Aggregate Supply and Demand

Chapter #5

Introduction

- The last few chapters have detailed models of long run economic growth → now turn to short run fluctuations in the economy that constitute the business cycle
- The AS/AD model is the basic macroeconomic tool for studying output fluctuations and the determination of the price level and the inflation rate
  - Can be used to explain how the economy deviates from a path of smooth growth over time, and to explore the consequences of government policies intended to reduce unemployment and output fluctuations, and maintain stable prices

AS and AD

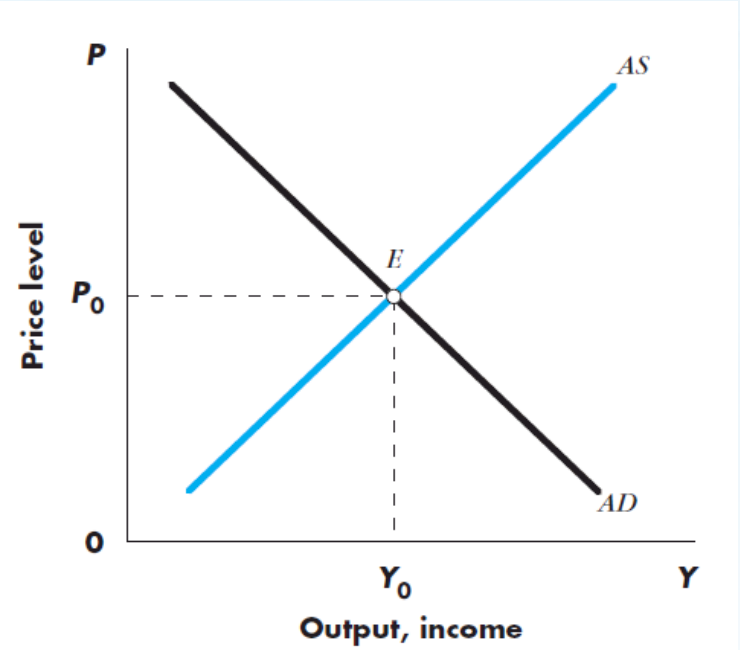
- Aggregate supply curve describes, for each given price level, the quantity of output firms are willing to supply
  - Upward sloping since firms are willing to supply more output at higher prices
- Aggregate demand curve shows the combinations of the price level and the level of output at which the goods and money markets are simultaneously in equilibrium
  - Downward sloping since higher prices reduce the value of the money supply, which reduces the demand for output
- Intersection of AS and AD curves determines the equilibrium level of output and price level

AS, AD, and Equilibrium

- AS and AD intersect at point E in Figure 5-1

→ Equilibrium: AS = AD

  - Equilibrium output is Y_0
    - Observed level of output in the economy at particular point in time
  - Equilibrium price level is P_0
    - Observed price level in the economy at particular point in time



AS, AD, and Equilibrium

- Shifts in either the AS or AD schedule result in a change in the equilibrium level of prices and output
  - Increase in AD → increase in P and Y
  - Decrease in AD → decrease in P and Y
  - Increase in AS → decrease in P and increase in Y
  - Decrease in AS → increase in P and decrease in Y

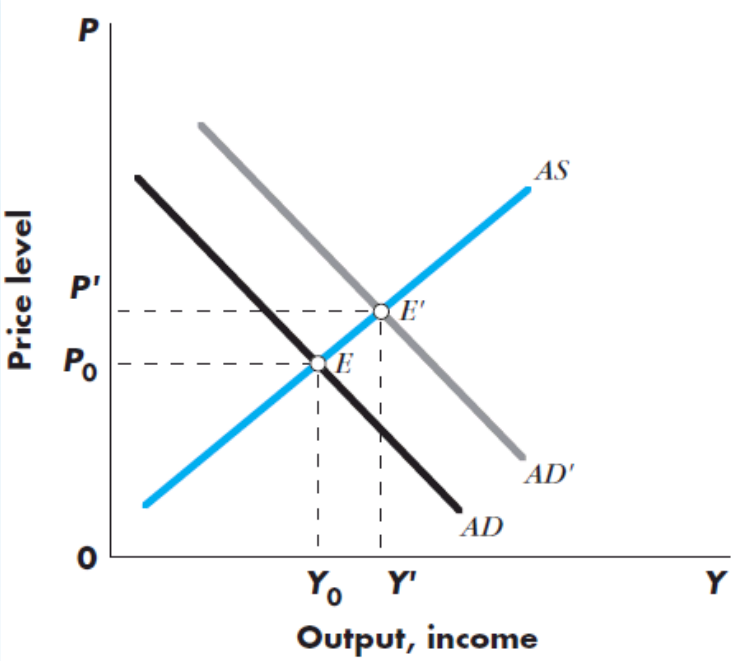


Figure 5-2 illustrates an increase in AD resulting from an increase in money supply

