ECON 20210 Notes

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Todo list

1 Lecture 1

In Macroeconomics, we want to look at the economy in the whole, hence the "macro" aspect of the economy. In this field. we try to analyze the "trend" within the economy. For example. we may be interested in how the economy reacts when we give the population a stimulus check. However, we cannot be always sure that the previous trends will be representative of that of the current trends.

However, when we think about the economy as a whole, there are a lot of data we need to work with. Hence, we can collapse the data into aggregate values, which are as follows:

- GDP (Gross Domestic Product): How well is the local economy doing?
- GNP (Gross National Product): How well are the nationals of a an economy doing?
- Unemployment: How is the labor market functioning?
- Inflation: How much money do you have to have now to buy the same basket of goods you bought in 2000.
- Stock price: How valuable are corporations.
- CPI (Consumer Price index): Measure of the general goods and prices. Done by keeping track of a certain collection of goods.

We can see that these are a lot easier to work with, rather than working with high-dimensional data.

1.1 GDP explained

In it of itself, GDP is a flow of money. Specfically, the *final* dollar amount produced per unit of time. We can measure GDP in mainly 3 ways. All goods and services purchased, produced, and all income earned. All of these have to add up to the same value, and if the product is unsold, then they are treated as self-bought goods. Usually, that value is the price. However, prices change over time, and we thus have to account of the temporal nature of prices. Thus, we have the following indicators of GDP, where we let P indicate quantity and Q denote the quantity of good, and t be time, and i be the index of the good:

- Y_t^n or the nominal GDP, values products at their *current* dollars at a time t.

$$Y_t^n = \sum_i P_{i,j} Q_{i,t}$$

- Y_t^r or the real GDP, values products at a *constant* dollars at time 0:

$$Y_t^r = \sum_i P_{i,0} Q_{i,t}$$

- P_t: GDP Deflator (price index), which serves as a baseline comparison between the year of interest and the baseline year.

$$\begin{aligned} P_t &= \frac{Y_t^n}{Y_t^r} \times 100 \\ &= \frac{\sum_i P_{i,j} Q_{i,t}}{\sum_i P_{i,0} Q_{i,t}} \approx \frac{P_t}{P_0} \end{aligned}$$

May need to but in chain weighted GDP here later.

1.2 Expenditure

We can calculate expenditure, the total amount of money spent, as the following:

$$Y = C + I + G + EX - IM$$

where

- C denotes the consumption madde by Households
- I denotes the physical investment, purchases of new capital goods by businesses.
- G Government expenditures (purchases and investments) us all expenditure for all levels of government. However, we exclude transfer payments.
- EX denotes the cost of exports
- IM denotes the cost of imports[1]

And we set this equal to the income, as noted by our assumption above, or

$$Y = C + I + G + EX - IM = wL + \pi rK + T$$

where

- wL denotes the wage and compensation to workers
- rK denotes the compensation to capital owners
- π denotes the corporate profits
- T denotes Taxess

we also have the notion of production functions, which are very similar to that but **ECON 20210**, where

$$y = f(A, K, L, X)$$

where

- A denotes technology
- K denotes capital stock
- L denotes labor
- X denotes aother factors of production

1.2.1 Criticisms of GDP as a measure of Economic Well-being. One of the good things aout GDP is that GDP per capita is often correlated with measures as infact mortality rate (-), life expectancy (+), and literacy rate (+). However, GDP does not include non-market activities such as household production and other activities, as leisure is an important to one's well being.

[1] NX denotes net exports, which is just $EX - IM$

1.3 Level versus Growth

However, note that GDP (X) is a time dependent variable. Hence, we should be interested in *growth* as well as the *level* of the good. If the we can describe the growth in a *discrete* manner, we can see that:

$$\gamma = \frac{X_{t+1} - X_t}{X_t} \quad X_{t+1} = (1+\gamma)X_t$$

if we have a continous and exponentially growing GDP, we have the following:

$$\lim_{n\to\infty} \left(1 + \frac{\gamma}{n}\right)^n$$

and since $e = \lim_{n\to\infty} \left(1 + \frac{1}{n}\right)^n$, we see that:

$$\lim_{n\to\infty} \left(1 + \frac{\gamma}{n}\right)^n = e^{\gamma} \implies X_t = X_0 \cdot e^{\gamma t} \iff \ln X_t = \ln X_0 + \gamma t$$

This implies that if we take an contionus GDP, take the natural log of GDP with respect time and it is linear, then the GDP rate of growth is constant.