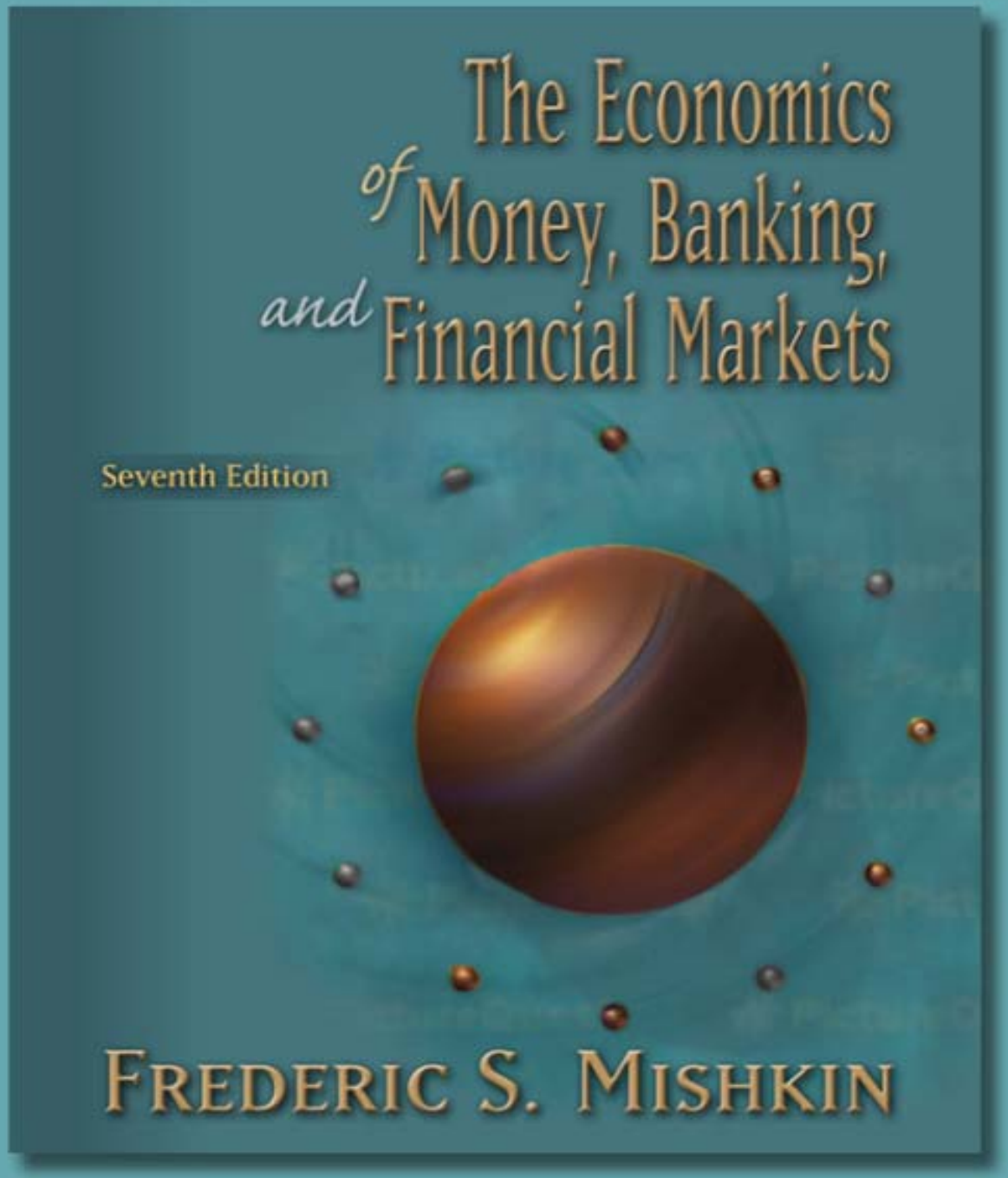
Essex EC248-2-SP
Lecture 5

The Demand for Money and Monetary Theory

Alexander Mihailov, 13/02/06



PEARSON Addison Wesley

Plan of Talk

- **Introduction**

1. Theories on the Demand for Money
2. Money in IS-LM and AD-AS Analysis
3. Money and Inflation
4. Money and Output

- **Wrap-up**

Aims and Learning Outcomes

- **Aims**
  - Understand what determines money demand
  - Discuss the role of money and policy in the economy
- **Learning outcomes**
  - Compare alternative theories of money demand
  - Analyse effects of money in IS-LM and AD-AS models
  - Comment the link between money and inflation
  - Characterise the real effects of money

