Chapter 1: The Macroeconomy

I. Macroeconomics in the long and short run

In economics, we have a major subdivision of study called macroeconomics. This refers to all economic phenomena which are not determined by a single individual, firm, or industry. It is concerned with highly aggregated economic behavior and therefore is much closer to sociology, anthropology, politics, and history. Macroeconomics is our national and international collective economic effort and performance.

Broadly speaking, macroeconomics is concerned with (i) short run national income determination and (ii) long run economic growth. Of course, there is no easy dividing line between short run and long run, but we usually think of the short run as lasting a few years, while the long run covers periods as long as several decades. In the short run, the determination of the national income (or real GDP) will determine the level of employment in the economy. It will largely decide the level of consumption and saving. It will determine in part how much we import and how large the government budget deficit will be. In the long run, economic growth will decide our long run standard of living, whether there is discernible progress in the economy, and our overall strength in the world economy. Countries that have strong economic growth tend to be more stable politically and their citizens tend to live longer, healthier lives. Strong economic growth has been found to be a wonderful way to raise the welfare of all citizens, thus smoothing the inevitable income and wealth inequality in society. Higher growth allows people a chance to enjoy greater leisure, the arts, and even religion.

In the short run, we usually accept that a country that has a stable and high level of real GDP is better than a country having the same high level of income, but which is very unstable. Look at the two graphs below and ask yourself which of the two is more stable. Note that the two countries have the same average level of national income. In the short run, we would rather live in country 2 instead of country 1. Stability of the economy is a vital short run consideration. This is why that governments endeavor to stabilize the economy through fiscal and monetary policies. Despite wanting to stabilize the economy, government may not be able to do so. In fact, some economists have argued that government actions taken to stabilize the economy may very well destabilize the economy. These economists point out that to stabilize the economy requires that governments utilize exactly the right effective policies, at exactly the right time, and at exactly the right level of intensity. To do this would seem to be well beyond the ability of any government since our understanding of complicated collective human behavior is extremely limited. It also ultimately sees government as a benign player in the process, when we all know that government is composed of people just as business and households are composed of people. In this sense, government often uses stabilization policy as an excuse to hand out favors for its own interests rather than for society’s welfare. Greedy government agencies exist just as greedy corporations and greedy consumers. There is no need to accord government some kind of special
dispensation simply because it says it is working to help the poor and underprivileged. Government is involved in great waste since it is seldom held accountable for its actions and because it does not use its own money to do things but rather taxes and borrows money to spend as it wishes.

It is easy to see that both countries in the graphs below are growing at the same pace on average, but country 1 is doing so in a radically unstable fashion – sometimes quickly growing and

sometimes slowly growing. By contrast country 2 is growing the same as country 1, but doing so in an extremely stable fashion. Given the choice, country 2 is better than country 1.

Now, consider the two graphs below. Both countries have the same stability over time (i.e. fluctuation about trend), but country 2 is growing markedly faster. If we draw a trend line through the graphs we get roughly the same level of instability of real GDP from the trend. However, country 2 has a strong long run growth rate, while country 1 has a much lower growth rate. Most people would prefer to live in country 2.¹

Our first set of graphs illustrates the short run problem of macroeconomics, viz. stabilization of national income over time. The second set of graphs illustrates the long run problem of macroeconomics, viz. obtaining a high and sustainable economic growth rate over time. **Sustainable** growth is an important attribute for an economy. It is easy to find very short periods of time, say one or two years, where economic growth hits double digit rates. However, these periods were not sustainable. Growth subsequently fell back. Taiwan in the 1980s had extremely high economic growth. In 1986-1988 economic growth was above 10%. With this kind of

¹ I have met foreigners who have moved from the EU and from the US to fast growing developing countries like China and Thailand because they see these countries as having promising futures. They make these decisions, even though income levels in the US and EU are higher than these developing countries. Many people are finding that high growth areas are wonderful places to build rich and satisfying lives despite having to build from a lower base.
growth, the national output could double in 7 years. But, it could not maintain such growth for such a long time. Eventually growth fell back to 6-7% during the period. This was high, but was nothing like the wonderful period of high growth of the late-1980s.

