

Chapter 5

Introduction to Macroeconomics

Chapter Introduction

In the previous chapters we learned concepts and tools that are equally applicable to both microeconomics and macroeconomics. Starting with this chapter, Chapter 5, we switch to macroeconomic concepts. At this point it will also be a good idea to review Table 1.2 and look at the distinction between macroeconomic and microeconomic concepts. We start with the concepts of national income and output.

Microeconomics vs. Macroeconomics

Recall the distinction between microeconomics and macroeconomics. Microeconomics deals with the individuals while macroeconomics deals with the aggregates. I am reproducing Table 1.2 here to help us remind the distinctions between microeconomics and macroeconomics.

Table 1.2: Microeconomics vs. Macroeconomics

[1]	[2]	[3]
Variable	Microeconomics	Macroeconomics
Output	Output of a particular firm or an industry.	Output of the overall economy.
Price	Price of a particular good or service such as a pen, a computer, services of a doctor, a plumber, and so on.	The overall price level is an “average” of all the prices of goods and services.
Consumption	Consumption of goods and services by a household.	Consumption of goods and services by all the households in the economy.
Saving	Saving by a household.	Saving by all the households in the economy. National saving is the sum of all the private and public savings.
Employment	Employment in a particular firm or an industry, and employment status of a particular household, and so on.	Employment in the overall economy in all the industries. Employment status of all the households in the economy.
Unemployment	Unemployment of a household, in an industry, and so on.	Unemployment in the overall economy.

Source: M. Ashraf

As we know from Chapter 1 (see also Table 1.2 reproduced here), in microeconomics we focus on the income of an individual household, output of a firm, price of a product, employment of an individual, and so on. In macroeconomics, on the other hand, we study aggregates—aggregate

output or income, aggregate consumption, aggregate saving, the overall price level, the employment, and unemployment levels of the country, and so on.

As we will see, often calculating aggregates requires some extra care; it is not a matter of just adding up. This is especially the case when we are calculating aggregate output or income and price level.

Aggregate Output or Income

Let's start with output or income. Aggregate output is the sum of all the output produced in the economy, and aggregate income is the sum of income earned by all the economic agents in the economy.

First, note that output and income represent the same underlying concepts. Indeed, these two terms are interchangeable. Here is the reason why these two terms represent the same underlying concept.

Suppose that you produce widgets. During, say, January, you produced 100 units of widgets. Your output for the month of January is 100 widgets. These same widgets are also your income. You may use these widgets to buy some widgets produced by someone else, assuming, of course that you have enough widgets, and the seller of other widgets is willing to accept your widgets for his/her widgets.

One reason for confusion is that when we think of income we think in terms of some currency—US dollar, British pound, Japanese Yen, Chinese Yuan, European euro, and so on. Output measured in terms of some currency is called nominal output, and output measured in terms of goods and services—the number of widgets—is called real output. In the next chapter, Chapter 6, we will learn how to measure nominal and real output.

Business Cycle

The path of an economy's output is rarely smooth; all economies go through ups and downs. These short-run ups and downs in the economy's output is called a business cycle. Figure 5.1 shows a stylized business cycle.

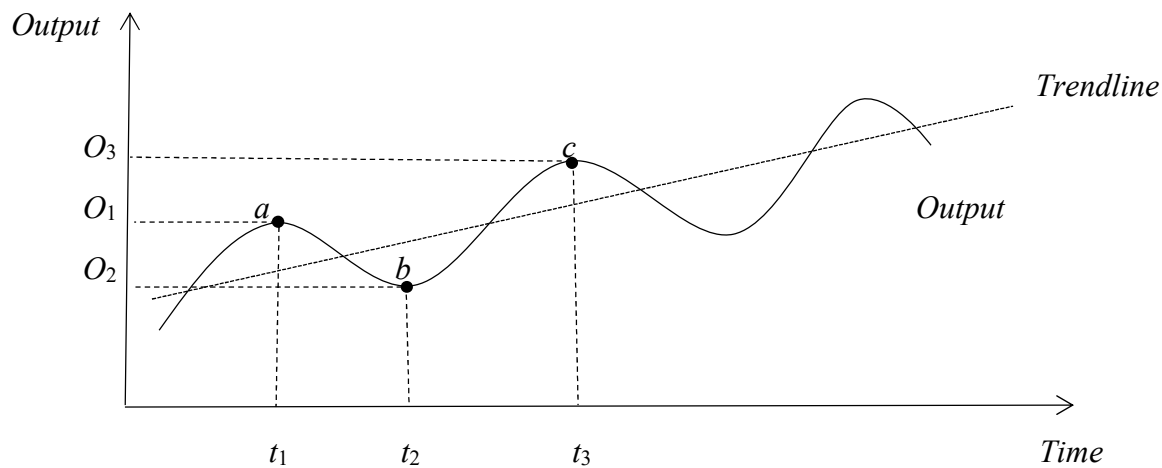


Figure 5.1: Business Cycle

Source: M. Ashraf

Figure 5.1: Time is on the horizontal axis, and aggregate output on the vertical axis. The solid curve represents the path of aggregate output. The “Trendline” has a positive slope, indicating that while the output fluctuates, over time, the output is growing. A point such as *a* on the curve is called a peak, and a point such as *b* is called a trough.