Quantity Theory of Money

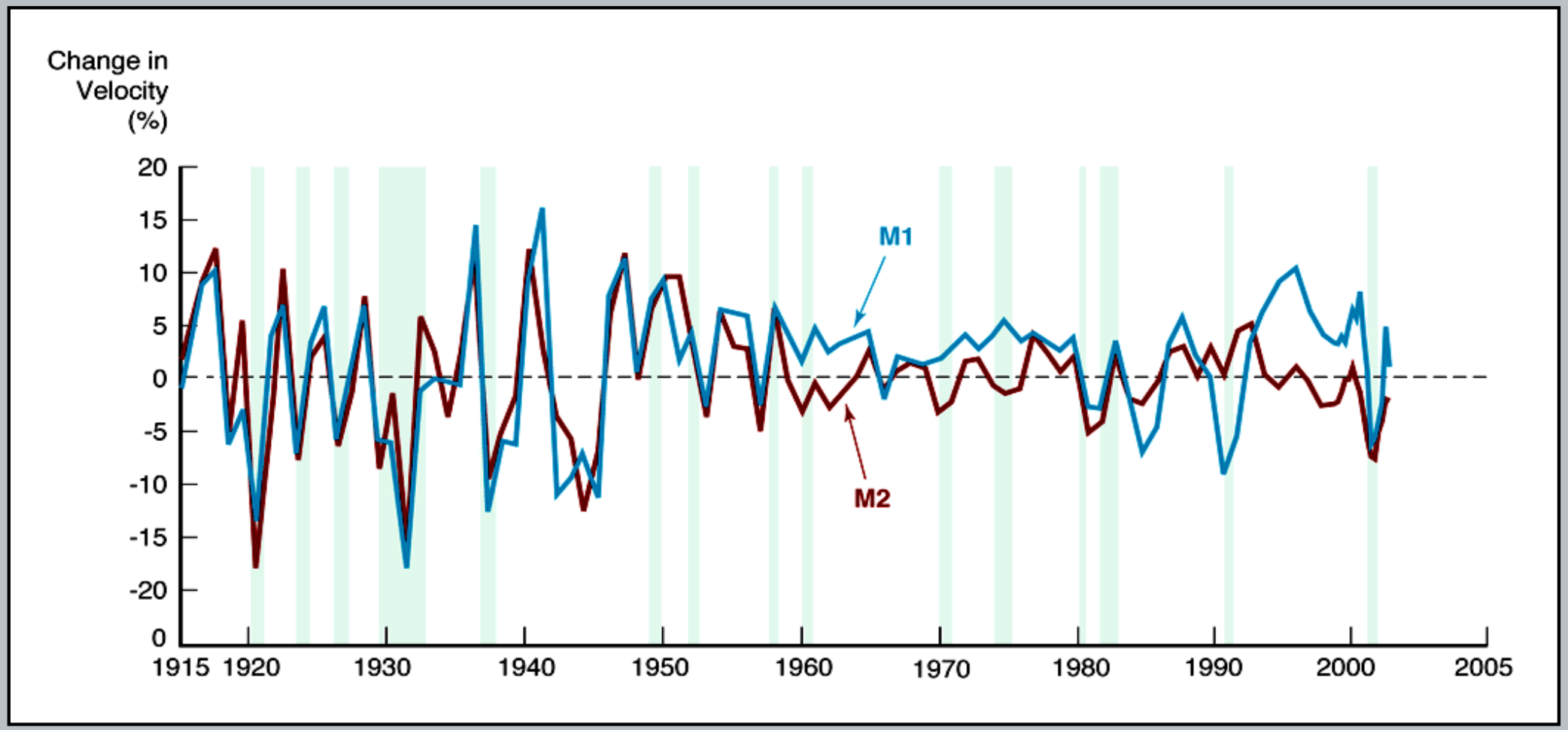
Velocity $V \equiv \dfrac{P \times Y}{M}$ (definition)

