LECTURE 1: A TOUR OF THE BOOK*

Fei Tan†

We need a formal definition of the basic macroeconomic variables before we analyze them. The discussion in this lecture provides enough information for you to begin looking at macroeconomic data. In particular, we study how economists define output, unemployment rate, and inflation rate. Output is intimately related to our standard of living. Economists care about the unemployment rate not only because the unemployed suffer but also the unemployment rate provides an indicator of whether the economy is growing too fast or too slowly. Inflation has three main effects: it redistributes real income away from those who receive fixed nominal income; it distorts relative prices to the extent that some nominal variables do not adjust; and it creates uncertainty about relative price levels.

1 AGGREGATE OUTPUT

It was not until the end of World War II that the **national income and product accounts** (NIPA) were put together. Simon Kuznets and Richard Stone were given the Nobel Prize for their contributions to the development of the national income and product accounts. You can download the NIPA from the Bureau of Economic Analysis (BEA), http://www.bea.gov. Note that all data in levels from the NIPA are annualized nominal values. Measures of aggregate output have been published on a regular basis in the United States since October 1947.

GDP: production and income. The measure of aggregate output in the NIPA is called the **gross domestic product**, or **GDP**.[1] There are three ways of defining and constructing GDP:

- GDP is the value of **final** goods and services produced in the economy during a given period.[2]
- GDP is the sum of **value added** in the economy during a given period.
- GDP is the sum of incomes in the economy during a given period.

Date: September 1, 2021.

These are notes that I used by myself to lecture from and for educational purposes only. The material presented here is largely based upon the undergraduate textbook by Blanchard and Johnson (2012), *Macroeconomics*, 6th Edition, Prentice Hall. Please do NOT circulate.

†Department of Economics, John Cook School of Business, Saint Louis University. E-mail: tanf@slu.edu

[1] There is a similar term, **gross national product**, or **GNP**. Both GDP and GNP are flow variables. We defer the discussion of their differences to a subsequent lecture on open economy.

[2] An **intermediate good** is a good used in the production of another good.

To summarize, GDP is the measure of aggregate output, which can be viewed both from the production side (aggregate production) and income side (aggregate income). This implies that aggregation production and aggregate income are always equal.

Nominal and real GDP. Much of the increase in U.S. post-World War II output reflects an increase in prices rather than an increase in quantities produces. This leads to the distinction between nominal GDP and real GDP:

- **Nominal GDP** (Table 1.1.5, line 1) is the sum of the quantities of final goods produced times their current price. Thus, nominal GDP increases over time because the production of most goods as well as their prices increase over time.
- **Real GDP** (Table 1.1.6, line 1) is the sum of the quantities of final goods times a common price.

Construction of real GDP in practice involves a weighted average of the output of all final goods and the natural weights would be the relative prices of the goods.[3] See Figure 1 below.

