The Demand for Money

- **Monetary Theory**
  - Study of effect of money supply on the economy (e.g., Price level, aggregate output, etc.)
- **Need to also know about Money demand**
- **Theories of demand for money**
  - Classical theory: Quantity theory of money
  - Keynesian theory: Liquidity preference theory
- **Main debate is about the importance of interest rate on money demand**

**Quantity Theory: Irving Fisher**

- **Definition: Velocity of Money**
  - The average number of times per year that a dollar is spent in buying the total amount of goods and services produced in the economy.

\[
P = \text{price level} \\
Y = \text{aggregate output} \\
PY = \text{nominal GDP} \\
M = \text{money supply} \\
V = \frac{PY}{M}
\]

- **Note:** this is an identity, not an equation.
Turning it into a Theory

The Quantity Theory

- *Fisher’s assumption*
  
  Velocity depends on the institutions and the technological features of the economy
  
  ⇒ $V$ is very slow to change and reasonably constant in the short run

- Then, Money supply is proportional to nominal GDP

$$M = \frac{1}{V} \times PY = k \times PY$$

Quantity Theory to Quantity Theory of Money Demand

- When money market is in equilibrium
  
  ⇒ Money supply = Money demand
  
  ⇒ $M = M^\text{d}$
  
  [Note: for classical economists, market is always in equilibrium]

- Then, we have the quantity theory of demand for money:

$$M^\text{d} = k \times PY$$

where, $k = \frac{1}{V} = \text{constant velocity}$
QTM Implications

- Demand for money is determined by
  - The level of transactions generated by the level of nominal money income \( PY \)
  - The institutions and technology in the economy

- Classical economists believed in flex price
  - If \( Y \) relatively fixed (in short run) \( \Rightarrow \) \( M \) and \( P \) are proportional
    \( \Rightarrow \) \( \uparrow \) in money supply only leads to an \( \uparrow \) in price level
    \( \Rightarrow \) Neutrality of money (money cannot affect output)

- Interest rate has no role in money demand

\[
M = M^d = k \times PY \quad \Rightarrow \quad \frac{M^d}{P} = k \times Y = f(Y)
\]

i.e., real money holding is a function of income only.

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**FIGURE 1** Change in the Velocity of M1 and M2 from Year to Year, 1915–2005

Sources: Economic Report of the President; Banking and Monetary Statistics; [www.federalreserve.gov/releases/h6/](http://www.federalreserve.gov/releases/h6/)

**Velocity not really constant!**

- Prior to 1950 very large swings in velocity, after that still quite large.
- Lack of data before WWII.
- After the Great Depression, new thinking emerged.
Keynesian Thinking

- Abandon the view that velocity is constant
  Adopt the view that interest rate matters
- Mr. Keynes’s asked a very basic question:
  “Why do people hold money?”

Motives Behind DD for Money

- Transaction motive
  Transactions are assumed to be proportional to income
- Precautionary motive
  - Unexpected spending
  - Also proportional to income

- How about interest rate?
  - How does it affect money demand?
  - Interest rate is the opportunity cost of holding money.
Demand for Money

Cash balance is the transaction demand for money.

Example: $1000 a month
Spend over time
Ave cash balance = $500

Consider an interest yielding bond \((i=1\%)\)

New situation:
Ave cash balance = $250
Interest earnings is $2.50 \((=1/2\times500\times1\%)\)

What if interest rate increases to 5%?

Transaction costs of bond buying and selling
Balance between opportunity cost and transaction costs

Transaction demand also depends on \(i\)
\(\uparrow i \rightarrow \downarrow\) transaction demand
Demand for Money

- transaction demand for money also depends on $i$
- If $i$ rises, transaction demand will decrease
- Same analysis and conclusion holds for precautionary demand for money
- The basic logic is that opportunity cost of holding money is $i$

Keynesian Money Demand

- Keynes’s money demand:

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

- Real money demand depend on both income and interest rate
Implications of Keynes

\[ \frac{M^d}{P} = f(i, Y) \]

- Money demand negatively depends on \( I \)
- Money demand not stable because both \( i \) and \( Y \) fluctuate a lot

\[ \frac{PY}{M} = \left( \frac{P}{M^d} \right) \cdot Y \quad \text{[in equilibrium } M^d = M] \]

\[ = \frac{1}{f(i, Y)} \cdot Y = \frac{Y}{f(i, Y)} \]

- Velocity depends on interest \( i \)
  - \( i \) fluctuates a lot and so does \( V \) (velocity not constant)
  - \( \uparrow i \rightarrow \downarrow \) money holding
    - same money being transacted more times \( \rightarrow \uparrow V \)
Friedman: Modern QTM

\[ \frac{M^d}{P} = f(Y_p) \]

What is \( Y_p \)?
- Friedman’s measure of wealth.
- Present discounted value of all expected future income, or expected average long-run income
- As \( Y_p \) increase, money demand increases
- Has much less short run fluctuations than current income

Implications of Friedman’s \( M^d \)

\[ \frac{M^d}{P} = f(Y_p) \]

- \( M^d \) insensitive to interest rate changes
- Because \( Y_p \) does not fluctuate a great deal in the short-run, \( M^d \) should be quite stable
  [Note: Keynian \( M^d \) not very stable]

\[ V = \frac{Y}{f(Y_p)} \Rightarrow \text{not constant but quite predictable} \]

Velocity in Friedman is predictable because the relationship between \( Y \) and \( Y_p \) is usually quite predictable
About Velocity

QTM: \[ V = \frac{1}{k} \] \Rightarrow \text{constant (i.e. completely predictable)}

Keynes: \[ V = \frac{Y}{f(i,Y)} \] \Rightarrow \text{fluctuates a lot (unpredictable)}

Friedman: \[ V = \frac{Y}{f(Y_p)} \] \Rightarrow \text{not constant but quite predictable}

Money Supply

\[ V = \frac{PY}{M} \] \Rightarrow \quad M = \left(\frac{1}{V}\right) \times PY

\therefore \text{Money Supply} = \left(\frac{1}{\text{Velocity}}\right) \times \text{Aggregate Spending}

- **QTM**: since velocity is constant, can affect aggregate spending with money supply
- **Keynes**: since velocity is unpredictable, monetary policy may not be an effective tool to affect aggregate spending
- **Friedman**: although velocity not constant it is quite predictable. Hence, can still affect aggregate spending with money supply
Procyclical Movement of $V$

QTM: $V = \frac{1}{k} \Rightarrow$ constant

Friedman: $V = \frac{Y}{f(Y_p)} \Rightarrow Y$ and $V$ move together

Keynes: $V = \frac{Y}{f(i,Y)} \Rightarrow i$ and $V$ move together

- **QTM**: cannot explain
- **Keynes**: $Y$ and $i$ move together $\Rightarrow V$ procyclical
- **Friedman**: $Y_p$ stable, business cycle fluctuations affect $Y$ more $\Rightarrow V$ procyclical

Empirical Evidence

- Velocity not constant $\Rightarrow$ does not support QTM
- Money demand functions not stable since 1973 $\Rightarrow$ does not support Friedman
- Money demand is sensitive to interest rates $\Rightarrow$ does not support Friedman
- Money supply *is* an effective tool to influence aggregate spending $\Rightarrow$ does not support Keynes