AS, AD, and Equilibrium

→ The amount of the increase/decrease in P and Y after a shift in either aggregate supply or aggregate demand depends on:

1. The slope of the AS curve
2. The slope of the AD curve
3. The extent of the shift of AS/AD

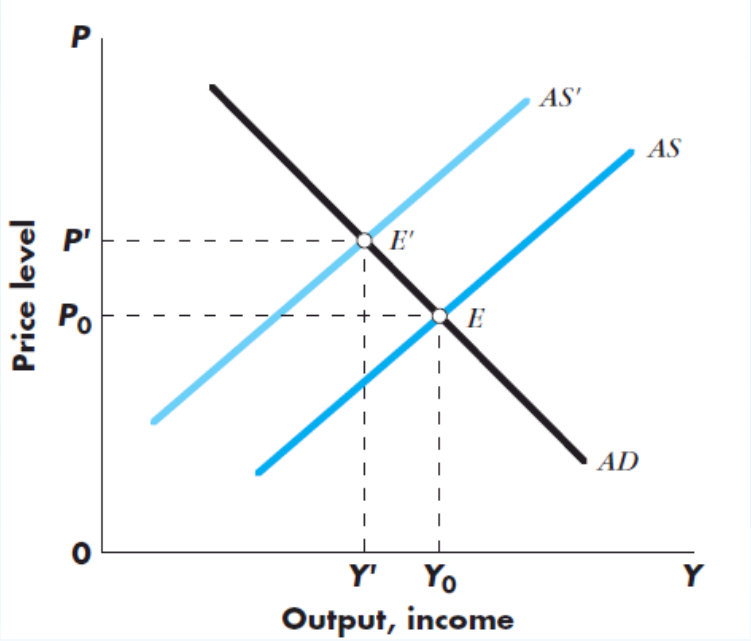
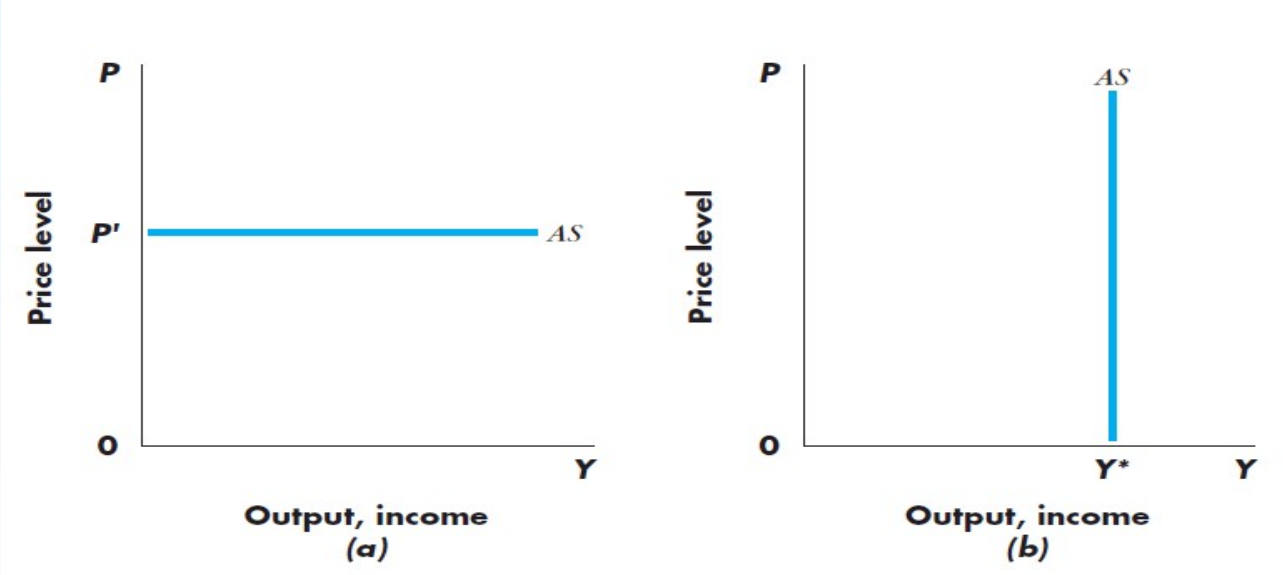