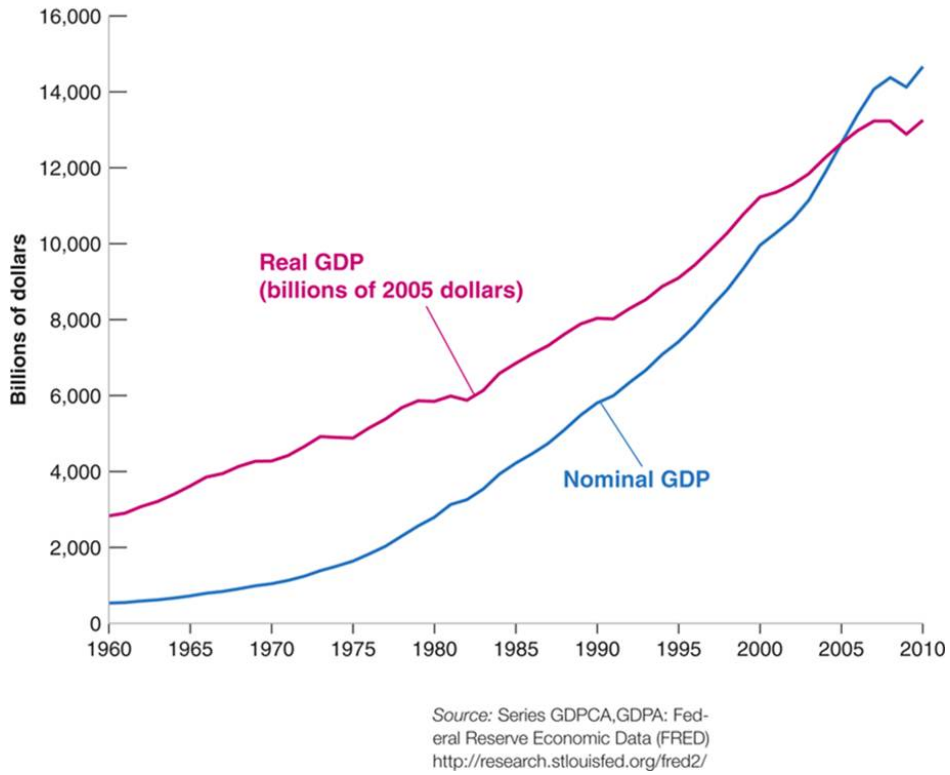


Figure 1. Nominal and real U.S. GDP, 1960-2010

[3]The measure of real GDP in the NIPA uses weights that reflect relative prices and which change over time. This measure is called **real GDP in chained (2009) dollars**.

Some notations. In what follows, GDP refers to real GDP and Y_t denotes real GDP in year t. Moreover, nominal GDP and variables measured in current dollars are denoted by a dollar sign in front of them, for example, $\$Y_t$ for nominal GDP in year t.

GDP: level versus growth rate. There are two equally important terms other than real GDP:

- **Real GDP per person** is the ratio of real GDP to the population of the country. It gives us the average standard of living of the country.
- **Rate of growth of real GDP**, or **GDP growth**. Periods of positive GDP growth are called expansions. Periods of negative GDP growth are called recessions. See Figure 2 below. GDP growth in year t is computed as

$$\text{GDP growth in year } t = \frac{Y_t - Y_{t-1}}{Y_{t-1}} \times 100\% \tag{1.1}$$

