Definitions

- **barter** (direct exchange) – trade for something that can be used directly in consumption or production
- **double coincidence of wants** – each person must want the good his trading partner is offering
- **transaction costs** – opportunity costs of finding a trading partner, negotiating a deal, and monitoring the terms
- **medium of exchange** (indirect exchange) – something not wanted for commodity value, but rather for trade value
- **money** – commonly accepted medium of exchange
- **commodity money** – money with a close relationship between money value and commodity value
- **fiat money** – money in which monetary value far exceeds trade value
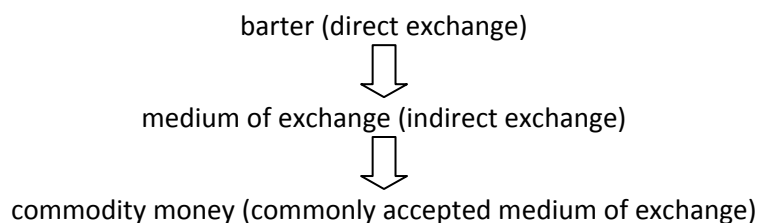- **unit of account** – common numerator of all prices

More properly:
  - **medium of account** – good used as a pricing or accounting unit
  - **unit of account** – specific quantity of the good used as a pricing or accounting unit

- **store of value** – separates act of buying from selling (saving with low transaction costs)
- **standard of deferred payment** – money is a good way of paying back loans
- **degree of marketability** – more highly marketable goods are easier to sell for a "good price" (best price with full information)
- **network effect** – the value of a good increases the more people use it
- **uniform** – purity can be tested at low cost (biting, sounding, or assaying)
- **assay** – chemically test the quality of metals
- **durable** – no extra carrying cost due to spoilage
- **divisible** (and fusible) – payment can be tailored to purchase size
- **portable** – high ratios of value to bulk
- **stable value** – not subject to seasonal variations
- **coinage** – the process of fashioning monetary metal into standardized marked discs
- **seigiorage** – profit that results from producing coins (difference between face value and metal value)
- **purchasing power of money** – the basket of goods and services that a single dollar can buy
- **price level** – weighted average of prices in the economy
- **inflation** – a rise in the price level (fall in PPM)
- **deflation** – a fall in the price level (rise in PPM)
- **relative prices** – implicit barter ratios between goods
- **real variables** – "constant" dollars
- **nominal variables** – "current" dollars
- **aggregate output** – total production of final goods and services in the economy
- **aggregate income** – Total income of factors of production (land, labor, capital) in the economy
- **real money balance** – quantity of money in real terms
- **velocity of money** – average number of times a unit of money turns over in a given period
- **transactions motive** – money is a medium of exchange that can be used to carry out transactions
- **precautionary motive** – people hold money as a cushion against an unexpected purchase need
- **speculative motive** – people hold money as an alternative store of wealth to bonds
- **transactions demand** – money demand for transactions
- **portfolio demand** – money demand as a store of value (captures precautionary and speculative)
- **permanent income** – present discounted value of all future earnings

Principles

- Transaction costs (especially search costs) can be very high under barter.
- Barter remains where laws or social norms retard indirect trade.
- Using a medium of exchange (indirect exchange) can make more beneficial trades possible.
- When a circulating medium of exchange becomes commonly accepted (widely adopted by most traders), it becomes money.
- Many forms of money have been adopted around the world.
- Carl Menger theorized that money came about through evolution from barter – aka, through the "invisible hand" (Adam Smith) or spontaneous order (F.A. Hayek).
- Traders carry an inventory of various media of exchange, preferring the most marketable commodities.
- Most civilizations converged to gold and/or silver.
- When traders from two regions with different commodity monies came into contact, the better of the two monies spread to the other region.
- Coins first appeared in ancient Lydia (Turkey) and China.
- The earliest coins were punched, later coins were stamped, finally coins were minted.
- Merchants would mark a piece of assessed gold to avoid the cost of re-assessing upon payout.
- Private mints were common around gold and silver mines.
- Marketability of coins was discontinuously greater than marketability of unminted gold.
- Marketability of money was discontinuously greater than that of other commodities.
- Price level is stated in terms of price indexes.
- Price levels move independently of relative prices.
- Capital letter variables are nominal. Lowercase letter variables are real. (nominal/P = real, e.g.: $Y/P = y$)
- The money supply can be in terms of any of the monetary aggregates: M1, M2, M3, MB, MZM.
- Equation of exchange is an identity, not a theory ($V \equiv Py/M^S$)
- Right side of equation of exchange is nominal output ($Y = Py$)
- Quantity theory of money: $\bar{V}M^S = \bar{y}P$, P is flexible & y is sticky: $\Delta M^S \rightarrow \Delta P$ (doubling M^S will double P)
- Keynes: interest rates should be in a narrow band: when interest high, people expect it to fall.
- Keynes: If interest rates rise, then the price of a bond falls. So if $i^e\uparrow$, expect a capital loss from bonds.
- Baumol & Tobin showed transactions and precautionary demand are also sensitive to the interest rate because people will vary how frequently they visit the bank.
- The permanent income hypothesis is that people spend money based on perceived average life income.
- Under Friedman's theory, changes in interest rates have little effect on the demand for money.
- Friedman's velocity isn't constant, but it is stable: relationship between y_P and y is predictable.
- If something doesn't affect M^S or M^D, then it can't affect the price level.

