In this lecture, we consider the joint determination of unemployment and inflation, using the AD/AS framework.

First, some background on unemployment.

Unemployment rates are calculated as the percentage of the labor force that is either temporarily laid off or actively looking for work. The labor force is defined as the unemployed plus the employed.
Some important points about unemployment:

1. The measured numbers do not include individuals who have left the labor force. These are known as discouraged workers.

2. The measured numbers include frictional unemployment. This is unemployment that is an inevitable consequence of the process by which workers are matched to jobs through search.

Important message: the unemployment rate will never be 0.
Important Concepts:

**Natural Rate of Unemployment.** Roughly speaking, this is the level of unemployment that one would expect to occur in the presence of wage and price flexibility.

**Cyclical Unemployment.** This constitutes deviations from the natural rate. The notion of cyclical means that it is expected to reverse itself over time.
**Okun’s Law:** Okun’s Law represents the relationship between GDP growth and changes in unemployment. Following Blanchard *Macroeconomics* (Prentice Hall, 2000, pg. 168) let $g_t$ denote the per capta GDP growth rate between $t$ and $t+1$ and $u_t$ the unemployment rate. Okun’s law takes the approximate form:

$$u_{t+1} - u_t = -0.4(g_t - 0.3)$$
What this means is that for deviations of growth above 3%, a one percentage increase in per capita output growth lowers unemployment by .4%.

Why is this relationship not 1 to 1? One would think that a one percentage point increase in growth would lower unemployment by one percent.
One reason has to do with labor hoarding. There are costs associated with hiring and firing that lead firms to smooth employment decisions. This leads to overstaffing in recessions and understaffing in booms, relative to what is predicted by a costless labor adjustment model.

A second reason is that labor force participation is procyclical. This means there are more potential workers in booms.
The Phillips Curve

The Phillips curve represents the short run tradeoff between unemployment and inflation. Under the assumption that a policymaker desires low inflation and low unemployment; the Phillips curve represents the tradeoffs the policymaker must address. A hypothetical Phillips curve is described in Figure 1. Note that $\pi_t$ denotes inflation between $t$ and $t+1$.

The nature of the Phillips curve is still studied in current macroeconomic research. The analysis involves tools and concepts beyond the level of this course, so I can only sketch basic ideas.
Figure 1
Hypothetical Phillips Curve
Some source of the Phillips curve may be identified from our AD/AS model. Consider the basic downward nominal wage rigidity model, depicted in Figure 2.

If aggregate demand shifts from $\text{AD}_0$ to $\text{AD}_1$, two effects occur. First, there is output growth. Second, there is price growth. This means that there is positive relationship between output growth and inflation. By Okun’s Law, output growth is associated with lower unemployment. Hence the cost of lowering the unemployment rate is an increase in the inflation rate.
Figure 2

Inflation/output growth tradeoff in AD/AS model for the short run
Notice that this explanation of the Phillips curve makes clear why it is a short run phenomena. If we consider a world where all prices and wages are flexible, as in Figure 3, then changes in the price level (inflation) do not have output effects and hence do not have unemployment effects.

This illustrates another idea, namely the basic role of money supply growth in determining inflation in the long run. A constant money growth rate, in our model, will in the long run produce an equal long run inflation rate.
Figure 3

Absence of inflation/output growth tradeoff in AD/AS model for the long run
Expectations and the Aggregate Supply Schedule

The relationship between inflation and unemployment that I have described is not adequate for explaining inflation/unemployment dynamics as have been observed historically in the US and elsewhere. Why? The analysis in Figure 2 explains why a reduction in the unemployment rate will be associated higher inflation. It does not fully explain why lower levels are associated with higher inflation.
This requires us to consider one final model of aggregate supply. The idea of this AS schedule is that firms will produce more when prices are higher than expected. This expectations-based AS curve is:

\[ Y_t = Y_t^* + a(P_t - P_t^e) \]

Note: \( P_t^e \) is the subjective, not mathematical expected value of the price level. This is also known as the \textbf{misperceptions} model. The idea is that if a firm is able to charge more than expected, it misperceives this as an increase in the relative price of its output (relative to costs of production).
Now, suppose that expectations are “myopic”; this means that

$$P_t^e = P_{t-1}$$

This implies that the aggregate supply level may be written as

$$Y_t = Y_t^* + a(P_t - P_{t-1})$$

If we approximate the change in prices by the inflation rate, (ie. $\pi_t \approx P_t - P_{t-1}$), then

$$Y_t = Y_t^* + a(\pi_{t-1})$$
This gives us a steady state tradeoff between inflation and the output level and hence, inflation and the level of unemployment.

In this model, aggregate demand can, in principle, be manipulated to choose $\pi_{t-1}$, which produces a certain output level and hence unemployment level.
From the perspective of economic reasoning, the assumption of myopic beliefs is problematic. It is one think to say that individuals are not completely rational; it is another to say they make systematic errors of the type embedded in this model.

Much of modern macroeconomic research has been involved in modeling aggregate economic dynamics under the assumption of *rational expectations*, which basically means under the assumption that agents’ beliefs are consistent with the probabilities that actually characterize the economy.
Returning to our more general misperceptions based aggregate supply schedule

\[ Y_t = Y_t^* + a \left( \pi_{t-1} - \pi_{t-1}^e \right) \]

As before, the policymaker may be thought of as choosing \( \pi_{t-1} \). However, the effects of the policy will depend on how the policy affects \( \pi_{t-1}^e \).

This last question is hard and should be reserved for your next macro course!
One example: if the government announces it will choose a certain $\pi_{t-1}$ so that the public forms beliefs of the form $\pi^e_{t-1} = \pi_{t-1}$, then the choice of $\pi_{t-1}$ will have no effects.

But remember, this assumes that the AS curve takes the misperceptions form, i.e. prices and wages are flexible.