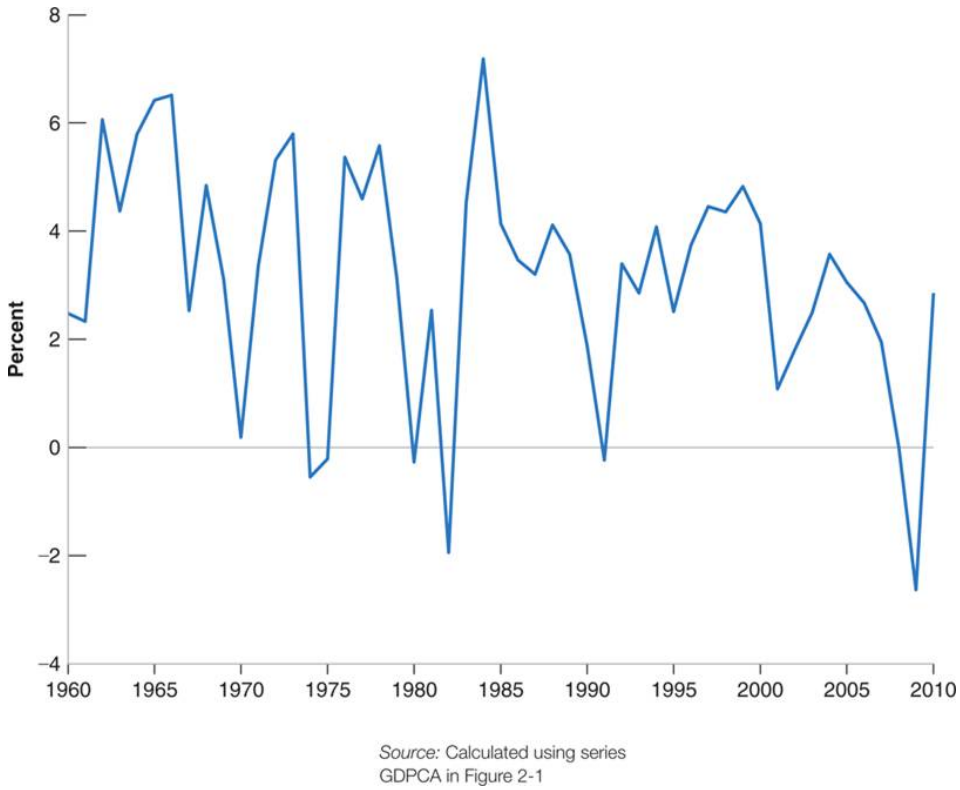


Figure 2. Growth rate of U.S. GDP, 1960-2010

2 UNEMPLOYMENT RATE

Some definitions. The official definitions and data of the labor force components used in the **Current Population Survey** (CPS), which calculates the U.S. unemployment rate, can be

found from the Bureau of Labor Statistics (BLS), http://www.bls.gov. See Figure 3 below.

- **Employment**, denoted N, is the number of people who have a job. **Unemployment**, denoted U, is the number of people who do not have a job but are actively looking for one. Those who do not have a job and are not looking for one are called **discouraged workers**.
- **Labor force**, denoted L, is defined as

$$L = N + U \tag{2.1}$$

- **Unemployment rate**, denoted u, is defined as

$$u = \frac{U}{L} \tag{2.2}$$

- **Participation rate** is defined as the ratio of the labor force to the total population of working age (or civilian noninstitutional population from the BLS).