Evolution

barter (direct exchange)

⇩

medium of exchange (indirect exchange)

⇩

commodity money (commonly accepted medium of exchange)

Places barter survives

- to evade or reduce taxes
- underground economy
- marriage, dating, sex
- new car (trade in old)
- health/dental benefits (less taxes)

Functions of money

- medium of exchange
- medium of account
- store of value
- standard of deferred payment

Characteristics of good money
- uniform
- durable
- divisible
- portable
- stable value

Quantity theory assumptions
- velocity is constant
- wages and prices are completely flexible

Transactions demand vectors
- population: $N\uparrow \rightarrow y\uparrow \rightarrow M^D\uparrow$
- output/person: $y/N\uparrow \rightarrow y\uparrow \rightarrow M^D\uparrow$
- vertical integration: $merge\uparrow \rightarrow M^D\downarrow$
- clearing system efficiency: $eff.\uparrow \rightarrow M^D\downarrow$

Transaction demand causes
- population: e.g., black death, baby boom
- output/person: e.g., Internet revolution
- vertical integration: e.g., oil company buys gas stations
- clearing system efficiency: e.g., credit cards

Government price indexes
- consumer price index (CPI)
- producer price index (PPI)
- GDP deflator

Keynes' reasons individuals hold money
- transactions motive (+ related to y)
- precautionary motive (+ related to y)
- speculative motive (− related to i)

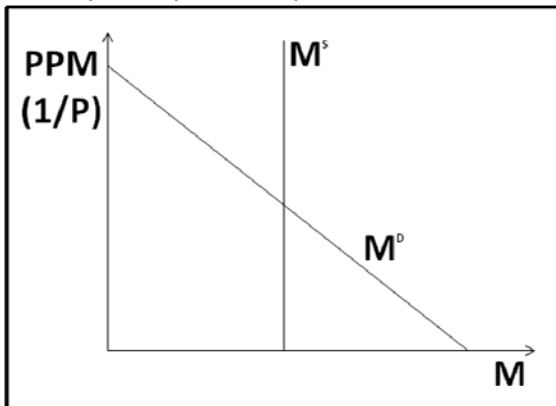**Portfolio demand vectors**
- wealth: $W\uparrow \rightarrow M^D\uparrow$
- uncertainty: $uncertainty\uparrow \rightarrow M^D\uparrow$
- interest differential: $i\uparrow \rightarrow M^D\downarrow$
- anticipations about inflation: $\pi_e\downarrow \rightarrow M^D\uparrow$

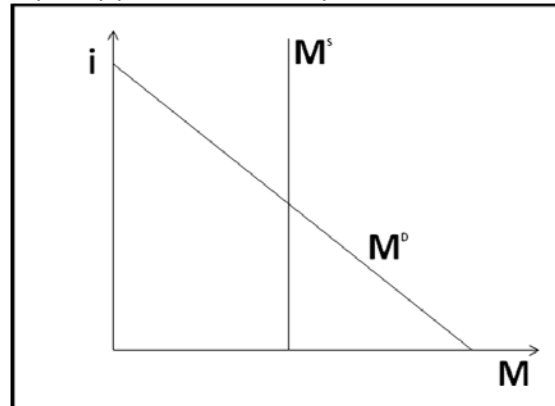**Portfolio demand causes**
- wealth: e.g., win the lottery
- uncertainty: e.g., travel to a foreign country
- interest differential: i.e., interest rate soars
- anticipations about inflation:
  e.g., print money non-stop

Quantity theory of money:

Liquidity preference theory:

Equations

- $M^S V = Py$ equation of exchange
- $V \equiv Py/M^S$ definition of velocity
- $Y = Py$ nominal output = price level x real output
- $M^D = Py/V$ money demand for graphical model
- $M^S = C$ money supply for graphical model
- $\bar{V}M^S = \bar{y}P$ quantity theory of money: bar means constant
- $M^D/P = f(i,y)$ liquidity preference theory: $f_i < 0$, $f_y > 0$
- $M^D/P = f(y_P)$ Friedman's quantity theory of money approximated

Variable definitions

- $PPM \equiv$ purchasing power of money
- $PPM \equiv 1/P$
- $P \equiv$ price level
- $V \equiv$ velocity
- $y \equiv$ aggregate output = aggregate income
- $Y \equiv$ nominal output
- $y \equiv$ real output
- $M^D \equiv$ money demand
- $M^S \equiv$ money supply
- $M^S/P \equiv$ real money stock
- $y_P \equiv$ permanent income
- $M^D/P \equiv$ demand for real money balances
- $\pi^e \equiv$ expected inflation rate