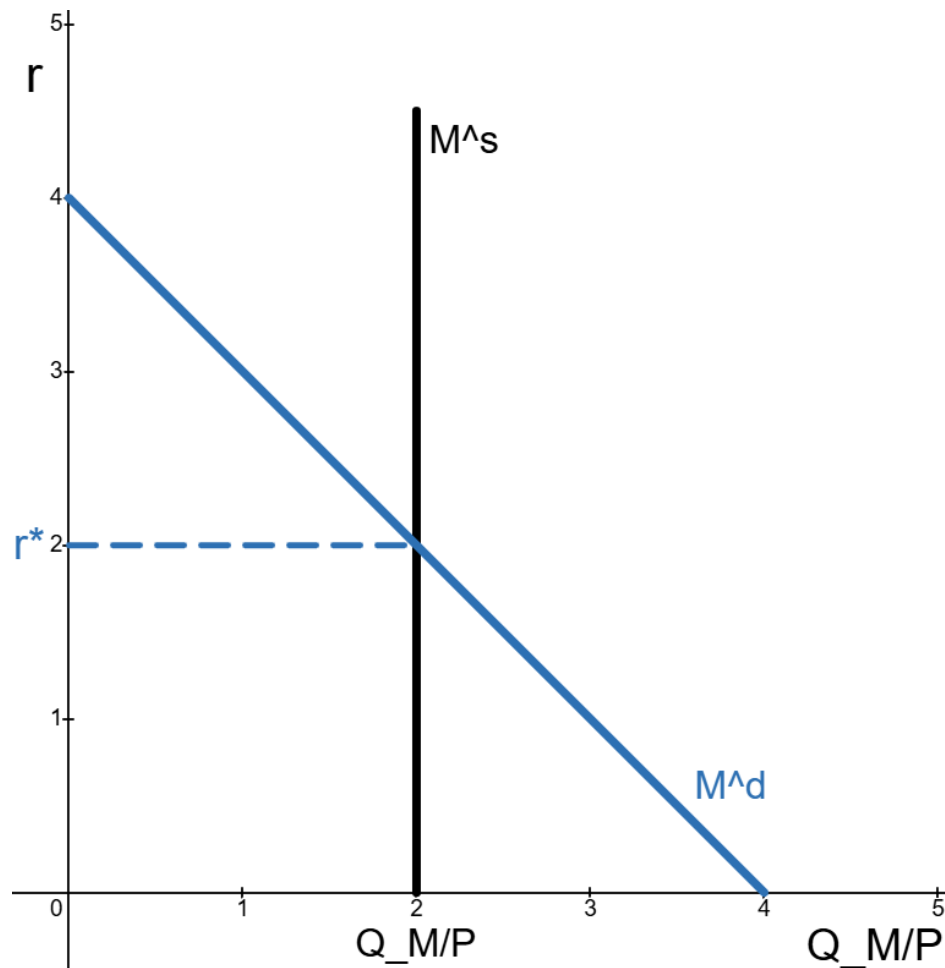
› We can divide by P (and redefine some things) to get:

$$\frac{M^d}{P} = L(\Omega, r + E[\pi])$$

› With the equilibrium condition being:

$$\frac{M^s}{P} = \frac{M^d}{P} = L(\Omega, r + E[\pi])$$

The Market for REAL Money Balances



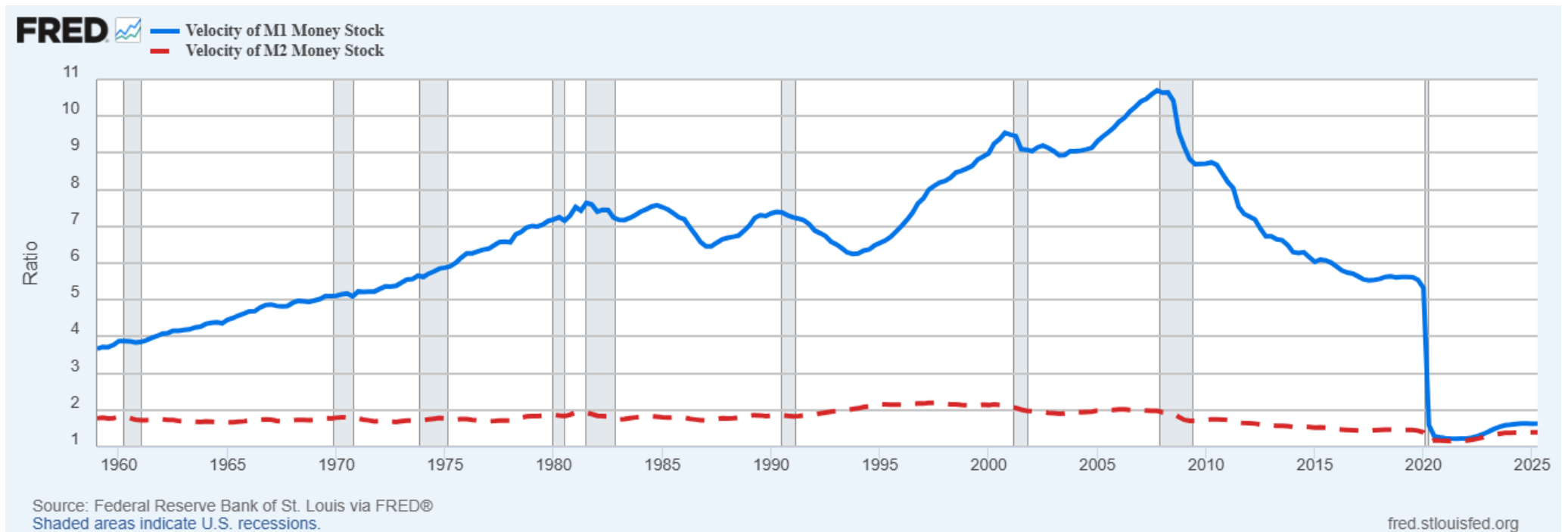
Velocity of Money

- › Related concept: **velocity (V)** of money
 - How often money changes hands

$$V = \frac{PY}{M^s}$$

- As V increases, each dollar is being used more
- › Assuming velocity is a constant, k : $\frac{M^d}{k} = PY$ and $V = \frac{1}{k}$
 - Quantity Theory of Money Cambridge equation

Velocity of M1 vs M2



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