Money Demand

- **Money demand** represents the amount of monetary assets that people are willing to hold (instead of illiquid assets).
  - What influences willingness to hold monetary assets?
  - We consider individual demand of money and aggregate demand of money.

What Influences Demand of Money for Individuals and Institutions?

1. **Interest rates/expected rates of return** on monetary assets relative to the expected rates of returns on non-monetary assets.
2. **Risk**: the risk of holding monetary assets principally comes from unexpected inflation, which reduces the purchasing power of money.
   - but many other assets have this risk too, so this risk is not very important in defining the demand of monetary assets versus non-monetary assets
3. **Liquidity**: A need for greater liquidity occurs when the price of transactions increases or the quantity of goods bought in transactions increases.

What Influences Aggregate Demand of Money?

1. **Interest rates/expected rates of return**: monetary assets pay little or no interest, so the interest rate on non-monetary assets like bonds, loans, and deposits is the opportunity cost of holding monetary assets.
   - A higher interest rate means a higher opportunity cost of holding monetary assets → lower demand of money.
2. **Prices**: the prices of goods and services bought in transactions will influence the willingness to hold money to conduct those transactions.
   - A higher level of average prices means a greater need for liquidity to buy the same amount of goods and services → higher demand of money.

What Influences Aggregate Demand of Money? (cont.)

3. **Income**: greater income implies more goods and services can be bought, so that more money is needed to conduct transactions.
   - A higher real national income (GNP) means more goods and services are being produced and bought in transactions, increasing the need for liquidity → higher demand of money.

A Model of Aggregate Money Demand

The aggregate demand of money can be expressed as:

\[ M^d = P \times L(R, Y) \]

where:

- \( P \) is the price level
- \( Y \) is real national income
- \( R \) is a measure of interest rates on non-monetary assets
- \( L(R, Y) \) is the aggregate demand of real monetary assets

Alternatively:

\[ M^d/P = L(R, Y) \]

Aggregate demand of real monetary assets is a function of national income and interest rates.
Aggregate Real Money Demand and the Interest Rate

For a given level of income, real money demand decreases as the interest rate increases.

Effect on the Aggregate Real Money Demand Schedule of a Rise in Real Income

When income increases, real money demand increases at every interest rate.

A Model of the Money Market

- The money market is where monetary or liquid assets, which are loosely called "money," are lent and borrowed.
  - Monetary assets in the money market generally have low interest rates compared to interest rates on bonds, loans, and deposits of currency in the foreign exchange markets.
  - Domestic interest rates directly affect rates of return on domestic currency deposits in the foreign exchange markets.

A Model of the Money Market (cont.)

- When there is an excess supply of monetary assets, there is an excess demand for interest bearing assets like bonds, loans, and deposits.
  - People with an excess supply of monetary assets are willing to offer or accept interest-bearing assets (by giving up their money) at lower interest rates.
  - Others are more willing to hold additional monetary assets as interest rates (the opportunity cost of holding monetary assets) falls.

A Model of the Money Market

- When no shortages (excess demand) or surpluses (excess supply) of monetary assets exist, the model achieves an equilibrium:
  \[ M^s = M^d \]
- Alternatively, when the quantity of real monetary assets supplied matches the quantity of real monetary assets demanded, the model achieves an equilibrium:
  \[ M^p/P = L(R, Y) \]

A Model of the Money Market (cont.)

- When there is an excess demand of monetary assets, there is an excess supply of interest bearing assets like bonds, loans, and deposits.
  - People who desire monetary assets but do not have access to them are willing to sell non-monetary assets in return for the monetary assets that they desire.
  - Those with monetary assets are more willing to give them up in return for interest-bearing assets as interest rates (the opportunity cost of holding money) rises.
## Determination of the Equilibrium Interest Rate

- **Real money supply** vs. **Real money holdings**
- **Aggregate real money demand, L(R,Y)**

### Effect of an Increase in the Money Supply on the Interest Rate

An increase in the money supply lowers the interest rate for a given price level.

### Effect on the Interest Rate of a Rise in Real Income

An increase in national income increases equilibrium interest rates for a given price level.

### U.S. Monetary Base 1980-2010

- Shaded area indicates U.S. recessions
- Data source: Federal Reserve Bank of St. Louis

### Federal Funds Rate 1950-2010

- Data source: Board of Governors of the Federal Reserve System

### Fed Funds Target Rate vs. U.S. Prime Rate vs. Interbank Libor vs. Interbank Libor, December 1, 1999 - December 31, 2000

- Data source: Federal Reserve Bank of St. Louis, more of data is available
Money Market/Exchange Rate Linkages

Linking the Money Market to the Foreign Exchange Market

Simultaneous Equilibrium in the U.S. Money Market and the Foreign Exchange Market

Effect on the Dollar/Euro Exchange Rate and Dollar Interest Rate of an Increase in the U.S. Money Supply

Euro-area interest rate

USD-Euro rate 1999-2010
Changes in the Domestic Money Supply

- An increase in a country’s money supply causes interest rates to fall, rates of return on domestic currency deposits to fall, and the domestic currency to depreciate.
- A decrease in a country’s money supply causes interest rates to rise, rates of return on domestic currency deposits to rise, and the domestic currency to appreciate.

Changes in the Foreign Money Supply

- How would a change in the supply of euros affect the U.S. money market and foreign exchange markets?
  - An increase in the supply of euros causes a depreciation of the euro (appreciation of the dollar).
  - A decrease in the supply of euros causes an appreciation of the euro (a depreciation of the dollar).

Effect of an Increase in the European Money Supply on the Dollar/Euro Exchange Rate

- The increase in the supply of euros reduces interest rates in the EU, reducing the expected rate of return on euro deposits.
- This reduction in the expected rate of return on euro deposits causes the euro to depreciate.
- We predict no change in the U.S. money market due to the change in the supply of euros.

Trade-Weighted Dollar Index 1970-2010

http://research.stlouisfed.org/fred2/series/TWEXBMTH?cid=105