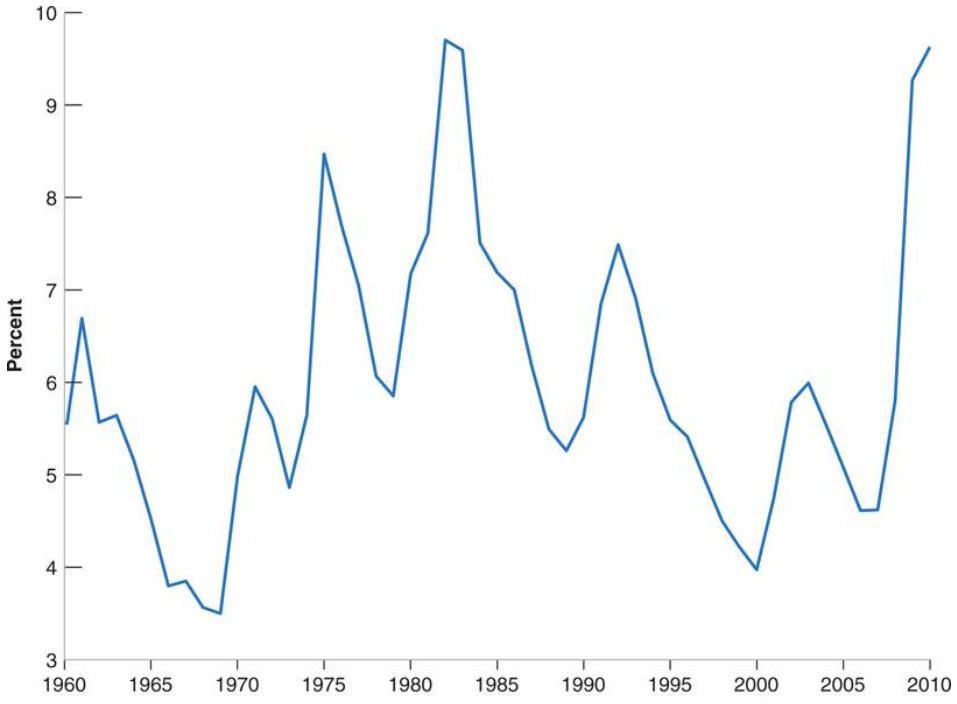


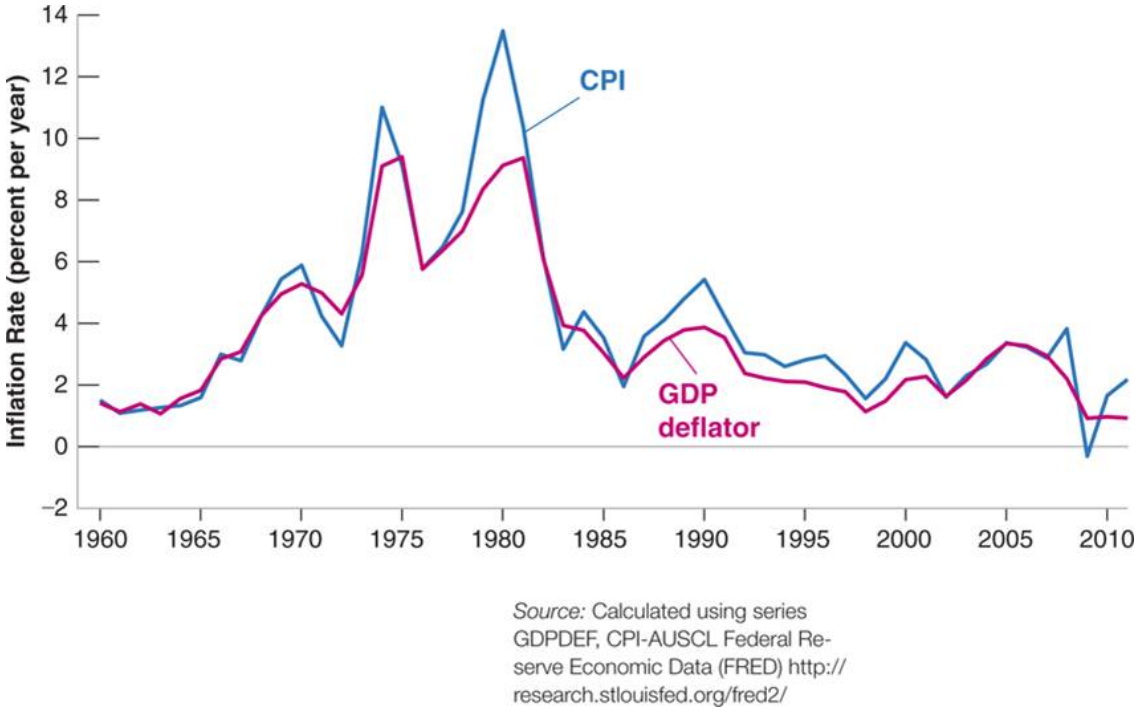
Figure 3. Unemployment rate of U.S. GDP, 1960-2010

Why do economists care about unemployment? There are two main reasons:

- Unemployment has direct effect on the welfare of the unemployed.
- Unemployment provides a signal that the economy may not be using some of its human resources efficiently.

3 INFLATION RATE

Inflation is a sustained rise in the general level of prices–the **price level**. The **inflation rate** is the rate at which the price level increases.[4]



Source: Calculated using series GDPDEF, CPI-AUSCL Federal Reserve Economic Data (FRED) http://research.stlouisfed.org/fred2/

Figure 4. Inflation rate of U.S., 1960-2010

Two measures of price level. There are two measures of the price indexes:

- **GDP deflator** (Table 1.1.9, line 1) in year t, P_t, is defined as the ratio of nominal GDP to real GDP in year t

$$P_t = \frac{\text{nominal GDP}_t}{\text{real GDP}_t} = \frac{\$Y_t}{Y_t} \tag{3.1}$$

  which is an index number and has no economic interpretations. Thus, the inflation rate in year t, π_t, can be defined as

$$\pi_t = \frac{P_t - P_{t-1}}{P_{t-1}} \times 100\% \tag{3.2}$$

[4] **Deflation** is a sustained decline in the price level. It corresponds to a negative inflation rate.

Given that $\$Y_t = P_t Y_t$, it can be easily verified that the growth rate of nominal GDP is equal to the inflation rate plus the growth rate of real GDP.

- **Consumer Price Index**, or **CPI**, which can be downloaded from the BLS, gives the cost in dollars of a specific list of goods and services over time. This list attempts to represent the consumption basket of a typical urban consumer. It measures the average price of consumption, or the cost of living, and is also an index number.

