

# Macroeconomics

Money: Definitions, Measures,  
Time Value + Introduction to  
Quantity Theory

# Money Defined

- Money is anything that can be used as:
  - A medium of exchange
  - A store of value
  - A unit of account / Standard of Value
- Money works best when it meets these criteria:
  - Portable
  - Durable
  - Divisible
  - Acceptable
  - Stable



# Money Facts:

- What backs the dollar and makes it valuable?
  - Gold?
  - NO! The dollar is legal tender because the government says it's money and people willingly accept it. The Dollar is backed by FAITH.
  - This is referred to as an inconvertible fiat standard.



# The Supply of Money

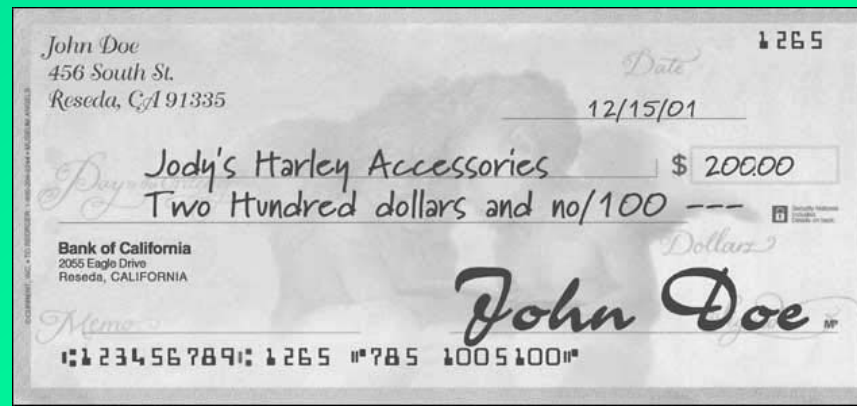
- In the United States, the Federal Reserve System is the sole issuer of currency.
  - This means the Fed has monopoly control over the money supply.
- There are two important measures of the Money Supply today.
  - M1
  - M2





# M1

- M1 serves primarily as a medium of exchange. It includes:
  - Currency and Coin
  - Demand Deposits