Equation of Exchange $M \times V \equiv P \times Y$ (identity)

Quantity *Theory* of Money

1. Irving Fisher's (1911) view: V is fairly constant
2. Equation of exchange no longer identity, but theory
3. Nominal income, PY, determined by M
4. Classicals assume Y fairly constant
5. P determined by M

Change in Velocity from Year to Year: US Data, 1915–2002



Cambridge Approach and Keynes (1936)

Cambridge approach: Is velocity constant?

1. Classicals thought V constant because they did not have good data
2. Great Depression => economists realised velocity was far from constant

Keynes: 3 motives to hold money

1. Transactions motive—related to Y
2. Precautionary motive—related to Y
3. Speculative motive
   A. related to W and Y
   B. negatively related to i

Liquidity Preference

$$\frac{M^d}{P} = f(\underset{-}{i}, \underset{+}{Y})$$

Keynes's Liquidity Preference Theory

Implication: Velocity not constant

$$\frac{P}{M^d} = \frac{1}{f(i,Y)}$$

Multiply both sides by Y and substitute in $M = M^d$

$$V = \frac{PY}{M} = \frac{Y}{f(i,Y)}$$

1. $i \uparrow$, $f(i,Y) \downarrow$, $V \uparrow$
2. Change in expectations of future i, change f(i,Y) and V changes

Baumol (1952) – Tobin (1956) Model of Transactions Demand

Assumptions
1. Income of $1000 each month
2. 2 assets: money and bonds

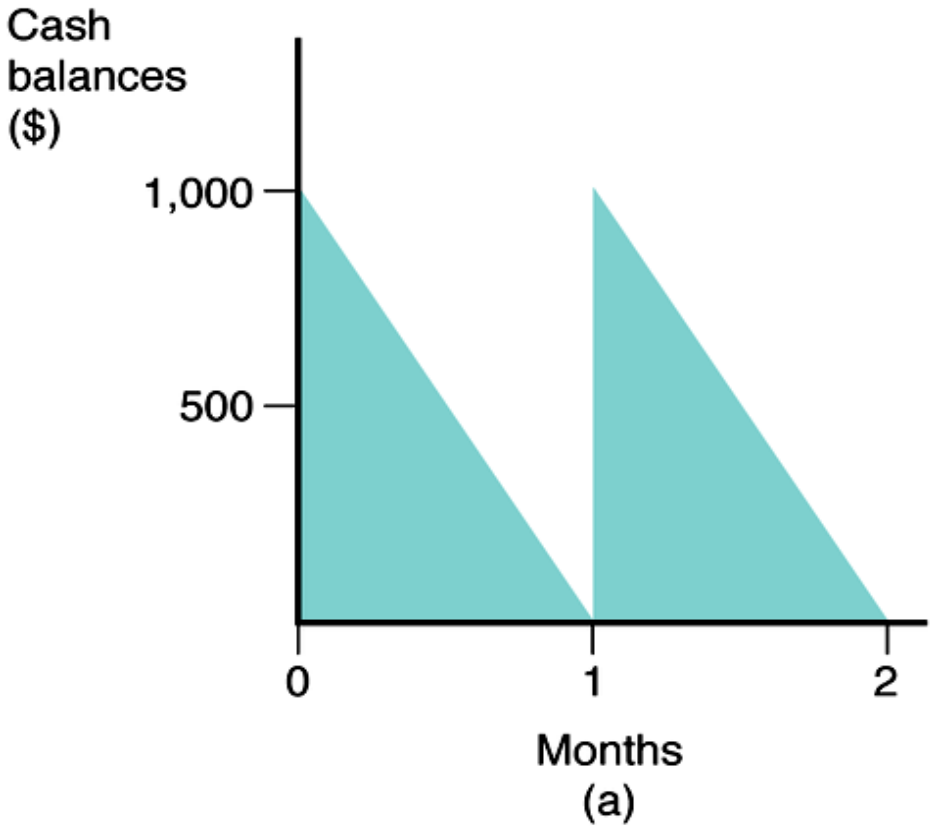
If keep all income in cash
1. Yearly income = $12,000
2. Average money balances = $1000/2 = $500
3. Velocity = $12,000/$500 = 24

