INDE 301 Engineering Economy

Chapter 14 Effects of Inflation

- **Definition**
  - *Inflation* is an increase (over time) in the amount of money necessary to buy goods.
  - For example,
    - The price of 1 McDonald's Big Mac was $2.14 in 08/03.
    - The price of 1 McDonald's Big Mac was $2.23 in 08/04.
    - Currently, it's around $3.5.
  - In simpler terms, "inflation means that your money won't buy as much today as it did yesterday."

- **Causes of inflation**[1]
  - Demand for goods exceeds supply. That is, "too much money chasing too few goods."
  - Government prints money more than the economy is worth.
  - Increases in production costs that when passed to customers push prices up.
  - Excessive spending power of consumers.
  - Impact of international market prices (e.g., oil price).
  - Unresponsive prices that seldom declines (e.g., prices set by large firms).

[1] Adapted from Riggs et al., *Engineering Economy*, McGraw-Hill, 1996.

- **Consequences of inflation**
  - Consequences depend on degree of inflation.
  - With *mild* inflation, rate is 2 to 4%/year, the economy prospers.
  - However, mild inflation often leads to a *moderate* inflation, with a rate of 5 to 9%/year. People start buying ahead.
  - *Severe* inflation occurs when inflation rate exceeds 10%. People with fixed incomes suffer.
  - *Hyperinflation* is when a nation's currency drastically looses value. Money becomes worthless.

- **Control of inflation**
  - Control of inflation requires government intervention.
  - It is not easy to achieve, given all the factors that comes to play.

- **Measuring inflation**
  - Inflation is measured based on actual price changes of basic commodities.
  - This gets complicated since different goods exhibit different price change patterns.
  - Predicting future inflation rates is not too reliable.

- **Deflation**
  - This is the opposite of inflation. It happens when supply exceeds demand. That is, when money is tight.
  - Deflation has very bad consequences if it lasts long. E.g., U.S. Great Depression in the Thirties.

- **Inflation rate**
  - Money in time period t_1 can be related to money in time period t_2 by the following

$$\text{Dollars}_{t_1} = \frac{\text{Dollars}_{t_2}}{\text{inflation rate between } t_1 \text{ and } t_2}$$

  - Dollars in period t_1 are termed *constant-value dollars* or *today's dollars*
  - Dollars in time period t_2 are termed *future dollars* or *then-current dollars*.
  - If n is the number if time periods between t_1 and t_2, and f is the inflation rate per time period. Then,

    Future dollars at t_2 = (Today's dollars at t_1) $(1+f)^n$.

Example

How much would be *required today* to purchase an item that increased in cost by exactly the inflation rate? The cost 30 years ago was $1000 and inflation has consistently averaged 4% per year.

Solution: Solve for future dollars

Future dollars = constant value dollars$(1 + f)^n$

$= 1000(1 + 0.04)^{30} =$ **$3243**

Note: This calculation only accounts for the *decreased purchasing power of the currency*. It does ***not*** take into account the ***time value of money*** (to be discussed)

- **Annual inflation rate in Lebanon**[2]

Figure 1: Lebanon Inflation Rate - Jan 2008 - Jan 2014

"The data given shows an annual change in the Consumer Price Index. The CPI measures changes in the price level of consumer goods and services purchased by households. The CPI is calculated by taking price changes for each item in the predetermined basket of goods and services and averaging them. The items weight according to their importance. Depending on the country, the highest weights are usually given to the food, energy, housing, clothing, medical care, transportation and household equipment."(Trading Economics, 2014)

[2] Source: Trading Economics, www.tradingeconomics.com
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- **Inflation-adjusted interest rate**
  - Denote by *i* the *real interest rate* per time period. This interest represents the actual gain on investment without the effect of inflation.
  - Then, with an inflation rate of *f*, *P* dollars now are equivalent to *F*, after *n* years where

$$F = P(1+f)^n(1+i)^n .$$

  - That is,

$$F = P(1+i+f+if)^n = P(1+i_f)^n .$$

  - The interest rate i_f is called the *inflation-adjusted interest*,

$$i_f = i + f + if$$

  - This is the interest rate observed in the market.
  - Utilizing i_f in the economic evaluation of a project takes into account the effects of inflation and the effect of real interest.

- **Future value in today's dollar and maintaining purchasing power**
  - The future value in today's dollars is the future value by excluding the effect of inflation, $F = P(1+i)^n$.
  - The amount of future dollars which has the same *purchasing power* as *P* dollars today is $F = P(1+f)^n$. (This is the same as future dollars.)