Elements of Macroeconomics

February 2023

7 Inflation

Inflation rate is the percentage change in the price level.

The Consumer Price Index (CPI)

- The CPI is a weighted average of a basket of goods using current prices!
- The CPI market basket illustrates the consumption basket of an urban family of four.

Note: Comparison Inflation, nominal and real GDP

- **CPI**: *fixed* basket to *current* prices
- **nominal GDP**: *current* final goods/services to *current* prices
- **real GDP**: *current* final goods/services to *fixed* prices

Costs of Inflation

1. **Money Illusion**: People interpret nominal wage changes as real changes
2. **Menu Costs**: The costs of changing prices
3. **Wealth redistribution between borrower and lender**: Long term borrowers have to pay less in real terms if inflation goes up (Ernie and Bert)
4. **Uncertainty about future price levels**: Long term contracts get riskier
5. **Tax distortion**:
    - Capital gains taxes are taxes on the gains realized by selling an asset for more than its purchase price
    - Problem: often, the price rises due to inflation rather than an increase in the value of the good

		Jan-20		Jul-20	
Product	**CPI weight**	**Quantity**	**Price**	**Quantity**	**Price**
Pizza	20	30	10	35	8
Cars	40	50	200	55	205
Bread	30	20	5	25	6
Beer (Imports)	10	10	7	50	14

Example Calculate nominal GDP, real GDP, annual growth rates for nominal and real GDP, GDP deflator, CPI, Inflation rate. Compare and explain the differences in GDP deflator and Inflation rate.

8 Saving, Investment and Capital Markets

Fisher Equation Relation between the nominal rate (i), inflation (π) and the real rate (r).

$$i = r + \pi$$

Bonds

1. Basic vocabulary:
   - **Principal**: the amount of money loaned out
   - **Market price**: the price paid for a bond in the bond market ("price" referred to by Barbera) → This may not be equal to the principal!
   - **Yield/Coupon rate**: the interest paid on that loan
2. Market price of a specific bond and interest rate/yield are inversely related! This works in TWO (connected) WAYS.
   (a) Bond price and the CURRENT/MARKET interest rates are inversely related. New bonds are issued all the time. If they have higher interest rates than the ones before them, then the older bonds are less valuable. Demand goes down for those old bonds, decreasing its market price.
   (b) bond price and its OWN yield are inversely related. The principal and the coupon payment is fixed, but the market price is not.
   - E.g. bond with principal of \$100, coupon rate of 10% (meaning \$10 per year)
   - Price drops to \$90, but coupon of \$10 is unchanged

   → Price (\$100 → \$90); Yield (10% → 11%)
3. All bond yields follow the Fed Funds rate (set by the Federal Reserve)—if the ffr increases, so do long-term treasury bond yields and corporate bond yields.
4. Yield is determined by duration (time to maturity) and default risk.
   (a) Corporate bonds are risky
   (b) Government bonds are risk-free
   (c) Risky/risk free spread: interest rate on risky bonds minus interest rate on risk-free (Treasury) bonds

Learning expectations from the market Observing bond prices, we can learn what the financial market expect for *inflation, default risk*, and *interest rates*

1. **Expected inflation based on TIPS (treasury inflation protection securities)**

$$\text{TIPS yield} = \text{T-bond yield} - \text{expected inflation}$$

2. **Expected default risk based on corporate spread**
   - Government bonds are risk-free (almost)
   - Corporate bonds are risky (riskier)
   - Comparing the *same duration* of bonds, when the risk spread is larger, default risk is higher and needs to be compensated more.

$$\text{risk spread} = \text{Corporate bonds prices - Government bonds prices}$$

3. **Expected interest rates based on term structure of T-Bills**
   - Government bonds of different maturities are both risk free
   - Government bonds increase with interest rates (fed funds rate)
   - Comparing the two gives us the expected interest rate
   - In theory, we could just roll-over the bond with a shorter maturity
   - Example we have a 1-yr US treasury and a 5-yr US treasury. We are ignoring the term premium (the premium for lending money for a longer time)
   - If we expect interest rates to stay the same and, we could either buy each year a 1-yr US treasury or buy the 5-yr US treasury.

$$(1 + r_t^{5y})^5 = (1 + r_t^{1y}) * (1 + r_{t+1}^{1y}) * (1 + r_{t+2}^{1y}) * (1 + r_{t+3}^{1y}) * (1 + r_{t+4}^{1y}) + \text{term premium}$$

   - If we expect higher interest rates $\rightarrow$ 5-yr US treasury: $\uparrow$ yield $\rightarrow \downarrow$ price
   - If we expect lower interes rates $\rightarrow$ 5-yr US treasury: $\downarrow$ yield $\rightarrow \uparrow$ price

Saving, Investment, and Paradox of Thrift In a closed economy (no trade with other countries), investment equals savings. Why?

$$\begin{aligned} S_{private} &= Y + TR - C - T \\ S_{public} &= T - G - TR \\ S &= S_{private} + S_{public} = Y - C - G \end{aligned}$$

This equals the same as our GDP equation which we can re-arrange.

Paradox of Thrift (Keynes): when everyone increases savings, overall savings decreases

- When savings increase, demand drops (for goods & services, consumption).
- Firms increase inventory and have to produce less in the next period
- Employment falls, so overall economy income falls. Savings also falls.

$\rightarrow$ Saving rate increased, but total savings decreased

Comparing different interest rates: The standard loanable funds model in the textbook looks at only one interest rate. In a crisis, it is important to look at the interest rate for the government in addition to the corporate bond interest rate!

- People start shifting savings from corporate bonds to government bonds
- interest rate for government bonds decreases
- interest rate for corporations goes up

→ Even though households might save more, the private sector cannot invest it!