The best performances over a short run period of time in the US are as follows:

- 1962-1966 five years average rate of growth 5.8%
- 1976-1978 three years average rate of growth 5.2%
- 1983-1985 three years average rate of growth 5.3%
- 1997-2000 four years average rate of growth 4.4%

and the most recent long run poor performance including two recessions is

- 2000 –2014 fifteen years average rate of growth 1.9%

No wonder people in the US long for the old days when growth was high and exciting. Arguments over what is the best policy to achieve long and short run goals often involve us in major political controversies in macroeconomics. This is unavoidable, but it also makes economics and politics more interesting.

II. Real GDP and the Circular Flow

What do we mean by real GDP and how is it different from national output or national income? During the 1930s a great deal of effort was made to define and accurately measure the national or aggregate income of the economy. The early leaders in this movement were Colin Clark,

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2 Calculated as a geometric average growth rate using $Y_{2000.01} = 12359.1$ billion and $Y_{2014.04} = 16293.7$ over 15 years this rate is 1.86 %. See [http://research.stlouisfed.org/fred2/data/GDPC1.txt](http://research.stlouisfed.org/fred2/data/GDPC1.txt)
James Meade, Richard Stone, and Simon Kuznets.³ The basic idea is that whenever something is produced, it must be sold. Thus, the production of the good or service constitutes output, whereas the sale of the good or service constitutes income to the seller. All sales must create a corresponding income. Annual real GDP, which is short for the real gross domestic product, is the value of all goods and services produced domestically and sold during year valued in some fixed base year prices. It will be convenient to think of real GDP as the output of the economy. Thus, to a close approximation,

\[
\text{output} = \text{national income} = \text{real GDP}.
\]

Can we make this any clearer? Yes, consider the simplified circular flow of the macroeconomy. In this simple model there are households and there are businesses. This is shown in the diagram below. This figure is known as the circular flow of the economy. Actually it is two flows combined – an outside flow and an inside flow.

³ See F. Commin (2001) for an interesting article about the history of national income accounting in the journal History of Political Economy.
This simple abstract drawing above illustrates a great deal of macroeconomics. It will pay you to think about it for a moment. It is deceptively simple. First, there are two flows. One is a flow of labor for goods. This is the so-called real economy. It does not involve the exchange of money. It is the outer flow in the figure above. Remember that money is not really important since both households and firms willingly give up their money to get goods and labor. Without the goods, the money is meaningless. Without the labor, the production of goods is impossible. Money is just helping us make the exchange – or so it would seem. Second, the money economy is the inner flow of money for money. It is called the money economy or the nominal economy. The inner flow is not as important to economists as the outer flow. Indeed, classical economists said that the size of the inner flow was completely unrelated to the size of the outer flow. They called this the neutrality of money. They said that the amount of money in the economy would merely determine the prices stamped on the goods and the number of zeros stamped on labor’s paychecks. If we were to double the amount of money in the economy, there would still be no more goods and labor produced and exchanged. The only difference would be the prices and wages in the economy, which would double as well. Third, there is simply no way to increase real GDP without also increasing output and national income. The flow in the top is the same as the flow on the bottom. How could it be different? Of course, if the top flow increases, then the bottom flow must also increase the same amount. Thus, we have

\[ \text{real GDP} = \text{national output} = \text{national income} \]

We will find it useful to simply refer to these three concepts with a single letter, \( Y \). Whenever a student sees the letter \( Y \) they should think of this as the total output or total real GDP or total national income of the economy in a single year. This is not exactly correct, but for now it will suffice and it will be very helpful in conceptualizing many of the macroeconomic relations we will discuss later.

**III. Growth, Inflation, and Unemployment**

The economic growth rate of the economy is defined as the percentage change in \( Y \), real GDP. We can calculate the economic growth rate using the following formula:

\[ g_t = \left( \frac{Y_t - Y_{t-1}}{Y_{t-1}} \right) \times 100\% \]

For example, if \( Y_{2011} = 120 \) and \( Y_{2012} = 124 \), then \( g_{2012} = \left( \frac{124 - 120}{120} \right) \times 100\% = 3.33\% \). Despite how exact this number looks, the economic growth rate is not precise at all. In our example, we wrote the growth rate as 3.33%. In real life, the growth rate could be 3.7 or 2.8, meaning that our
estimate is subject to many factors that robs it of precision. Economic data are not precise. The US government collects quarterly data on GDP and calculates a quarterly growth rate using this data. This can then be converted to an annual rate of growth if one needs this for comparison purposes.