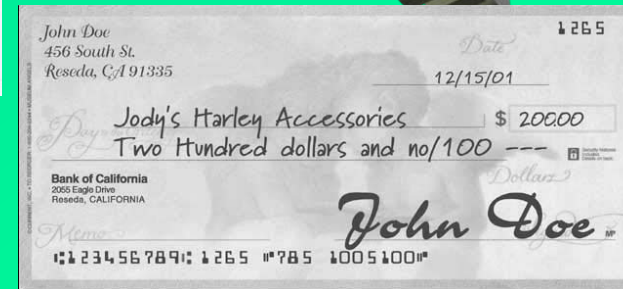




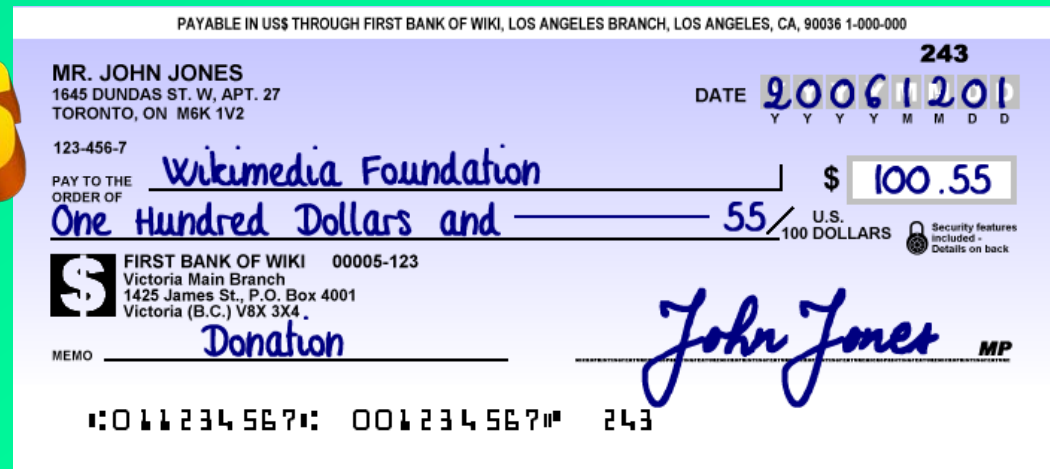
# M2

# Certificates of Deposit

- M2 serves as a store of value. It includes:
  - The M1
  - Time Deposits
  - Money Market Mutual Funds
  - Overnight Eurodollars



# Savings Accounts



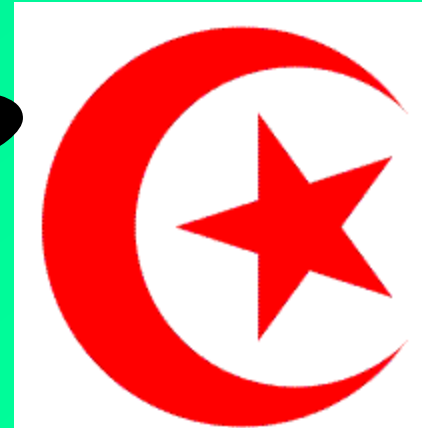
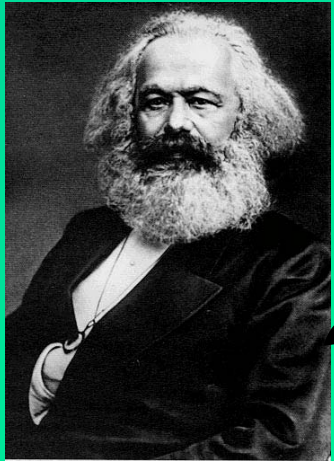
# M1 & M2

- As we go from M1 to M2
  - The measure becomes larger
  - *Money becomes less liquid*
- As we go from M2 to M1
  - The measure becomes smaller
  - *Money becomes more liquid*



# Time Value of Money

- Is a dollar today worth more than a dollar tomorrow?
  - YES
- Why?
  - Opportunity cost & Inflation
  - This is the reason for charging and paying interest





# Time Value of Money

- Let  $v$  = future value of \$  
 $p$  = present value of \$  
 $r$  = real interest rate (nominal rate – inflation rate)  
expressed as a decimal  
 $n$  = years  
 $k$  = number of times interest is credited per year

- The Simple Interest Formula

$$v = (1 + r)^n * p$$

- The Compound Interest Formula

$$v = (1 + r/k)^{nk} * p$$

# Time Value of Money Illustrated

- Assume that inflation is expected to be 3% and that the nominal interest rate on simple interest savings is 1%. Calculate the future value of \$1 after 1 year.
- Step 1: Calculate the real interest rate

$$r\% = i\% - \pi\%$$

$$r\% = 1\% - 3\% = \underline{-2\% \text{ or } -.02}$$

- Step 2: Use the simple interest formula to calculate the future value of \$1

$$v = (1 + r)^n * p$$

$$v = (1 + (-.02))^1 * \$1$$

$$v = (.98) * \$1$$

$$v = \$0.98$$

# Time Value of Money Illustrated

- Assume that inflation is still expected to be 3% but that the nominal interest rate on simple interest savings is 4%. Calculate the future value of \$1 after 1 year.
- Step 1: Calculate the real interest rate

$$r\% = i\% - \pi\%$$

$$r\% = 4\% - 3\% = \underline{1\% \text{ or } .01}$$

- Step 2: Use the simple interest formula to calculate the future value of \$1

$$v = (1 + r)^n * p$$

$$v = (1 + .01)^1 * \$1$$

$$v = \$1.01$$

# Time Value of Money

## FUN!!!

- Assume that annual inflation is expected to be 2.5% and that the annual nominal interest rate on a 10 year certificate of deposit is 5% compounded monthly. Calculate the future value of \$1,000 after 10 years.

