Inflation and Unemployment

These notes deal with two measures that figure prominently in macroeconomic discussion, namely inflation and unemployment.

1 Inflation

Inflation is defined as a sustained increase in the general level of prices. To make this idea operational we need a measure of the "general level of prices." There are several candidates but we'll start with the best-known, the Consumer Price Index or CPI. The CPI is produced on a monthly basis by the Bureau of Labor Statistics. It measures the total price of a "basket" or "bundle" of goods and services that is supposed to be representative of consumer spending.

The CPI is not itself a dollar value, but an *index*. It is set equal to 100 in the chosen base period; in other periods the CPI stands in proportion to 100 as the dollar cost of the basket stands in proportion to its cost in the base period. The formula for the CPI in period t is

$$\text{CPI}_t = 100 \times \frac{P_t}{P_b}$$

where b indicates the base period and the P figures represent the dollar cost of the CPI basket.

An actual number: in November 2015 the CPI stood at about 238, with a base period of 1982–84. This means that consumer prices rose about 140 percent (or in other words, somewhat more than doubled) between the early 1980s and the end of 2015.

The so-called "headline" measure of inflation is the annual percentage rate of change of the CPI. Let π stand for inflation and let time, t, be measured in months; the "year on year" CPI inflation rate is

$$\pi_t = 100 \times \frac{\text{CPI}_t - \text{CPI}_{t-12}}{\text{CPI}_{t-12}}$$

That is, the percentage increase in the CPI over its value 12 months ago. We can also talk about the "annualized" monthly inflation rate,

$$\pi_t \approx 1200 \times \frac{\text{CPI}_t - \text{CPI}_{t-1}}{\text{CPI}_{t-1}}$$

Inflation, deflation, disinflation

Over recent history inflation has been mostly positive (meaning greater than zero, not "good"). But when it's negative (falling prices) we talk about *deflation*. There was a prolonged period of deflation in the Great Depression of the 1930s. When the rate of inflation falls from a large positive value to a smaller one we talk of *disinflation*. There was substantial disinflation in the early 1980s, with the annual rate falling from a peak of about 14 percent to around 2.5 percent.

Journalists sometimes mix up the concepts of increasing *prices* and increasing *inflation*. Consider this toy example:

year	P
1	100.0
2	105.0
3	110.0

We can see at a glance that inflation of 5 percent occurred between years 1 and 2. With the help of a calculator we can see that inflation between years 2 and 3 was $100 \times (110 - 105)/105 = 4.76$ percent: *prices* continued to rise but the *rate of inflation* fell (slightly).

Other price indices

The CPI is not the only price index in general use. We sometimes hear of the Producer Price Index or PPI: this is again based on the price of a "basket" of goods, but in this case the basket is supposed to be representative of the purchases of "producers" (that is, firms rather than households).

In addition, *deflators* are often used, for example the GDP deflator: this is the ratio of nominal GDP to real GDP (times 100). Real GDP measures the "real" output of the economy, "purged" of inflation. So, if nominal (current price) GDP rises faster than real GDP that tells us that inflation must be going on. An example calculation is shown below. The basic data are US Nominal GDP (billions of current dollars) and Real GDP (billions of chained 2009 dollars). In the Deflator column we put $100\times$ Nominal/Real.

year	Nominal GDP	Real GDP	Deflator
2013	16663.2	15583.3	106.93
2014	17348.1	15961.7	108.69

The *increase* in the deflator between 2013 and 2014 tells us that a certain amount of inflation took place; we can calculate the rate as $100 \times (108.69 - 106.93)/106.93 = 1.6$ percent.

The deflator concept can also be applied to *components* of the GDP, for example consumer spending. Wherever we can measure both a nominal and a "real" value, we can form a deflator by taking the ratio of nominal to real. The deflator for consumer spending is noteworthy because it forms the basis for the measure of inflation that is favored by the US Federal Reserve.[1]

What's wrong with inflation?

It is generally reckoned that rapid inflation is a problem—and central banks the world over are charged with keeping inflation low—but what exactly is the problem?

At first sight the answer may seem perfectly obvious: if prices rise, people's dollars will buy less and their standard of living will suffer. But this ignores what is perhaps the most important insight in macroeconomics, namely, that everyone's expenditure is someone else's income (and vice versa). It's not possible for everyone to lose out by inflation: if some people are *paying* higher prices, others are *receiving* higher prices.

However, inflation can *redistribute* real income and wealth. If prices rise faster than wages, then wage-earners lose out to recipients of profits. In addition, lenders may lose out to borrowers, because the dollars owed by the borrowers to the lenders fall in real value or "purchasing power."

Another problem with fast inflation is that "economic calculation" becomes more problematic. By economic calculation we mean, for instance, the re-balancing of consumer spending by households in light of what's a "good deal" and what's expensive, and also the re-balancing of production by firms—producing more of what's relatively profitable and less of what's not so profitable. This sort of calculation depends on a knowledge of *relative prices* (what's expensive or profitable relative to what else). If the *absolute level* of prices is changing rapidly—and in particular if it's changing at a rapid and variable rate—it becomes difficult to extract the "signal" of relative price changes from the "noise" of ongoing inflation. So the efficiency of the market system is compromised.

So why not zero inflation?

A phrase widely used in stating the objectives of monetary policy is "price stability": central banks are supposed to aim to achieve price stability. One might think this should mean an inflation rate of zero, however

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[1] We'll have a lot to say about the Federal Reserve, or "Fed," later. For now I'll just note that it's the central bank of the USA. It is responsible for the formulation and execution of monetary policy, and one of its main charges is to maintain a low and stable rate of inflation.

in practice most policy-makers translate the phrase to mean a small positive rate (often 2 percent). Why?

