

Ch.5 Aggregate Supply and Demand

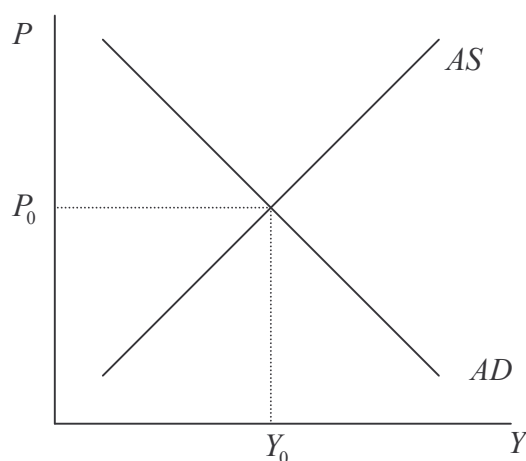
I. Introduction

We studied an economy when the goods and services markets are simultaneously in equilibrium given prices. However, prices are also changed over time. In this chapter, we will derive the price-output relation (Aggregate demand) from the IS-LM framework and will study the equilibrium in AD-AS framework. Also, we will discuss assumptions about aggregate supply, which are the heart of debate in modern macroeconomics.

II. Equilibrium in the macro economy

1. Goods (and services) markets in equilibrium: supply of goods equals aggregate demand for goods at the given price \rightarrow IS curve
2. Money market in equilibrium: supply of money equals the demand for money at the given price \rightarrow LM curve
3. Aggregate supply and demand in equilibrium: the price level is such that firms are willing to supply the level of goods that clear the goods and money markets are that price

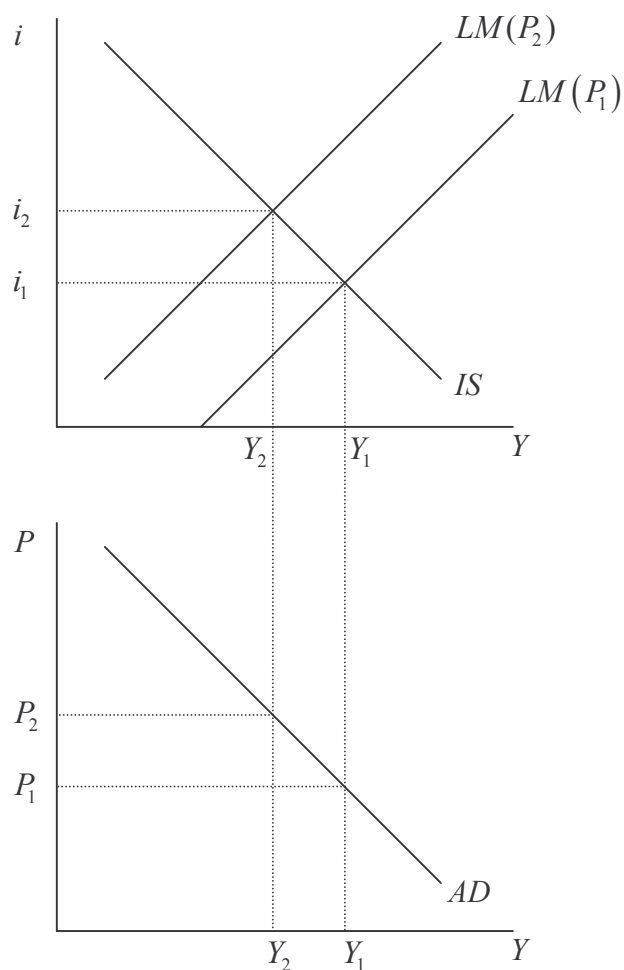
Simple example of AD and AS diagram



III. Aggregate Demand

- A. The aggregate demand (AD) curve shows the combinations of the price level and level of output at which the goods and money markets are simultaneously in equilibrium.
- The IS- LM model determines the output and interest rate levels that simultaneously clear the money and goods markets for the price. However, with a different price level, there will be a different equilibrium and a different level of aggregate demand and income.