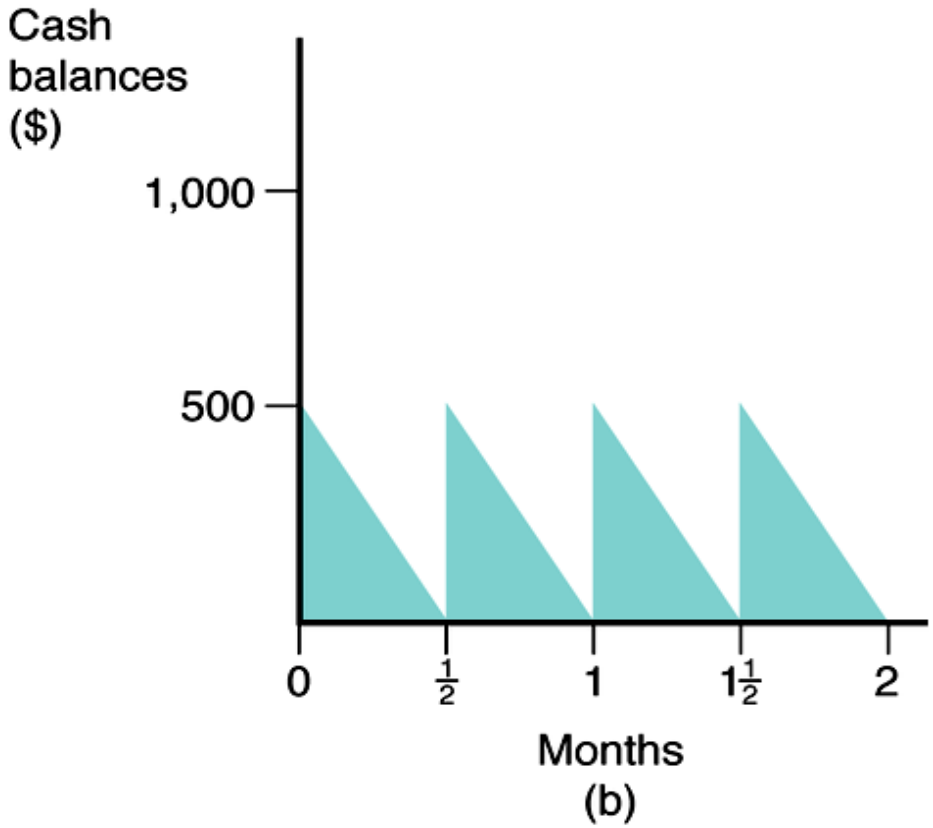
Keep only 1/2 payment in cash
1. Yearly income = $12,000
2. Average money balances = $500/2 = $250
3. Velocity = $12,000/$250 = 48

Trade-off of keeping less cash
1. Income gain = $i \times \$500/2 = i \times \$250 \Rightarrow i$ as an opportunity cost of holding money
2. Increased transactions costs: (i) brokerage fee; (ii) more trips to bank

Conclusion: Higher is i and income gain from holding bonds, less likely to hold cash: Therefore $i \uparrow$, $M^d \downarrow$

Cash Balance in Baumol-Tobin Model





Precautionary and Speculative M^d

Precautionary Demand

Similar trade-off to Baumol-Tobin framework

1. Benefits of precautionary balances
2. Opportunity cost of interest foregone

Conclusion:

