

Note: Aggregate Supply & Aggregate Demand, Unemployment-Inflation rate relationship, CPI

Aggregate Demand (AD)

Recalls “The Theory of Short-Run Fluctuations” from handout 3, we now know that the *IS-LM* curves together yield *IS-LM* model, which explains the aggregate demand curve. We use the *IS-LM* model to show why national income falls as the price level rises. In other words, the *AD* is downward sloping.

To explain why the *AD* curve slopes downward, we examine what happens in *IS-LM* model when the price level changes. For any given money supply *M*, a higher price level *P* reduces the supply of real money balances *M/P*. A lower supply of real money balance shifts the *LM* curve upward, which raises the equilibrium interest rate and lowers the equilibrium level of income. Here the price level rises from *P*₁ to *P*₂, and income falls from *Y*₁ to *Y*₂. Therefore, the *AD* curve plots this negative relationship between national income and the price level.

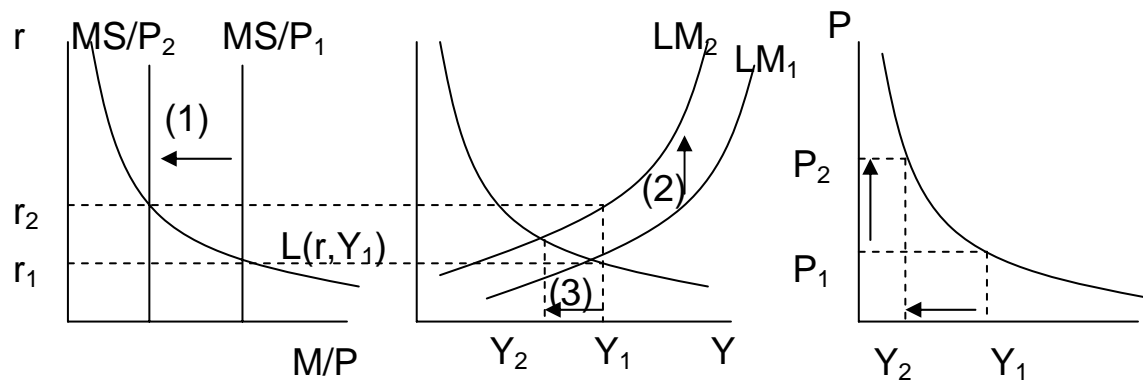


Figure 1

The aggregate demand curve describes a relationship between the price level and the level of national income. This relationship also was derived from the quantity theory of money, $MV = PY$. *M* is the money supply, *V* is the velocity of money, *P* is the price level, and *Y* is the amount of output. The analysis showed that for a given money supply, a higher price level implies a lower level of income. Increases in the money supply shift the aggregate demand curve to the right and vice versa.

Because the *AD* curve is only a summary of results from the *IS-LM* model, events that shift the *IS* curve or *LM* curve (for a given price level) cause the *AD* curve to shift. An increase in money supply raises income in the *IS-LM* curve model for any given price level; it thus shifts the *AD* curve to the right as show in Figure 2.