B. Graphical derivation of AD curve



C. Algebra of AD curve

Goods market is in equilibrium: IS curve (see Ch. 10)

$$Y = \alpha_G (\bar{A} - bi) \quad \text{where } \bar{A} = \bar{C} + c\bar{TR} + \bar{I} + \bar{G} + \bar{NX} \quad \text{and} \quad \alpha_G = \frac{1}{1 - c(1 - t)}$$

Money market is in equilibrium: LM curve (see Ch. 10)

$$i = \frac{1}{h} \left(kY - \frac{\bar{M}}{\bar{P}} \right)$$

Since the goods and money markets are simultaneously in equilibrium, we can derive the AD curve by combining IS and LM curves. The obtained AD curve is:

$$Y = \frac{h\alpha_G}{h + kb\alpha_G} \bar{A} + \frac{b\alpha_G}{h + kb\alpha_G} \frac{\bar{M}}{\bar{P}}$$

or equivalently

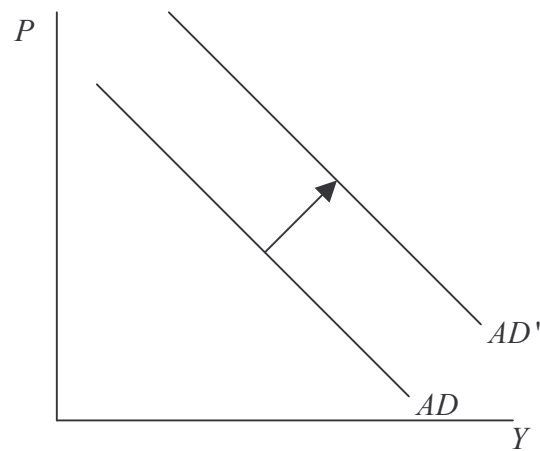
$$Y = \gamma \bar{A} + \gamma \frac{b}{h} \frac{\bar{M}}{\bar{P}} \quad \text{where } \gamma = \frac{h\alpha_G}{h + kb\alpha_G} \quad (1)$$

This formula shows the relation between level of output (Y) and the price level (P) for given levels of \bar{A} and \bar{M} . For the more detail discussion, refer Ch. 10-5. You don't need to memorize this formula but should understand how policy factors affect the AD curve.

D. Property of AD

- i. Downward slope
 - Notice that P in formula (1) is in the denominator. This is, when P increases, Y decreases. Conversely, when Y decreases, P increases.
- ii. Factors affecting AD curve
 - Increase in money supply: $\bar{M} \uparrow$

Given P, Y (output) increases \rightarrow AD curves shifts out



- Increase in autonomous spending (or any change that increases autonomous spending: e.g. increase in government spending): $A \uparrow$

Given P, Y (output) increases \rightarrow AD curves shifts out

- Some factors affect the slope of AD:

Consider the equation (1) as an equation in Y and P. The slope of AD

curve is related to the size of $\gamma \frac{h}{b} \left(= \frac{b\alpha_G}{h + kb\alpha_G} \right)$. As $\gamma \frac{b}{h}$ gets larger,

AD will be more flat (P has a larger effect on Y).

AD is flatter

(1) the smaller the interest responsiveness of the demand for money (h)

(2) the larger the interest response of investment (b)

(3) the larger the multiplier ($\alpha_{\{G\}}$)

(4) the smaller the income response of money demand (k)

IV. Aggregate Supply (AS)

- The aggregate supply curve describes the combinations of output and the price level at which firms are willing, at the given price level, to supply the given

quantity of output.

B. Property of AS

Typical AS curve is upward sloping as a function of price

i. Slope of AS

- Flat AS implies small price effects of changes in AD (and large output effects)

Extreme case: horizontal AS curve (Keynesian AS curve)

- Steep AS implies small output effects of changes in AD (and large price effects)

Extreme case: vertical AS curve (Classical AS curve)

ii. Factors affecting AS

- (1) Technology
- (2) Input price
- (3) Fixed inputs in the short run

V. Keynesian AS vs. Classical AS

A. The Keynesian aggregate supply curve

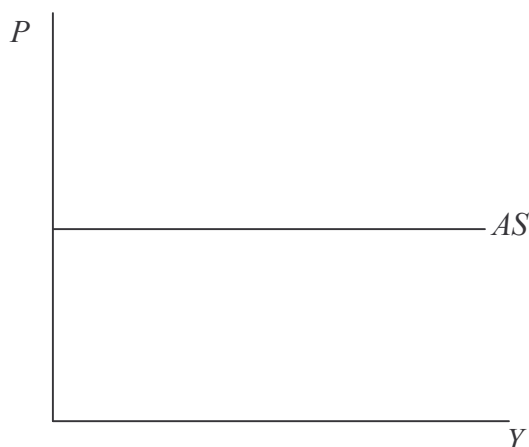
- i. The Keynesian aggregate supply curve is horizontal, indicating that firms will supply whatever amount of goods is demanded at the existing price level.

ii. Rationale

Because there is some unemployment in the economy, firm can hire as much labor as they want at the current wage. Without increase in input costs as output expands, firms can supply any amount of output at the going price, The wage does not fall even though there is excess demand, since the Keynesian model assumes that wages are sticky downward. Price is also assumed to be

sticky.