$i \uparrow$, opportunity cost $\uparrow$, hold less precautionary balances, $M^d \downarrow$

Speculative Demand

Problems with Keynes's framework:

Hold all bonds or all money: no diversification

Tobin (1958) Model

1. People want high R^e, but low risk
2. As $i \uparrow$, hold more bonds and less M, but still diversify and hold M

Problem with Tobin model: No speculative demand because T-bills have no risk (like money) but have higher return

Friedman's (1956) Modern Quantity Theory

Applied the theory of asset demand to money: M^d function of wealth = *permanent* income (Y_P) [= PDV of all future income] and *relative* R^e of other assets

$$\frac{M^d}{P} = f(\underset{+}{Y_P}, \underset{-}{r_b - r_m}, \underset{-}{r_e - r_m}, \underset{-}{\pi^e - r_m})$$

Differences from Keynesian theories

1. Other assets besides money and bonds: *equity* and *goods* (real assets) => *more than one interest rate* matters in the aggregate economy, no comovement
2. Goods and money are *substitutes* (choice) => M has direct effect on spending
3. r_m not constant: $r_b \uparrow$, $r_m \uparrow$, $r_b - r_m$ unchanged, so M^d insensitive to interest rates: Δr_b have little effect on M^d since matched by Δr_m
4. M^d is a stable function

Implication of 3. combined with 4.:

$$\frac{M^d}{P} = f(Y_P) \Rightarrow V = \frac{Y}{f(Y_P)}$$

Since relationship of Y and Y_P predictable, 4. implies V is predictable: Get QTM theory view that change in M leads to predictable changes in nominal income, PY

Empirical Evidence on Money Demand

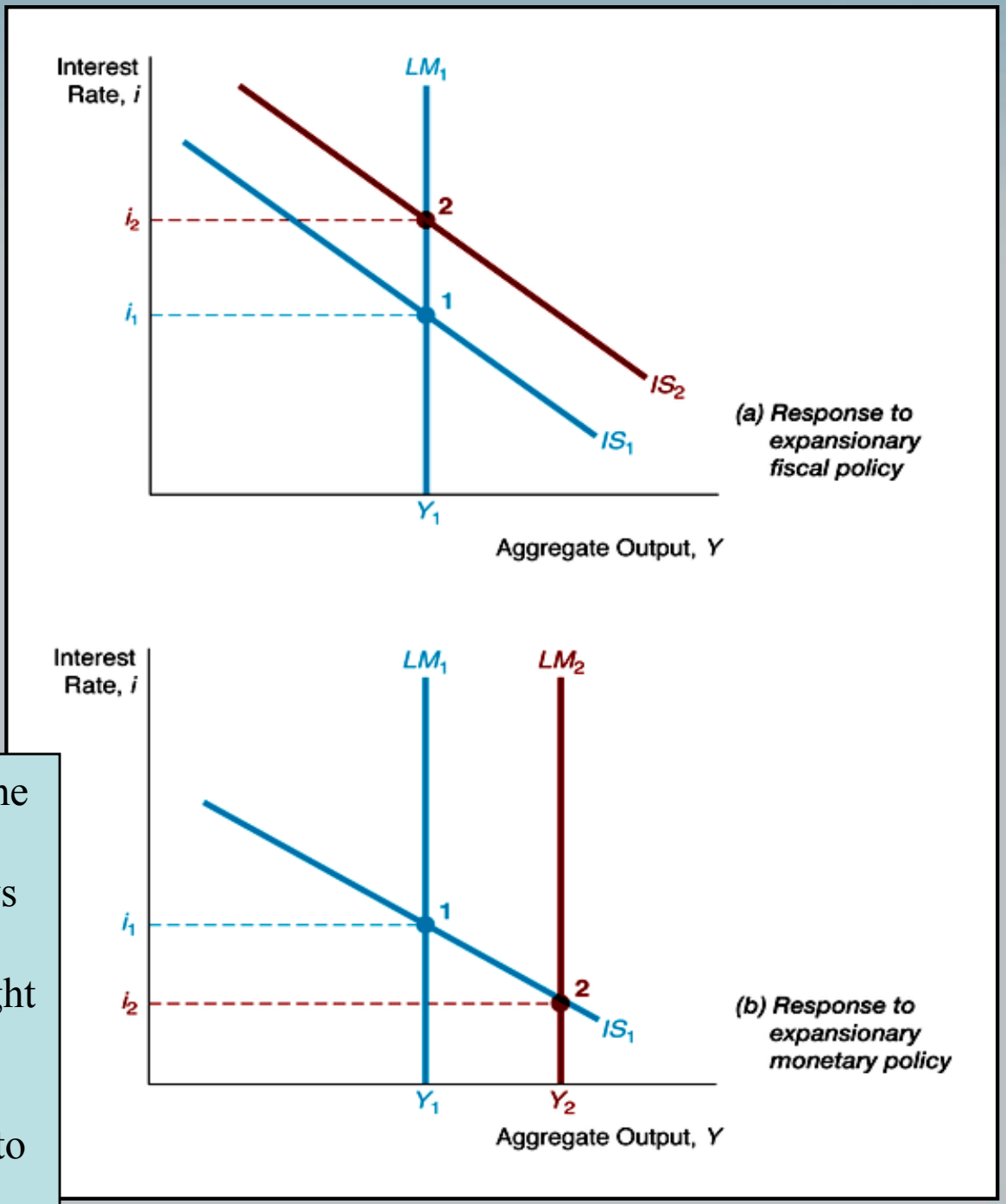
Interest Rate Sensitivity of Money Demand

