ECN 135 Lecture 4
Money, Banks & Financial Institutions

Galina A. Schwartz
Department of Economics
University of CA, Davis

Money

- What is Money (Ch. 3)
  - Meaning & Functions
  - Monetary Aggregates
- Demand for Money (Ch. 22) Historical perspective
  - I. Classical: Quantity Theory of Money
  - II. Keynes Liquidity Preference Theory of Money
  - III. Neo-Classical Theory of Money (Friedman)

Meaning and Functions of Money

- **Economist's Meaning of Money**
  - 1.Anything that is generally accepted in payment for goods and services
  - 2. Not the same as wealth or income
    - Wealth total collection of pieces of property that store value
    - Income – a flow of earnings per unit of time
- **Functions of Money**
  - 1.Medium of exchange = payment for goods and services [[barter makes transaction costs high]
    - Standard, widely accepted, divisible, easy to carry & store
  - 2. Unit of account
  - 3. Store of value
- **Efficient Money make transaction costs low**
- Inflation complicates 1, 2,3. Hyperinflation=inflation >50%per month
- **Importance of Liquidity**

Transaction costs – time & effort spend to exchange goods & services

Evolution of Payments System

- 1. Precious metals like gold and silver
- 2. Paper currency (fiat money)
- 3. Checks
- 4. Electronic means of payment
- 5. Electronic money: Debit cards, Stored-value cards, Smart cards, E-cash
- Why US is slower in switching to e-money than Scandinavian countries? Some estimates count tens of billions in gains per year.
  - Pros: savings on paper checks' cashing
  - Cons:
    - costs of setting up electronic payment system
    - Privacy & security concerns
    - Anti-fraud enforcement system

Federal Reserve's Monetary Aggregates

Table 1 Measures of the Monetary Aggregates

	Value as of December 2002 ($billions)
M1 = Currency	626.5
+ Traveler's checks	7.7
+ Demand deposits	290.7
+ Other checkable deposits	281.2
Total M1	1,206.1
M2 = M1	
+ Small-denomination time deposits and repurchase agreements	1,332.3
+ Savings deposits and money market deposit accounts	2,340.4
+ Money market mutual fund shares (noninstitutional)	923.7
Total M2	5,802.5
M3 = M2	
+ Large-denomination time deposits and repurchase agreements	1,105.2
+ Money market mutual fund shares (institutional)	767.7
+ Repurchase agreements	511.7
+ Eurodollars	341.1
Total M3	8,528.2

Source: www.federalreserve.gov/releases/h6/hist.

Note: The *Travelers checks* item includes only traveler's checks issued by non-banks, while traveler's checks issued by banks are included in the *Demand deposits* item, which also includes checkable deposits to businesses and which also do not pay interest.

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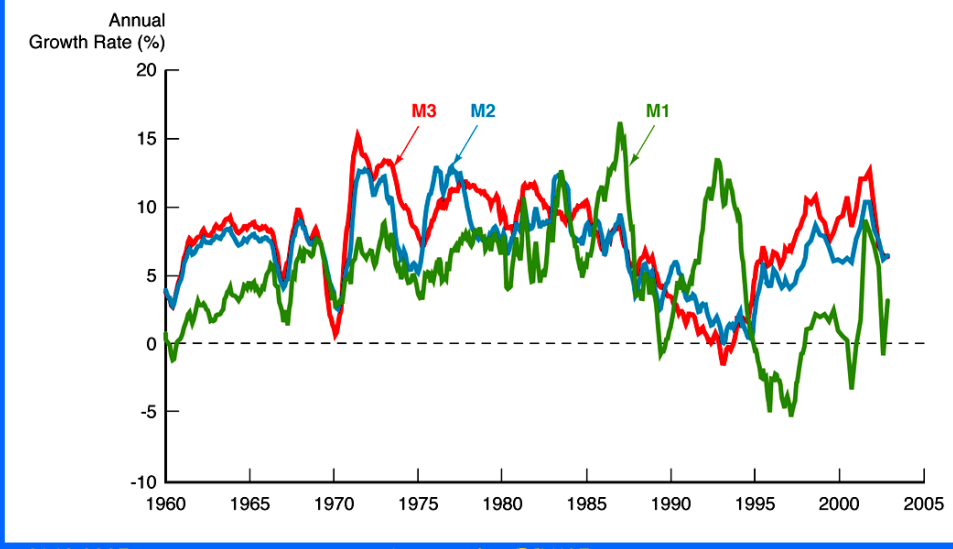
With financial innovation money aggregates change.