Figure 5-3 shows the result of an adverse AS shock: ↓AS → ↓Y, ↑P

Classical Supply Curve

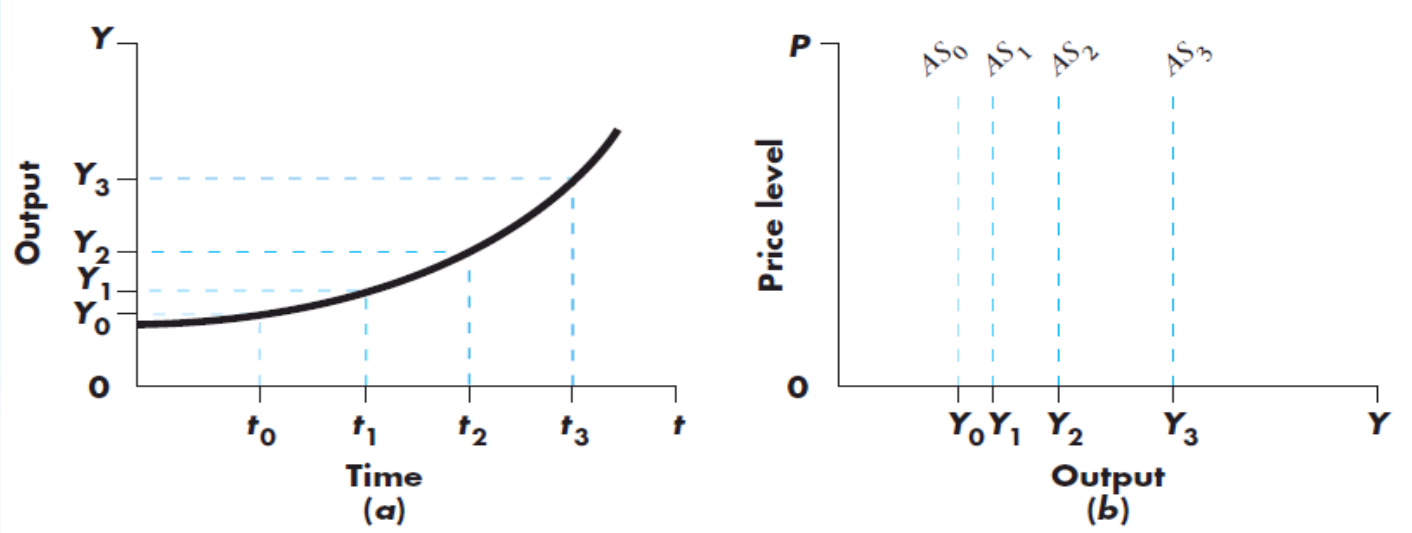
- The classical supply curve is vertical, indicating that the same amount of goods will be supplied, regardless of price [Figure 5-4 (b)]
  - Based upon the assumption that the labor market is in equilibrium with *full employment* of the labor force
  - The level of output corresponding to full employment of the labor force = potential GDP, Y*



Classical Supply Curve

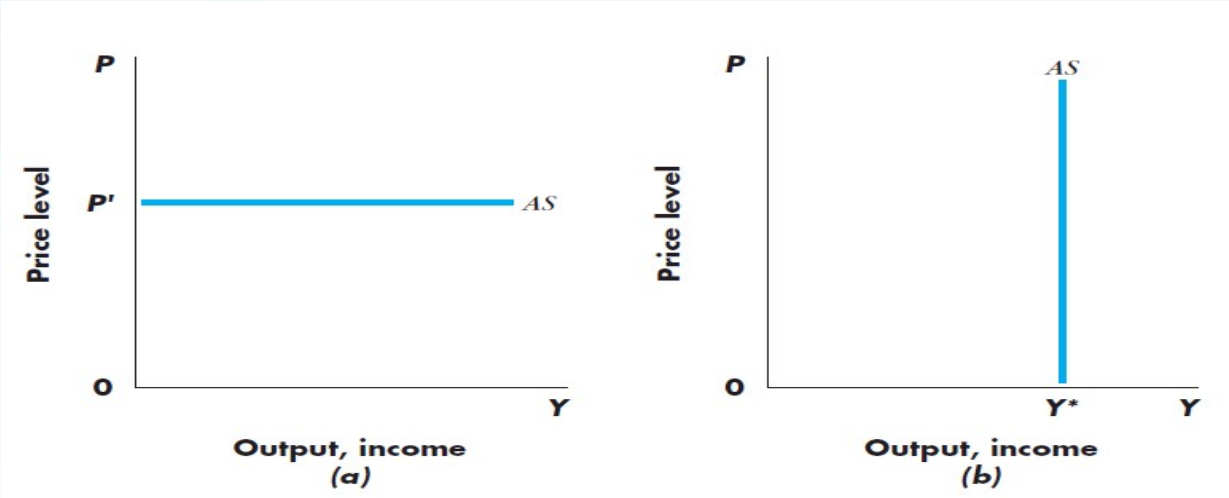
- Y* grows over time as the economy accumulates resources and technology improves → AS curve moves to the right
  - The growth theory models described in earlier chapters explain the level of Y* in a particular period
- Y* is "exogenous with respect to the price level"