In Figure 5.1, we have time on the horizontal axis, and some aggregate measure of output on the vertical axis. The solid curve represents the path of aggregate output. Note the ups and downs represented by this curve. The “Trendline” has a positive slope, indicating that while the output fluctuates, over time, the output is growing. More on this shortly.

For instance, at time t_1 , the level of output, represented along the vertical axis, is O_1 . As we move along the time axis, at time t_2 , the level of output decreases to O_2 . A point such as *a* on the curve is called a peak, and a point such as *b* is called a trough. As the economy moves from Point *a* to Point *b*, it is said to be in a recession. And when the economy moves from Point *b* to Point *c*, it is said to be in recovery or expansion. Economies tend to go through these peaks and troughs. While economists do not know exactly what causes these recessions, we do know how to get the economy out of a recession. In the coming chapters we will learn various policies that have been proven to be effective to get the economy out of a recession.

The curve in Figure 5.1 is smooth; the ups and downs are not erratic. The aggregate output path of the real economy is not that smooth. Figure 5.2 shows the actual aggregate per capita output data for the US. These data are provided by the Bureau of Economic Analysis (www.bea.gov).

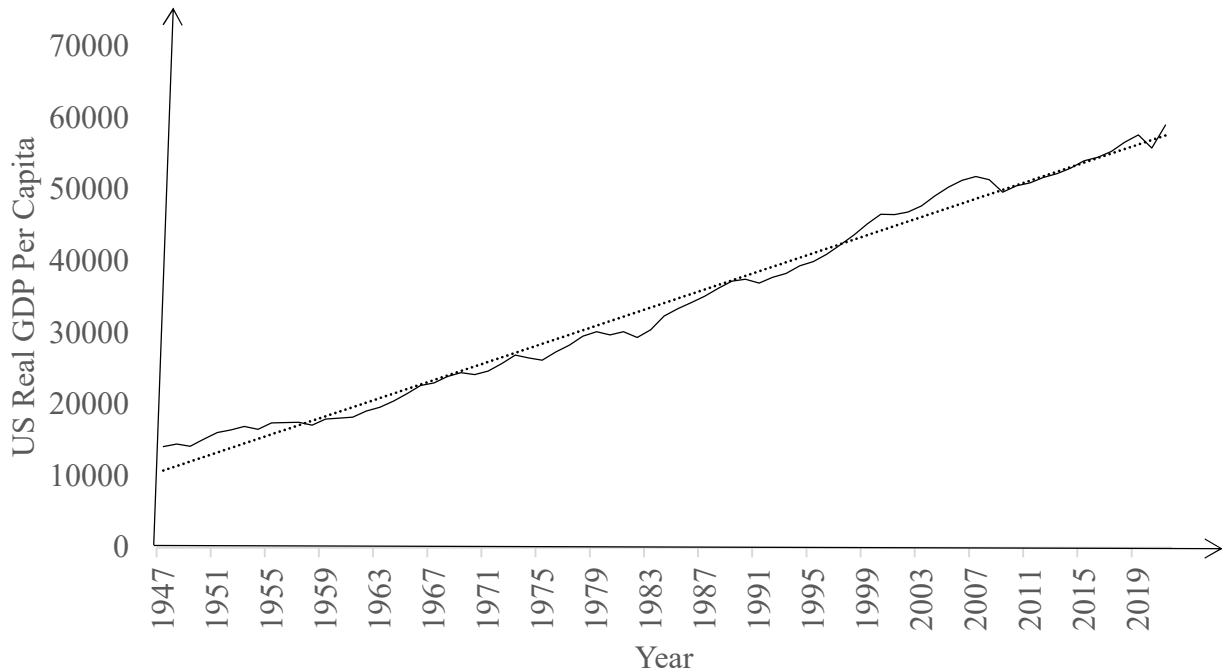


Figure 5.2: Real GDP Per Capita of the US (Chained 2012 US Dollars)

Source: M. Ashraf. Data Source: U.S. Bureau of Economic Analysis, Real gross domestic product per capita [A939RX0Q048SBEA], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/A939RX0Q048SBEA>, US Bureau of Economic Analysis (www.bea.gov) (Accessed: November 14, 2022)

Figure 5.2: Time in years is on the horizontal axis, and real per capita gross domestic product (GDP) of the US is on the vertical axis. It is represented by the solid line. The dotted line represents the trendline.