Is sensitive, but no liquidity trap

Stability of Money Demand

1. *M1* demand stable till 1973, unstable after
2. Most likely source of instability is financial innovation
3. Cast doubts on money targets

IS-LM Model: Effectiveness of Monetary and Fiscal Policy



1. M^d is unrelated to $i \Rightarrow i \uparrow$, $M^d = M^s$ at same $Y \Rightarrow LM$ vertical
2. Panel (a): $G \uparrow$, IS shifts right $\Rightarrow i \uparrow$, Y stays same (complete crowding out)
3. Panel (b): $M^s \uparrow$, $Y \uparrow$ so $M^d \uparrow$, LM shifts right $\Rightarrow i \downarrow Y \uparrow$

   Conclusion: Less interest sensitive is M^d, more effective is monetary policy relative to fiscal policy

AD-AS Analysis: *Monetarist* View of AD

$$V = \frac{P \times Y}{M} = \frac{1 \times 2000}{1000} = 2$$

***Modern* Quantity Theory of Money (Friedman, 1956)**

$M \times V = P \times Y$

Implication: M determines $P \times Y$ if V predictable and unrelated to ΔM

Deriving *AD* Curve

$P = 1$, $M = 1000$, $V = 2 \Rightarrow P \times Y = 2000$ (Point B below)

Point A:	$P = 2$	$Y = 1000$	$PY = 2 \times 1000 = 2000$
Point B:	$P = 1$	$Y = 2000$	$PY = 1 \times 2000 = 2000$
Point C:	$P = 0.5$	$Y = 4000$	$PY = 0.5 \times 4000 = 2000$

Conclusion: $P \downarrow$, $Y \uparrow$, downward sloping *AD*

2 Key Differences w.r.t. Keynesians (see also next slide)**:**

- **Shift in *AD* Curve:** *one* primary source, ΔM (e.g., if $M = 2000$ above)
  $M \uparrow$ <=> $P \times Y \uparrow$, i.e., *AD* shifts right (at any *given* P)
- **Crowding out:** *complete* (see next slide)

AD-AS Analysis: *Keynesian* View of AD

$Y^{ad} = C + I + G + NX$

Downward Sloping *AD*

$P \downarrow$, $M/P \uparrow$, $i \downarrow$, $E \downarrow$ (depreciation, in Mishkin) $I \uparrow$, $NX \uparrow$, $Y^{ad} \uparrow$, $Y \uparrow$