Growth Rates of Fed's Monetary Aggregates



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Over time, volatility of M1 increased

M1, M2 and M3 are not equivalent. They do not move together with time, cannot be used interchangeably in conducting monetary policy.

How Reliable are the M2 Money Data: Data Revisions

Table 2 Growth Rate of M2: Initial and Revised Series, 2002 (percent, compounded annual rate)

Period	Initial Rate	Revised Rate	Difference (Revised Rate – Initial Rate)
January	2.2	5.4	3.2
February	6.8	8.7	1.9
March	–1.4	0.2	1.6
April	–4.0	–2.6	1.4
May	14.8	15.4	0.6
June	7.6	7.1	–0.5
July	13.6	11.0	–2.6
August	9.9	8.6	–1.3
September	5.1	5.7	0.6
October	10.9	8.3	–2.6
November	10.2	8.0	–2.2
December	2.8	2.8	0.0
Average	6.5	6.5	0.0

Source: Federal Reserve Statistical Release H.6: www.federalreserve.gov/releases/h6.

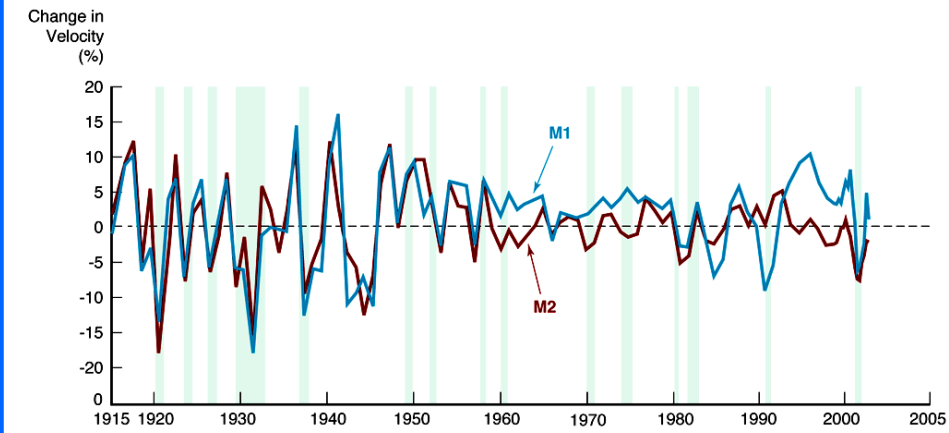
Conclusion: Money aggregate M2 varies with time /season. Its fluctuations are substantial, but can be predicted / approximated better over longer time periods (year).

Quantity Theory of Money

- **Velocity of Money (velocity)** $V =$ PY/M
- **We multiply by M to get**
  Equation of Exchange $M \times V = P \times Y$
- **Classics: Quantity Theory of Money**
  1. Irving Fisher's (1911) view: *V* is fairly constant, slowly changes with technology
  2. Equation of exchange no longer identity
  3. Nominal income, PY, determined by M
  4. Classical economists assume *Y* fairly constant
  5. *P is* determined by *M*
- **Quantity Theory of Money Demand**
  - $M = PY/V$
  - $M^d = k \times PY$, *where* $k=1/V$
- ***Implications:***
- interest rates do not affect M^d
- *Movements in the price level result solely from changes in quantity of money.*
- *In this view people do not (cannot) choose how much money to hold (amount)*

PY is aggregate nominal price (or total nominal spending)

Change in Velocity from Year to Year: 1915-2002



Cambridge Approach: Is velocity constant?

1. Classical economists thought that *V* is constant because they didn't have good data

2. After Great Depression, economists realized that velocity is far from constant

Keynes: Liquidity Preference Theory

- **3 Motives to hold money**
  - 1. Transactions motive—related to Y
  - 2. Precautionary motive—related to Y
  - 3. Speculative motive
    - A. related to wealth and income Y
    - B. negatively related to i interest rate level
- **Liquidity Preference: real money demand**

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

- Next: we combine Keynes and classics

In Keynes Liquidity Preference Theory:

- Combine $M \times V = P \times Y$ ➔ $P/M = V/Y$ *and* $P/M = 1/f(i,Y)$ ➔

$$V/Y = 1/f(i,Y)$$

- Multiply both sides by Y & substitute $M = M^d$

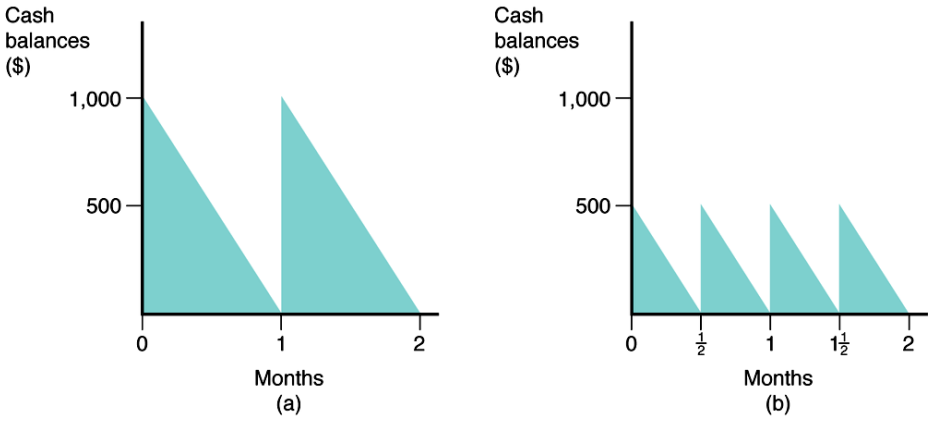
$$V = PY/M = Y/f(i,Y)$$

- **Implications:**
  - 1. $i \uparrow$, $f(i,Y) \downarrow$, $V \uparrow$
  - 2. Change in expectations of future i, changes $f(i,Y)$ and ➔ V changes
- In Keynes Theory: Velocity is not constant

Baumol-Tobin 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
  - 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 = $i \times \$500/2$
  - 2. Increased transactions costs (need time to get to the bank)
- ***Conclusion:*** Higher is i (and income gain from holding bonds), less likely to hold cash: Therefore when $i \uparrow \rightarrow M^d \downarrow$

Cash Balance in Baumol-Tobin Model



Precautionary & Speculative M^d

- **Precautionary Demand:** Similar tradeoff to Baumol-Tobin framework
  - 1. Benefits of precautionary balances
  - 2. Opportunity cost of interest foregone
  - ***Conclusion:*** when $i\uparrow$, 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 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: Modern Quantity Theory

- Theory of asset demand: M^d function of wealth (Y_p) and relative R^e of other assets

$$M^d/P = f(Y_p, r_b - r_m, r_e - r_m, \pi^e - r_m)$$

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- Differences from Keynesian Theory
  - 1. Other assets besides money and bonds: equities and real goods
  - 2. Real goods as alternative asset to money implies M has direct effects on spending
  - 3. r_m not constant: $r_b \uparrow$, $r_m \uparrow$, $r_b - r_m$ unchanged, so M^d unchanged: i.e., interest rates have little effect on M^d
  - 4. M^d is a stable function (Y_p *fluctuates less than* Y)
- **Implication of 3:**
- $M^d/P = f(Y_p)$ **and** $V = Y/f(Y_p) = YP/M^d$
- Since relationship of Y and YP is predictable, 4 implies that V is predictable (although not constant): Get Q-theory view that change in M leads to predictable changes in nominal income, i.e., PY

M^d/P – demand for real money balances

Y_p – Friedman's measure of permanent income

π^e – expected inflation rate

r_b , r_m , r_e – expected returns on bonds, money and equity (common stock)

Money & Demand for Money

- Friedman vs Keynes:
  - 2 main differences:
    - Friedman: changes in interest rates have little effect on asset returns (relative to money)
    - M^d is a stable function, V is predictable
  - ➔ Friedman has the same inference as in quantity theory ➔ money determine aggregate spending
- How well our theories match the real data? Empirical Evidence:
  - Demand for money is sensitive to interest rates changes
  - Demand for money: **stable before 1970s, and unstable after** due to financial innovation (implies that velocity is hard to predict) ➔ M^d is a bad target (i.e., M^d is not an effective way of monetary policy conduct)
- Due to technological and financial innovation data (empirical evidence) exhibits NEW patterns that our theories poorly capture!!!
- Rapid pace of financial innovation makes conducting monetary policy harder

Next Lecture

- Your preparation: read [M] Ch. 4, 5
- Interest rates & bonds

Summary of Today

- Money and Theories of Money Demand
  - Main Concepts & Theoretical Frameworks:
    - Classical
    - Keynes, Baumol-Tobin
    - Neo-classical (Friedman)
  - Data & Application to today's policy
    - Financial innovation makes monetary aggregates more volatile
    - M^d is a poor target for monetary policy conduct
- Have a Nice Night