In Figure 5.2, time in years—from 1947 to 2021—is on the horizontal axis, and real per capita gross domestic product (GDP) is on the vertical axis. The solid line represents the real per capita gross domestic product, and the dotted line represents the linear trendline.

What is GDP? As we will learn in greater detail in Chapter 6, GDP is a measure of aggregate output. For now, suffice it to say that GDP is a measure of aggregate output of the economy.

Note also that the linear trend of the curve, shown here by a dotted line, is positive. There is no guarantee, however, that the output trend of an economy will be positive. There are numerous countries in the world whose output does not show a positive trend for extended periods of time.

In Figure 5.3, I plot per capita GDP annual data for Sierra Leone from 1960 to 1991. I have also plotted a linear trend curve in this figure. Note that the trend is negative.



Figure 5.3: Per Capita GDP of Sierra Leone (2010 Constant US Dollars)

Source: M. Ashraf. Data Source: World Bank, Constant GDP per capita for Sierra Leone [NYGDPPCAPKDSLE], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/NYGDPPCAPKDSLE>. (Accessed: November 13, 2022.)

Figure 5.3: Time in years is on the horizontal axis, and real per capita gross domestic product (GDP) of Sierra Leone is on the vertical axis. It is represented by the solid line. The dotted line represents the trendline.

Figure 5.3 plots per capita gross domestic product (GDP) of Sierra Leone. The data are in 2010 constant US dollars. Time in years is on the horizontal axis, and real per capita GDP of Sierra Leone is on the vertical axis. It is represented by the solid line. The dotted line represents the trendline.

Two points to note here. One, I have used the adjective “real” when plotting GDP of the US and Sierra Leone. By “real” we mean that the data are not affected by the changes in prices. How do we achieve this? We divide the variable values by the overall price level. We discuss this in detail in the next chapter, Chapter 6, when we learn how to calculate GDP and a measure of the overall price level. In Chapter 6 we also learn about “chained dollars”—Figure 5.2, and “constant dollars”—Figure 5.3. Second, the postfix “per capita” means per person. We achieve this by dividing GDP by the population. Whenever we need to convert a variable into per capita terms, we divide that variable by the population.

Potential Output

The trendline in a business cycle represents the “potential” output; it is an estimate of the output around which the economy’s output fluctuates. The US Congressional Budget Office, the official agency that estimates the potential output of the US economy, defines it as follows.¹

Potential output—the trend growth in the productive capacity of the economy—is an estimate of the level of GDP attainable when the economy is operating at a high rate of resource use. It is not a technical ceiling on output that cannot be exceeded. Rather, it is a measure of maximum sustainable output—the level of real GDP in a given year that is consistent with a stable rate of inflation. If actual output rises above its potential level, then constraints on capacity begin to bind and inflationary pressures build; if output falls below potential, then resources are lying idle and inflationary pressures abate.

In coming chapters, we will learn more about the potential aggregate output, and its importance.

Price Level

As stated in Table 1.2, price level is an “average” of all the prices of various goods and services, where the average is calculated a certain way. When we learn to calculate GDP, we also learn to calculate price level.

There are several measures of price level. We will focus on two measures—GDP Deflator, and Consumer Price Index (CPI). The CPI is perhaps the most popular measure of price level in the news media. As we will see, there are important conceptual and methodological differences between the two. The CPI data are provided by the Bureau of Labor Statistics (www.bls.gov). The GDP Deflator data are provided by the Bureau of Economic Analysis.

Consumption and Saving

An economic agent may consume part (or all) of its income and save the rest (or all). That is, income may be divided into consumption and saving. Analogously, aggregate income (Y) of a country can be divided into aggregate consumption (C) and aggregate saving (S).

$$Y \equiv C + S \quad (5.1)$$

Note that Equation 5.1 is an identity; it has “ \equiv ” lines instead of “ $=$.” The two sides of an identity are true for all values; the relationship between the variables on the right-hand side and the left-hand side is true, by definition. The two sides of an equation, however, are true at one point. As

¹ Potential Output. (CBO's Method of Estimating Potential Output: An Update 2001)

an example, recall that in Chapter 3, the equilibrium in quantity demanded and quantity supplied takes place at one point. As we will see in later chapters, this difference between the concepts will play an important role in our understanding of macroeconomic equilibrium.

Labor Force, Employment, and Unemployment

Some of the most watched signs of the health of the economy are employment and unemployment data. The Bureau of Labor Statistics conducts monthly surveys to estimate, among other variables, the number of people who are in the labor force, who are employed, and who are unemployed. We will go into more details about labor force, employed, unemployed in Chapter 11.