2 Key Differences w.r.t. Monetarists

Shift in *AD*: *many* sources

$M \uparrow$, $M/P \uparrow$, $i \downarrow$, $I \uparrow$, $NX \uparrow$, $Y^{ad} \uparrow$, $Y \uparrow$

$\Rightarrow$ *AD* shifts right

$C \uparrow$ or $I \uparrow$ or $NX \uparrow$ or $G \uparrow$ or T $\downarrow$: $Y^{ad} \uparrow$, $Y \uparrow$

$\Rightarrow$ *AD* shifts right

Crowding Out: *partial* (in the *short* run)

Complete (monetarists): $G \uparrow$, $i \uparrow \Rightarrow C \downarrow$, $I \downarrow$, $NX \downarrow \Rightarrow$ $C + I + G + NX = Y^{ad}$ unchanged

Partial (Keynesians): private spending down, but not fully offsetting $G \uparrow$

Money and Inflation: The Evidence

"Inflation is always and everywhere a monetary phenomenon"

(M. Friedman)

Evidence

In every case when π high for *sustained period*, *M* growth is high

Examples:

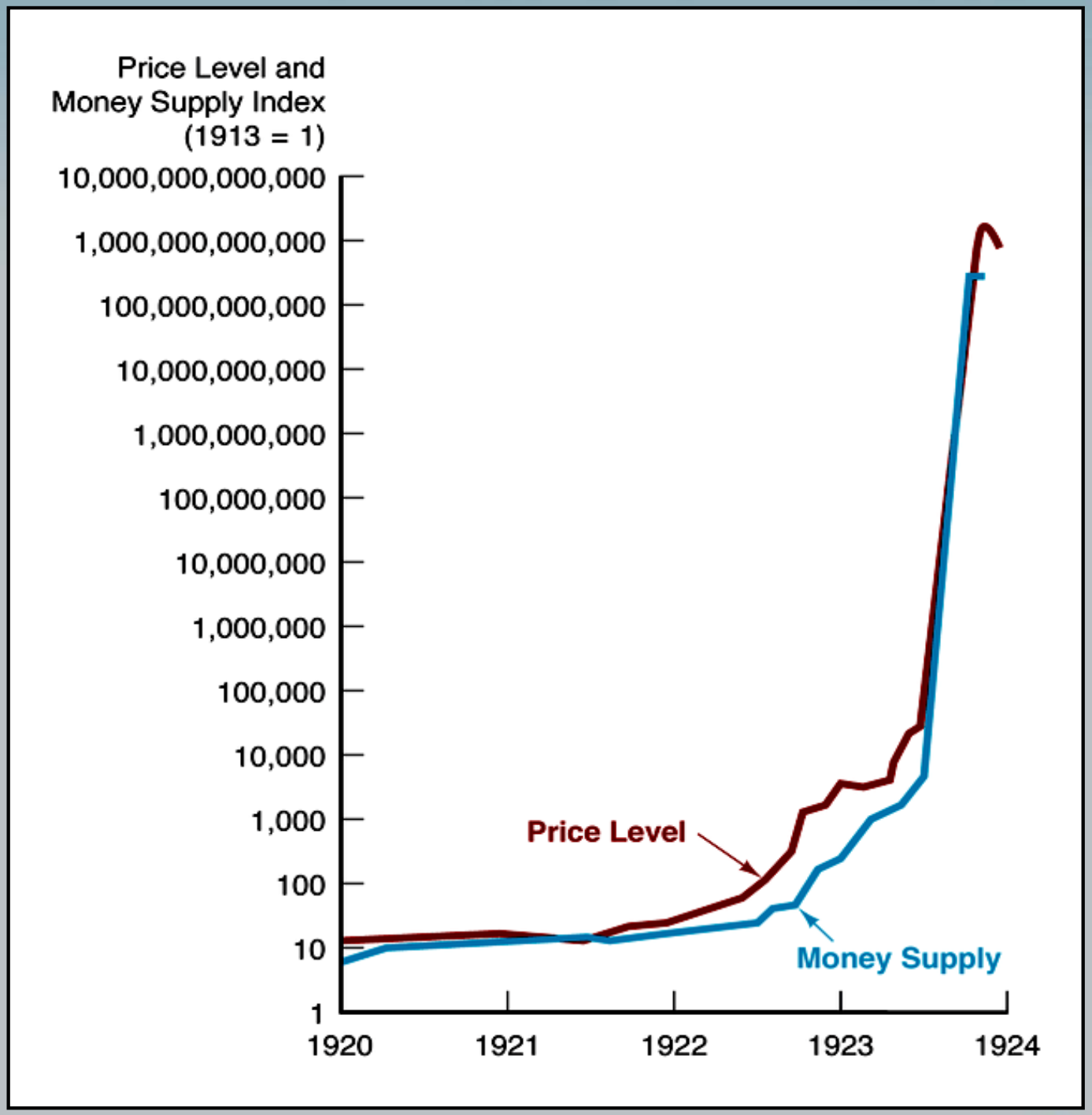
1. Latin American inflations
2. German Hyperinflation, 1921–1923