- Step 1: Calculate the real interest rate

$$r\% = i\% - \pi\%$$

$$r\% = 5\% - 2.5\% = \underline{2.5\% \text{ or } .025}$$

- Step 2: Use the compound interest formula to calculate the future value of \$1,000

$$v = (1 + r/k)^{nk} * p$$

$$v = (1 + .025/12)^{10*12} * \$1,000$$

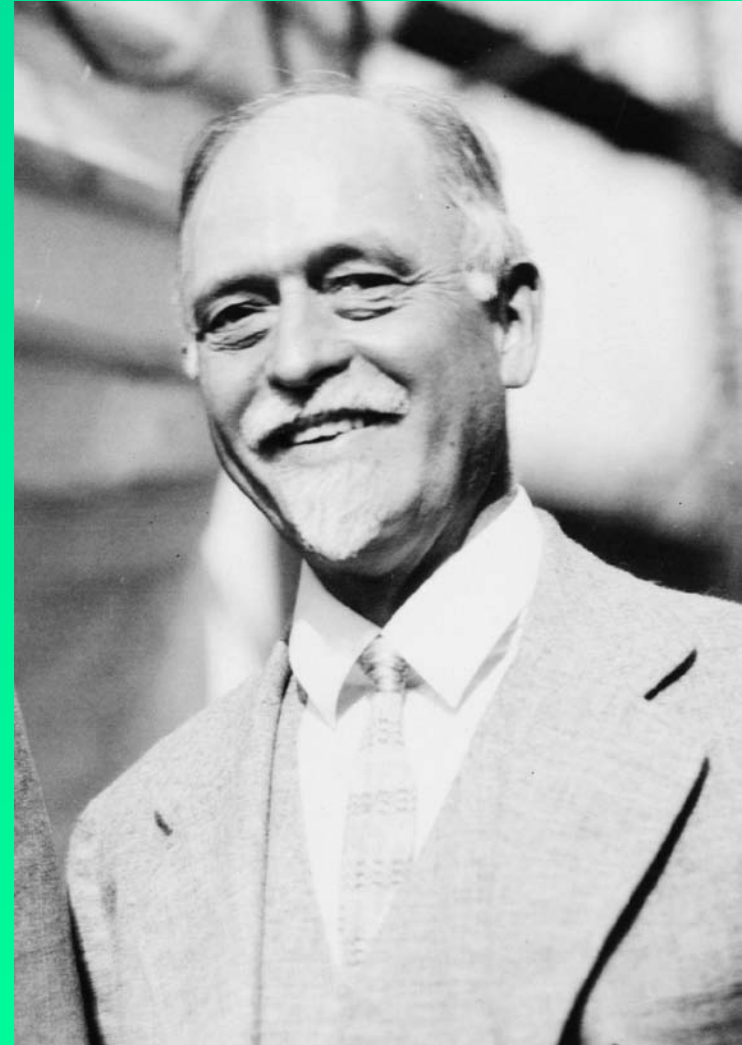
$$v = (1 + 0.002083)^{120} * \$1,000$$

$$v = \$1,283.69$$

# Relating Money to GDP

- Economist, Irving Fisher postulated that :

Nominal GDP = The Money Supply \*  
Money's Velocity





# The Monetary Equation of Exchange

- $MV = PQ$ 
  - $M$  = money supply (M1 or M2)
  - $V$  = money's velocity (M1 or M2)
  - $P$  = price level (PL on the AS/AD diagram)
  - $Q$  = real GDP (sometimes labeled  $Y$  on the AS/AD diagram)
  - $P*Q$  or  $PQ$  = Nominal GDP

# The Monetary Equation of Exchange

- $MV=PQ$ 
  - $M1 = \$2$  trillion
  - $V$  of  $M1 = 7$
  - $PQ = \$14$  trillion