Individual versus the Economy

Recall the fallacy of composition that we covered in Chapter 1. It states that what is true for a part is also true for the whole. As we learned that that might not be the case; what may be a virtue for an individual may very well be vice for the economy.

While the country's economy is composed of the individual economic agents in the country, there are distinct differences between the two. A policy that may be prudent for an individual may indeed be imprudent for the economy. One often hears about in the popular press and the in the political arena that when a household's income decreases, it "tightens its belt. The government should follow the same strategy," the argument goes. That is, when the economy is in recession and tax revenue declines, leading to an increase in budget deficit, we should cut back on government spending. As we will see in the coming chapters, this strategy may well lead to further worsening the economic picture.

Price Stickiness: Short Run versus Long Run

In Chapters 3 and 4 we learned that when demand and/or supply change, leading to shifts in the demand and/or supply curves, price of the product changes instantaneously. In the economics parlance, this is referred to as prices being flexible. Prices that do not change quickly to equate the quantity demanded and quantity supplied are called sticky prices.

For example, price of gas for your car is likely the most flexible, whereas an apartment or a house rent is usually fixed for a year.²

Short Run versus Long Run

A period during which at least some of the costs of production are fixed, is considered short run. And a period during which all the costs of production, are flexible, is called long run. It is important to note that whether a given period measured in months, years, etc., is short run or long run depends upon the industry.

² See for a list of goods and services with flexible and sticky prices. (Bils & Klenow, 2004; Bryan & Meyer, 2010)

Take the example of restaurant industry. Suppose that a restaurant owner is operating in a space that seats 100 diners. One cost of production, say, rent fixed; according to her contract, she will pay a certain rent per month for certain number of years. Suppose that she wants to expand the seating area because of the popularity her restaurant. She notices that the adjacent space is available and if she were to knock down the wall between the two places, her dining area will increase. She contacts the building owner, and after the building owner and the restaurant owner agree and negotiate a new rent agreement, they knock down the wall and the seating area has increased. It is likely that the expansion may take a year at most, from start to finish. In this case one cost, i.e., the rent, is fixed for a period less than a year, but flexible for a period greater than a year. So, in the restaurant industry, less than a year is short run, and greater than a year is long run.

Now take the example of a car manufacturer, say, Ford Motor Co. Suppose that Ford wants to expand its production facilities, and wants to build a new plant. It may take up to a decade or longer from start to finish for the new plant to start producing cars. So, for the car industry, a period of less than a decade is short run, and a period of longer than a year is long run.

Reasons for price and wage stickiness

While there are several reasons for price stickiness, we will focus contracts in this chapter.

Contract is a document that details the good or service supplied by the seller and the terms upon which that good or service is supplied. Both buyer and seller agree upon the terms and the length of time for which those terms will apply.

An example is apartment or house rental contracts. If you have ever rented an apartment or a house, it is likely that you signed a contract for a year. During the year you pay an agreed upon rent each month in the same amount. Closer to the end of the year you and the owner may renegotiate the rent for the next year.

Wage contracts of salaried employees is another example. Often employers hire employees and both the employee, and the employer agree on a monthly salary for a year. At the end of the year, the employer reviews the employee performance and both the employee, and the employer may renegotiate the salary for the next year.

Why do buyers and sellers of goods and services write contracts? The reason is that renegotiating prices and terms are time consuming and wasteful. To avoid this, buyers and sellers write contracts for a certain period, usually a year, during which the seller promises to the buyer to sell the good or service at an agreed upon price.

Chapter Conclusion

This chapter introduced the main topics that are covered in macroeconomics. We will go into a lot more detail about these topics in the coming chapters. For instance, we will learn how to calculate GDP, a measure of aggregate output. We will also learn to calculate GDP deflator and CPI, measures of overall price level. We will learn more details about employment and unemployment, among other concepts.

As we move forward, an important point to keep in mind that an individual household or a firm is not the same as the economy. And that what may be a prudent strategy for a household or a firm, may be an imprudent strategy for the economy.

A Review of Terms

- Aggregate Output or Income: Total output produced in the economy. Note that income and output represent the same underlying concepts. Indeed, they are used as synonyms.
- Gross Domestic Product (GDP): GDP is a measure of aggregate output or income.
- Per Capita Output or Income: Output or income divided by the population of a country.
- Price Level: A measure of the “average” of prices of all the goods and services. GDP deflator and Consumer Price Index (CPI) are two measures of price level.
- Sticky Prices: Prices that do not change quickly to the changes in economic conditions. That is, they do not change quickly to equate quantity demanded and quantity supplied of the good or services.
- Short Run: A period during which at least one cost of production, or price of a good or service, is fixed. That is, a period during which not all prices have adjusted to the changes in the economy.
- Long Run: A period during which all costs of production, or prices of goods or services, are variable. That is, a period long enough that all prices have adjusted to the changes in the economy.