Controlled experiment, particularly after 1923 French invasion of Ruhr—government prints money to pay strikers, $\pi >$ 1 million %

Meaning of "inflation"

Friedman's statement uses definition of π as continuing, rapidly rising price level: only then does evidence support it!

German Hyperinflation: 1921–1923



Monetarist and Keynesian Views on π

Monetarist View

Only source of *AD* shifts and π can be M^s growth

Keynesian View

Allows for other sources of *AD* shifts, but comes to same conclusion that only source of *sustained* high π is M^s growth

Lags in Shifting *AD*

1. Data lag
2. Recognition lag
3. Legislative lag
4. Implementation lag
5. Effectiveness lag

Case for Activist Policy

If self-correcting mechanism is slow ($U > U_n$ for long time)

Case for Nonactivist Policy

If self-correcting mechanism is fast

Lucas (1976) Critique

Lucas challenges usefulness of econometric models for policy evaluation

1. Critique follows from RE implication that change in way variable moves, changes way expectations are formed
2. Policy change, changes relationship between expectations and past behavior
3. Estimated relationships in econometric model change
4. Therefore, can't be used to evaluate change in policy

***Example:* Evaluate effect on long rate from Fed policy raising short-term *i* permanently, if in past changes in *i* quickly reversed (were temporary)**

1. Estimated term structure relationship indicates only small change in long rate
2. Once realize short *i* ↑ permanently, average future short rates ↑ a lot, long rate ↑ a lot
3. Another implication of Lucas analysis: expectations about policy influence response to policy

New (Neo)Classical Model

Assumptions:

1. Rational expectations
2. Wages and prices completely flexible with respect to expected inflation: adjust immediately and fully to changes in the expected price level

Implications:

1. Policy ineffectiveness proposition: anticipated policy has no effect on business cycle
2. Effects of (unanticipated) policy are uncertain because they depend on expectations
3. No beneficial effect from activist policy: supports nonactivism

New Keynesian (or NNS) Model

Assumptions:

1. Rational expectations
2. Wages and prices display rigidity: do not adjust immediately (and fully) to changes in the expected price level

Implications:

1. Unanticipated policy has larger effect on *Y* than anticipated policy
2. But policy ineffectiveness does not hold:

   Anticipated policy does affect *Y*!
3. Does not rule out beneficial effect from activist policy
4. However, effects of policy are affected by expectations: designing policy is tough

Concluding Wrap-Up

- **What have we learnt?**
  - How alternative theories of money demand differ
  - What is the role of money in IS-LM and AD-AS models
  - Why inflation is ultimately a monetary phenomenon
  - What are the effects of money and policy on output
- **Where we go next:** to the *formulation* and *implementation* of monetary policy by central banks