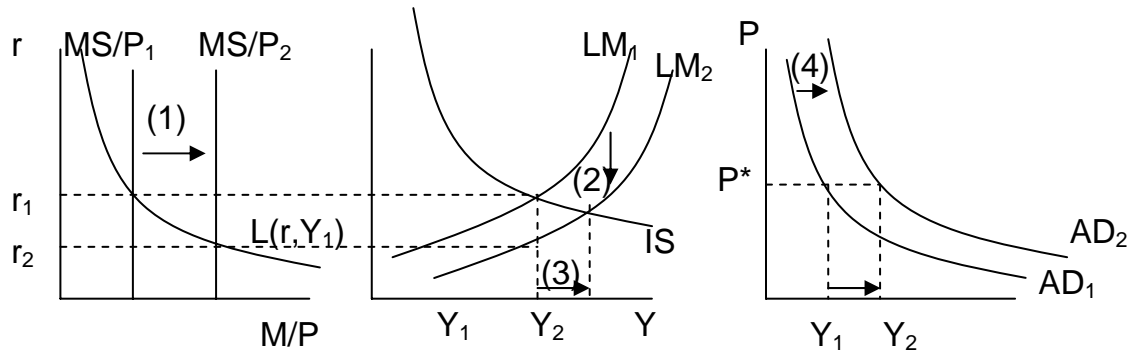


Figure 2

Similarly, an increase in government purchases or a decrease in taxes raises income in the *IS-LM* model for a given price level; it also shifts the aggregate demand curve to right, as show in Figure 3. Conversely, a decrease in the money supply, a decrease in government spending, or an increase in taxes lowers income in the *IS-LM* model and shifts the AD curve to the left.

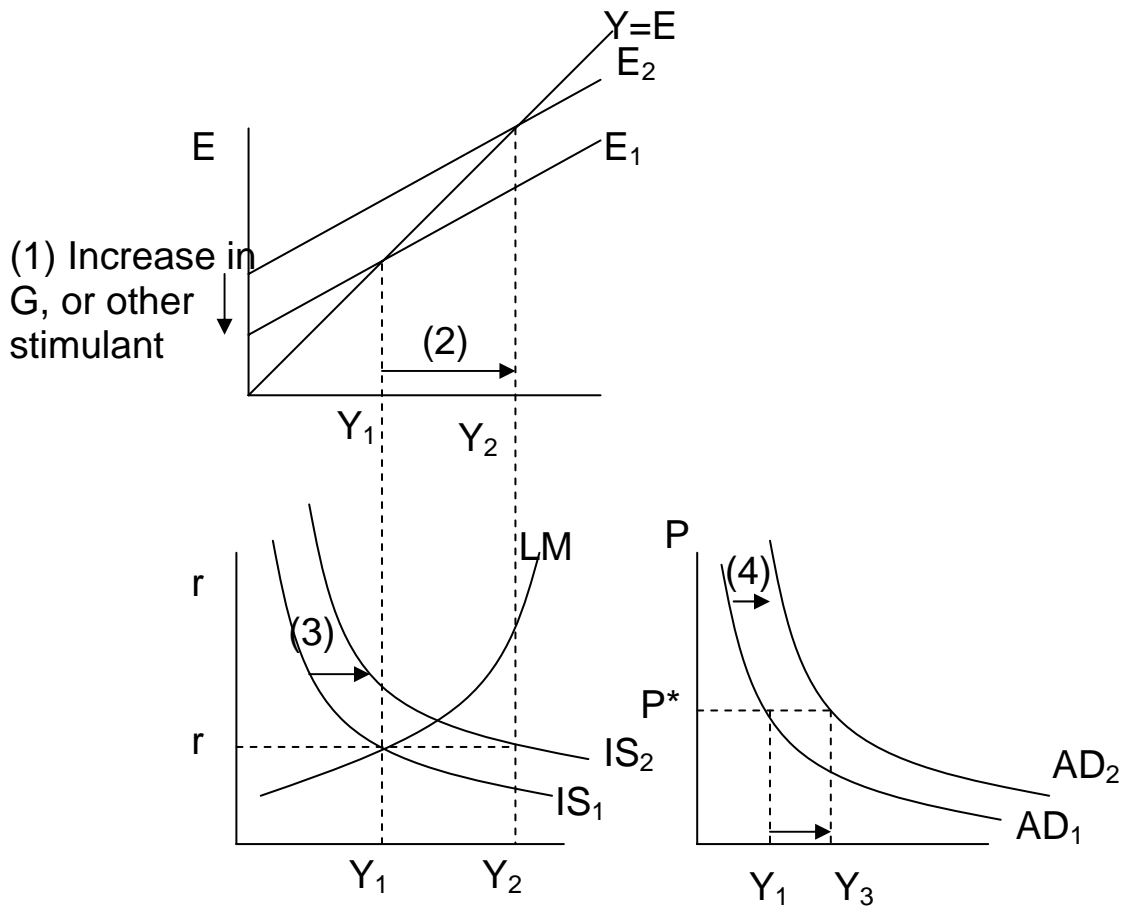


Figure 3

Aggregate Supply (AS)