The growth of the economy fluctuates about a trend and this trend growth may be termed the natural growth of the economy. Corresponding to this natural growth of the economy is a natural real GDP, $Y^N$, which some economists prefer to call potential real GDP. Potential real GDP is determined by full employment of land, labor, and capital in the economy. If the economy is working at full employment then it will produce an output equal to natural real GDP or its potential output. If the economy is operating at less than full employment of its resources, then real GDP will be less than potential output. If the economy is performing above its potential, then real GDP will be above natural real GDP. In such a case, the economy will be operating (at least for a short while) above its potential. We can summarize these three cases as:

Case I: $Y > Y^N$ economy is above its potential and the economy exceeds full employment
Case II: $Y < Y^N$ economy is below its potential and economy is below full employment
Case III: $Y = Y^N$ economy is at its potential and there is full employment

Corresponding to these three cases for output are three cases for the unemployment rate of labor. The unemployment rate, like real GDP, has a natural level which we can write as $U^N$. This is as close to full employment that we can expect to get, since many unemployed may be so for seasonal reasons, structural reasons, or frictional reasons. That is, they are unemployed because of the weather, or because of a lack of needed skills, or because they are currently between jobs.

Case I: $U < U^N$ economy is booming and the unemployment rate is below its natural level
Case II: $U > U^N$ economy is lax and the unemployment rate is above its natural level
Case III: $U = U^N$ economy is at full employment and unemployment is at its natural level

Clearly, the two sets of cases are related. That is, case I for natural real GDP corresponds to case I for the unemployment rate. Thus, when the economy is above its potential, then unemployment rate will be below its natural level. This seems eminently reasonable, since a quickly growing economy should result in a steep drop in unemployment.

What can we say about inflation? Everything translates to inflation, so long as we use the change in the inflation rate, rather than inflation itself. That is, letting $\pi$ = the inflation rate and letting $\Delta\pi$ = the change in the inflation rate over time.

Case I: $\Delta\pi > 0$ economy is booming and inflation is increasing
Case II: $\Delta\pi < 0$ economy is lax and the inflation rate is falling
Case III: $\Delta\pi = 0$ economy is at full employment and inflation is neither rising nor falling
Note that there is no natural level of inflation. In fact, inflation can be most any number. In some countries, inflation may be 3% per year, while in other countries it may be 10% per year. Economists are interested to know whether inflation is rising or falling and not simply what its level may be. People seem to be able to adapt well to inflation so long as it is expected. Problems arise when inflation becomes erratic, high, and unpredictable.

But, what do we mean by unemployment and inflation? The unemployment rate is easy to calculate. It is equal to the total number of people unemployed (15 years and older, looking for work, but unable to find it) divided by the total number of employed and unemployed people. We can write it as

\[
U = \frac{\text{unemployed}}{\text{unemployed + employed}}
\]

The inflation rate is defined as the percentage change in the average level of prices or price level. This can be written as a formula very similar to economic growth. If \( P \) = the average level of prices, then inflation is equal to

\[
\pi = \left( \frac{P_t - P_{t-1}}{P_{t-1}} \right) \times 100\%
\]

IV. Graphing the relation between growth, unemployment, and inflation

We can combine all that we have discussed thus far on the relation between real GDP, inflation, and unemployment in a series of graphs as follows. First, we consider real GDP and potential output. The data is actual data taken from the St. Louis Fed databank and shows actual real GDP (shown in black) and estimated potential real GDP (shown in red). Note how that in the late
1990s potential output (red) exceeded actual real GDP (black). This was the period of the internet boom when companies were investing tremendously in both hardware and software. It was the period when everyone was buying a PC and life was changing to the digital age. It was a time of great excitement and hope, a period of speculation and over-reaching expectations. Over this forty year period, it is difficult to find such an unusually high and sustained growth above potential GDP for the US economy. Most of the time, the US economy is either at its potential or below it.

This is not true if we extend our time frame back to the 1950s and 1960s. It is here that we see periods of great economic expansion and optimism. If we subtract potential from actual GDP and divide by potential output we get the following graph which is one way of describing the business cycle.