See Figure 4 above for how the inflation rate differs when both the GDP deflator and CPI are used to measure it.

Why do economists care about inflation? There are two main reasons:

- During periods of inflation, not all prices and wages rise proportionately. As a result, inflation affects the income distribution.
- Inflation leads to variations in relative prices, which in turn lead to more uncertainty, making it harder for firms to make decisions about the future.

4 OKUN'S LAW AND PHILLIPS CURVE

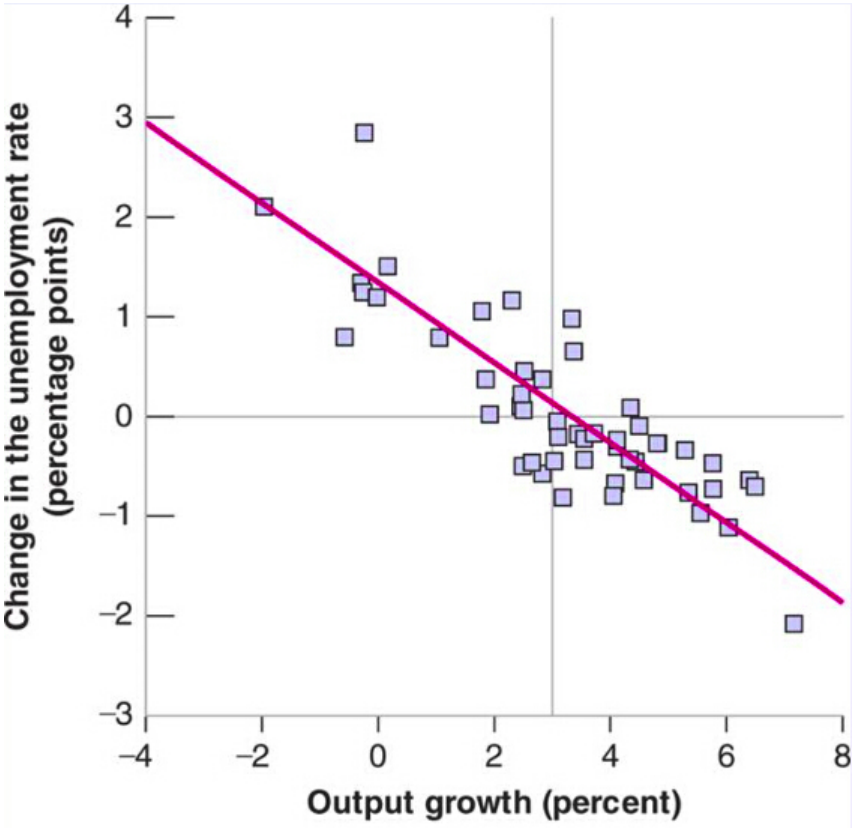


Figure 5. Okun's Law in U.S., 1960-2010

Okun's Law. There is a tight relation, first examined by American economist Arthur Okun, between output growth and change in unemployment rate: higher output growth leads to a decrease in unemployment. See Figure 5 above.

Phillips Curve. The relation, first explored by New Zealand economist A. W. Phillips, between unemployment rate and change in inflation rate: higher unemployment leads on average to a decrease in inflation.

5 SHORT RUN, MEDIUM RUN, AND LONG RUN

What determines the level of aggregate output in an economy? The answer depends on the time frame:

- In the **short run**, say, a few years, the year-to-year movements in output are primarily driven by movements in demand, perhaps due to changes in, e.g. consumer confidence.
- In the **medium run**, say, a decade, the economy tends to return to the level of output determined by supply factors: the capital stock, the level of technology, and the size of the labor force.
- In the **long run**, say, a few decades or more, the determinants of output are factors like a country's educational system, its saving rate, and the quality of its government.

6 MISCELLANEOUS

Here are some very good online resources of economic time series data.

- FRED Economic Data: https://fred.stlouisfed.org
- Bureau of Economic Analysis: http://www.bea.gov
- Bureau of Labor Statistics: http://www.bls.gov