For one thing, a little inflation helps "grease the wheels" of a market economy. As technology changes, and as the pattern of consumer demand evolves over time, productive resources have to be reshuffled across the various industries, and the most important of these resources is labor. Workers have to be induced to move to where their labor will be most productive, and to leave occupations or industries where they are less productive. In a market system, an important inducement is wage differentials: other things equal, workers will move to where they'll be better paid, and leave jobs where they're worse paid.

If we had zero inflation then the required wage differentials would likely involve *cutting* wages for workers in industries/occupations that have become relatively less productive. But if there's some ongoing inflation, it may be sufficient that workers in that situation don't get raises, or don't get much of a raise. Why should that make a difference? Well, it's a fact of life that people *really* don't like having their wages cut; that's taken as a painful slap in the face, and it's destructive of morale and productivity. Of course people don't like it if their wage fails to keep up with price inflation, but this is seen as much less of a personal affront and it's less damaging to employer–worker relations.

There's a second reason why some inflation can be helpful. We're not yet ready to understand it in detail, but here's a brief statement of the point.

- When a recession comes along, it may be possible for the monetary authority to boost the economy by cutting interest rates. But how much leeway they have to cut depends on the initial level of interest rates, because interest rates cannot go below zero.

- The average level of interest rates is positively related to inflation.

- So in a zero-inflation economy, on average interest rates would be quite low and there would be little scope to cut them further as a measure to counter recession.

Finally, since it's difficult to hit any target for inflation exactly, operating with a target of zero would mean that the economy is likely to experience *deflation* from time to time. For reasons that we'll get to later, deflation is generally regarded as particularly dangerous: it can lead to a downward spiral of falling prices, falling employment and financial disruption. So, better to minimize the risk of deflation by aiming on the positive side of zero.

2   Unemployment

In general terms, a person is defined as unemployed if he or she does not have a job but wants a job. More specifically, the standard measure of unemployment requires not just that the person *wants* a job, but that he or she is *actively seeking* employment. We'll return to the significance of this distinction below, but first we'll say a bit about the costs of unemployment and the main causes or categories of unemployment.

Costs of unemployment

Unemployment is rather obviously costly to the individual who becomes unemployed. He or she suffers a loss of income, and in addition, in a system like the US, may well lose health insurance—although this effect is somewhat mitigated by the Affordable Care Act. If unemployment persists, the household may be unable to keep up with mortgage or rental payments and have to move to cheaper housing or even become homeless. Moreover, people tend to define themselves by "what they do"—that is, by what their work is. In the absence of work they become prey to stress, depression and ill-health.

From a social point of view, too, unemployment is costly: it means that the economy is producing less than it's capable of—lost output.

Nonetheless, even in a well functioning peace-time economy we don't expect to see a zero rate of unemployment. This can be understood by examining the categories of unemployment.

Categories of unemployment

It's common to divide unemployment into three categories as follows.

- "Frictional": by this we mean short-term unemployment that arises when individuals move—either geographically, or between occupations, or from full-time education into the workforce. In these cases we don't expect (most) people to move straight into a suitable job. There will likely be a period of "search" as the individual tries to find work that matches his or her skills and training.

- "Structural": here we mean unemployment due to the economic decline of an existing industry or region. Workers are going to have to move, but the skills or training that suited them to their previous employment may not be much in demand any more. They may have to retrain to find new employment. And workers near to the end of their careers may have particular difficulty finding a new job.

- "Cyclical" or "demand-deficient": this is unemployment due to a shortfall or deficiency in the aggregate demand for goods and services in the economy (recessions, depressions). Think lay-offs of workers when firms find they can't sell enough of their product to justify keeping on their full workforce.

While demand-deficient unemployment arguably can be—and should be—zero in a well functioning economy, frictional and structural employment will never be zero in a dynamic economy with changing technology and opportunities. The rate of unemployment that we'd expect to see if there were no shortfall in aggregate demand is sometimes called the "natural rate." It's generally agreed that this is above zero, but an actual value cannot be given with certainty. Is it 5 percent, 4 percent, maybe even 3 percent? Opinions differ.

The unemployment rate and discouraged workers

Let's return to the issue mentioned at the start of this section. Let u denote the unemployment rate; then the standard measure is

$$u = 100 \times \frac{\text{Number unemployed}}{\text{Size of workforce}} = 100 \times \frac{\text{Number unemployed}}{\text{Number employed} + \text{Number unemployed}}$$

where, as mentioned above, a person must be actively seeking work to count as officially unemployed.

Movements in u as defined above can sometimes be misleading. Consider a "toy" economy with a labor force of 1000 workers. Let's say it's in a depressed state with 100 workers unemployed. That corresponds to state A in the table below. Now, for one scenario, suppose that over the next year 50 of the unemployed workers find work: that gives state B below. For an alternative scenario, suppose that nobody who was unemployed finds a job, but 50 people give up looking for work, hence dropping out of the workforce. That's state C.

state	Unemployed	Employed	Workforce	u
A	100	900	1000	10.0%
B	50	950	1000	5.0%
C	50	900	950	5.3%

Now notice that if we just look at u, state C looks "almost as good" as state B. But in fact C represents a dismal case: 5 percent of the original workforce have been discouraged to the point of giving up the search. Maybe they still want work, but it seems hopeless.

When the rate of unemployment falls this *may* be good news, but we want some more information before we jump to that conclusion. As a first approximation, we want to know what's happened to the size of the workforce. But in the real world it's more complicated, since the population may have grown (or shrunk) and moreover the fraction of the population that is of working age might have changed.