From this graph we see that the 1950s was a period of American expansion and postwar building. The new interstate highway system was being built. Industries like the car and steel industries were growing and booming. Housing was important and people were marrying and having babies. Higher education was sought after and was highly valued, while television was replacing radio as the new information medium. The US was growing in importance in the world and the strength of its resource base in oil and other natural resources was proving a boon to its growth. The 1960s continued this boom as the space age came to occupy peoples’ mind. Important chemical and engineering accomplishments drove increased optimism. US economies of scale
made its products throughout the world unsurpassed in quality and reliability. The United States became the single greatest bulwark against the spread of communist ideology.

Note that it is much easier to find periods where output is below potential than periods where it exceeds potential. Expansions in the economy are longer than contractions, usually, but the expansions are slow and un-dramatic. Contractions on the other hand are fast and often very dramatic. What is particularly depressing is the way in which the US economy fell in 2008 and has yet to recover to its previous level. The US economy remains well below its potential. This is unprecedented in US economic history. It will be a matter of importance for us to discuss in the future. This strange lack of self-correction in the economy in 2008-2013 calls into question whether the government is helping or hurting the recovery. A somewhat similar phenomenon occurred after the 1991 recession, but was not nearly as serious. The lack of recovery after 2009 indicates how costly the recession has been on the standard of living of Americans. Certainly we can say that America has lost its flexibility and vitality. Why this has occurred and what we should do about it are questions which we will be considering in later chapters.

We can also look at the record on unemployment. This is shown in the graph below. The natural rate of unemployment is not constant but is certainly much more stable than the actual rate of unemployment. The natural rate of unemployment ranges between 5% and 6% with the most recent estimate being close to 5.5%. Note how that prolonged periods of high actual unemployment lead to a corresponding rise in long term natural unemployment.
When the economy expands unemployment falls relative to natural unemployment; when the economy contracts, actual unemployment begins to rise relative to natural unemployment. In the graph below we subtract natural unemployment from actual unemployment to get an unemployment gap. It is clear from this graph that the unemployment gap was mainly negative in the 1950s and 1960s, while turning mainly negative after 1975. This graphic result points up again the stylized fact that the US has been on an economic decline since 1975 with perhaps a brief respite in the late 1990s.
What can be said about the record on inflation in the US? If we look at the annual change in the inflation rate (where inflation is defined as the % change in the GDP deflator or overall price level) we get the following graph. It shows, to a reasonable approximation, that inflation tended to increase more over the period of American expansions (i.e. 1950s and 1960s). Whereas over the period of US relative economic decline (1975 to present) inflation has tended to fall. Overall inflation has become quite stable in recent years. The point of the graph is to show that inflation tends to drop during recessionary periods and rise in times of expansion. Note how that inflation drops when there is a recession and tends to pick back up when the economy bounces back. 

Some students may feel that economics is far too loose with its “laws”, unlike natural sciences such as chemistry and physics that have strict and unchanging laws and that many people like to call “truth”. This is a common and quite natural complaint heard from reasonable people. But, as the great English economist Alfred Marshall put it, reflecting on John Stuart Mill, economic laws are tendency laws meaning that they state what would “tend to occur” if there were no intervening events or factors that disturb the natural flow of the phenomenon over time. It may be better to side with Marshall’s most famous student, John Maynard Keynes, and view economics as a branch of logic, an apparatus of the mind, and a tool of analysis which allows its possessor the special ability to arrive at useful conclusions to complicated economic questions. See the Keynes’ Introduction to Henderson’s Supply and Demand, Cambridge Economic Handbooks, 1922 available free online at http://www.gutenberg.org/files/10612/10612-h/10612-h.htm. Economic analysis is not a science, but rather is a special type of useful logic.
If we take data from 1954-2012 on the change in inflation and the output gap we can run a regression and get the following result

$$\Delta \pi_t = 0.067 + 29.84 \left( \frac{Y_t - Y_t^N}{Y_t^N} \right) \quad R^2 = 0.11$$

$t$-statistics are in parentheses. Note that the coefficient is positive and statistically significant, but the $R^2$ is still very low. Below is a graph of actual changes in inflation against predicted changes in inflation...