Aggregate supply (AS) is the relationship between the quantity of goods and services supplied and the price level. Because the firms that supply goods and services have flexible prices in the long run but sticky price in the short run, the AS relationship depends on the time horizon. Because the classical model describes how the economy behaves in the long run, we derive the long-run aggregate supply curve from the classical model. Based on the classical model, output does not depend on the price level. To show that output is the same for all price levels, we draw a vertical aggregate supply curve. When the aggregate supply curve is vertical, shifts in the *AD* curve affect the price level, but the output of the economy remains at its natural rate.

The short run aggregate supply curve is upward sloping, rather than vertical, and shifts in the *AD* curve causes the level of output to deviate temporarily from the natural rate. There are several models explain how to derive the AS curve. Although each model takes us down a different theoretical route, each rout ends up in the same place. That final destination is a short run aggregate supply equation of the form

$$Y = \bar{Y} + \alpha(P - P^e), \quad \alpha > 0$$

where Y is output, \bar{Y} is the natural rate of output, P is the price level, and P^e is the expected price level. This equation states that output deviates from its natural rate when the price level deviates from the expected price level. The parameter α indicates how much output responds to unexpected changes in the price level; $1/\alpha$ is the slope of AS curve.

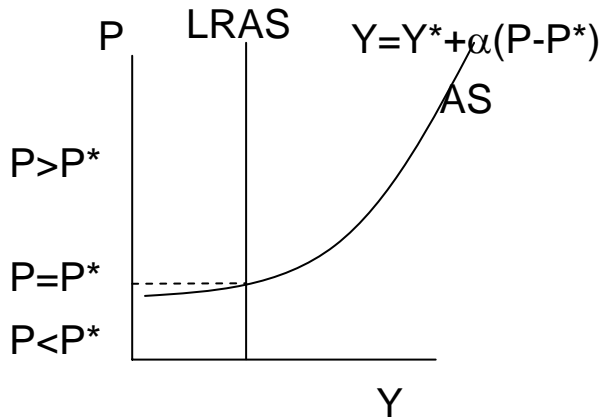


Figure 4

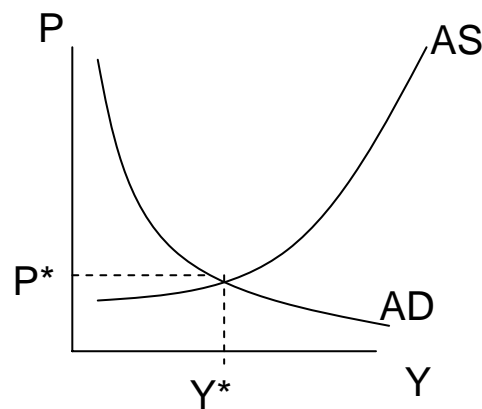


Figure 5

The aggregate demand and supply curves together pin down the economy's price level and quantity of output.

Inflation, Unemployment, and the Phillips Curve

Inflation is a rising general level of prices. This does not mean that all prices are rising. Even during periods of rapid inflation, some prices may be relatively constant and others falling. The rate of inflation (π) can be calculated as

$$\pi = (P_{t+1} - P_t) / P_t$$

The tradeoff between inflation and unemployment, called the *Phillips Curve*. The Phillips curve is a reflection of the short-run AS curve: as policy makers move the economy along the short-run AS curve to the point of higher output and higher price.

Higher output means lower unemployment, because firms need more workers when they produce more. A higher price level, given the previous year's price level, means higher inflation. Therefore, as the economy moves along the short run AS curve, an unemployment and inflation moves in opposite directions.