- iii. A reasonable approximation in the short-run analysis.



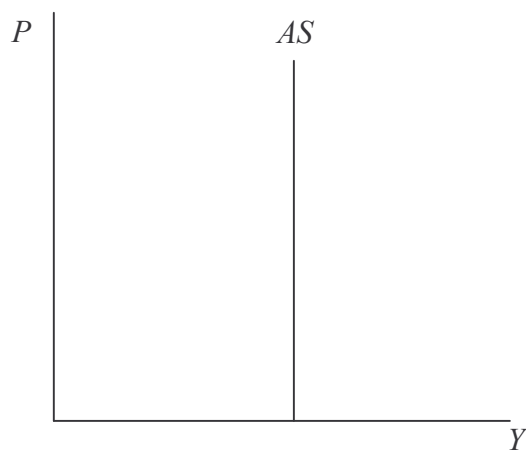
B. The Classical Aggregate supply curve

- i. The classical aggregate supply curve is vertical, indicating that the same amount of goods will be supplied whatever the price level.
- ii. Rationale

If wages and prices are fully flexible, then the labor market will always be in equilibrium with full employment. Firms will attempt to produce more output by hiring more workers. For example, if AD increases, firms will attempt to produce more output by hiring more workers. Since employment is already full, they will have to raise wages to lure workers away from other firms. Wages are bid up and so firms will attempt to raise prices to compensate. Output, however, will remain unchanged. The point is that workers and firms both look at both wage and price levels so that with full employment if wages rise, so will prices and vice versa.
- iii. A reasonable approximation in the long-run analysis.

Note: Although the Classical AS assumes no unemployment (that is, labor market is in equilibrium), there exists some amount of frictional unemployment called natural

rate of unemployment. The natural rate of unemployment is the rate of unemployment arising from normal labor market frictions that exist when the labor market is in equilibrium.

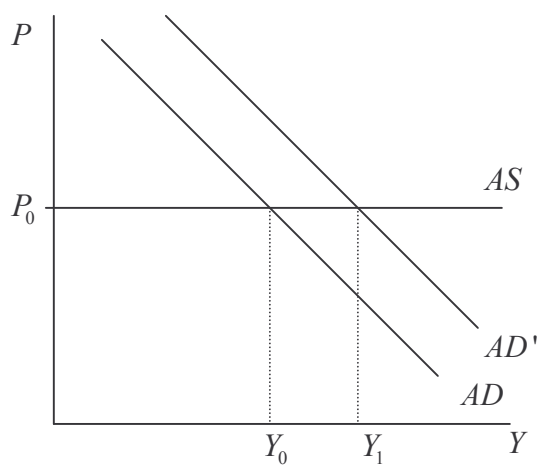


VI. AD-AS analysis: Monetary and Fiscal Policy

A. Expansionary fiscal or monetary policy

- AD shifts out

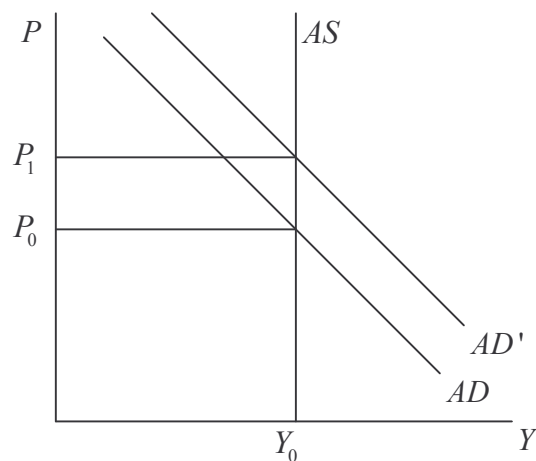
i. Keynesian case (short-run)



- Maximum increase in output

- No change in price: no inflation or deflation

ii. Classical case (long-run)



- No change in output
- Only price increases

Note: maximum crowding out effect of the expansionary fiscal policy

VII. Self-study

- Supply-side economics (Ch. 5-4)
- AS-AD analysis for restrictive fiscal or monetary policy
- Change in interest rate due to fiscal/monetary policies in the Keynesian or the Classical case.