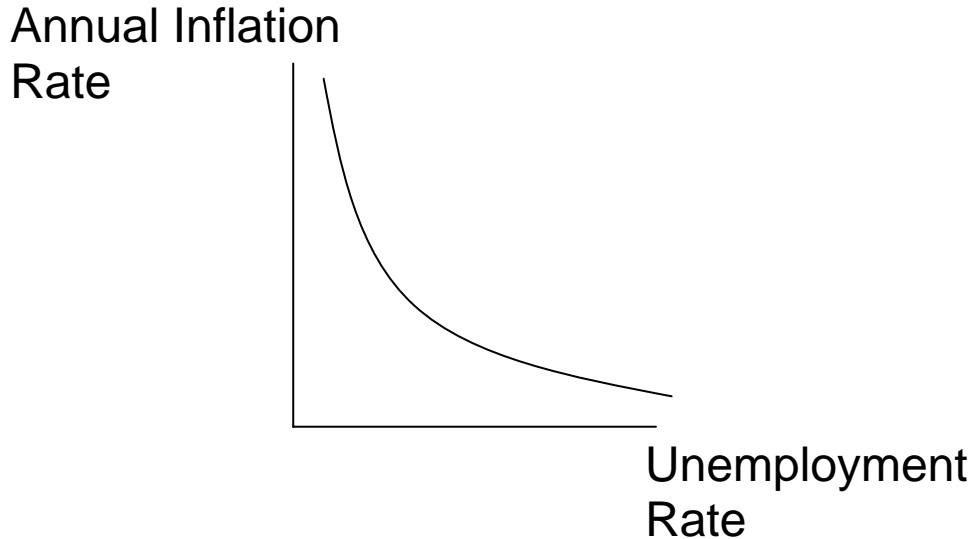


Figure 6

The Phillips curve in its modern form can be expressed as

$$\pi = \pi^e - \beta(u - u^n) + v$$

where π^e is the expected inflation, β is a parameter measuring the response of inflation to cyclical unemployment, $(u - u^n)$ the deviation of unemployment from the natural rate, called *cyclical unemployment*, and v is the supply shock.

According to the Phillips Curve equation, unemployment is related to unexpected movements in the inflation rate. A simple and often plausible assumption is that people form their expectations of inflation based on recently observed inflation. This assumption is called adaptive expectations. If people expect prices to rise this year at the same rate as they did last year. Then $\pi^e = \pi_{t-1}$.

The second component of the Phillips curve shows that low unemployment pulls the inflation rate up. This is called **demand-pull inflation** because high AD is responsible for this type of inflation. The third component, v , shows that inflation also rises and falls because of supply shocks. An adverse supply shock, such as the rise in world oil price in the 1970s, implies a positive value of v and causes inflation to rise. This is called **cost-push inflation** because adverse supply shocks are typically events that push up the costs of production.

Figure 7 plots the short-run tradeoff between inflation and unemployment. When unemployment is at its natural rate ($u = u^n$), inflation depends on expected inflation and the supply shock ($\pi = \pi^e + v$).

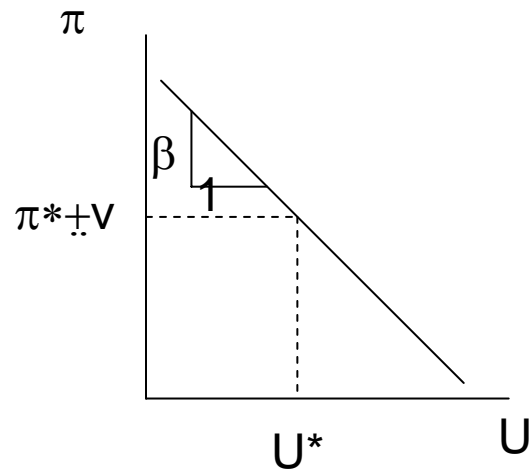


Figure 7

Consumer Price Index (CPI)

CPI is a statistical measure of a weighted average of prices of a specified set of goods and services purchased by wage earners in urban areas. It is a price index which tracks the prices of a specified set of consumer goods and services, providing a measure of inflation. The CPI can be used to track changes in prices of all goods and services purchases for consumption by urban households.

Measuring inflation can be done in different ways. One is using the weightings of goods and services of a base year.

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