  → illustrated as a vertical line, since graphed in terms of the price level



Keynesian Supply Curve

- The Keynesian supply curve is horizontal, indicating firms will supply whatever amount of goods is demanded at the existing price level [Figure 5-4 (a)]
  - Since unemployment exists, firms can obtain any amount of labor at the going wage rate
  - Since average cost of production does not change as output changes, firms willing to supply as much as is demanded at the existing price level



Keynesian Supply Curve

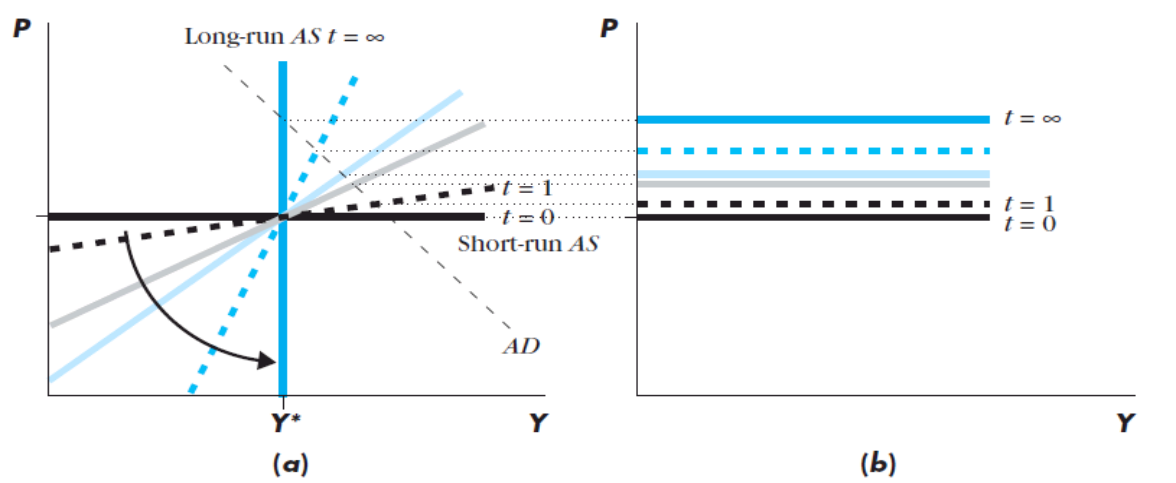
- Intellectual genesis of the Keynesian AS curve is found in the Great Depression, when it seemed firms could increase production without increasing P by putting idle K and N to work
- Additionally, prices are viewed as "sticky" in the short run → firms reluctant to change prices and wages when demand shifts
  - Instead firms increase/decrease output in response to demand shift → flat AS curve in the short run

Frictional Unemployment and the Natural Rate of Unemployment

- Taken literally, the classical model implies that there is no involuntary unemployment → everyone who wants to work is employed
  - In reality there is some unemployment due to frictions in the labor market (Ex. Someone is always moving and looking for a new job)
- The unemployment rate associated with the full employment level of output is the natural rate of unemployment
  - Natural rate of unemployment is the rate of unemployment arising from normal labor market frictions that exist when the labor market is in equilibrium

AS and the Price Adjustment Mechanism

- AS curve describes the price adjustment mechanism within the economy
  - Figure 5-6 shows the SRAS curve in black and the LRAS in blue, and the adjustment from the SR to the LR
- The AS curve is defined by the equation: $P_{t+1} = P_t[1 + \lambda(Y - Y^*)]$ (1) where
  - P_{t-1} is the price level next period
  - P_t is the price level today
  - Y^* is potential output

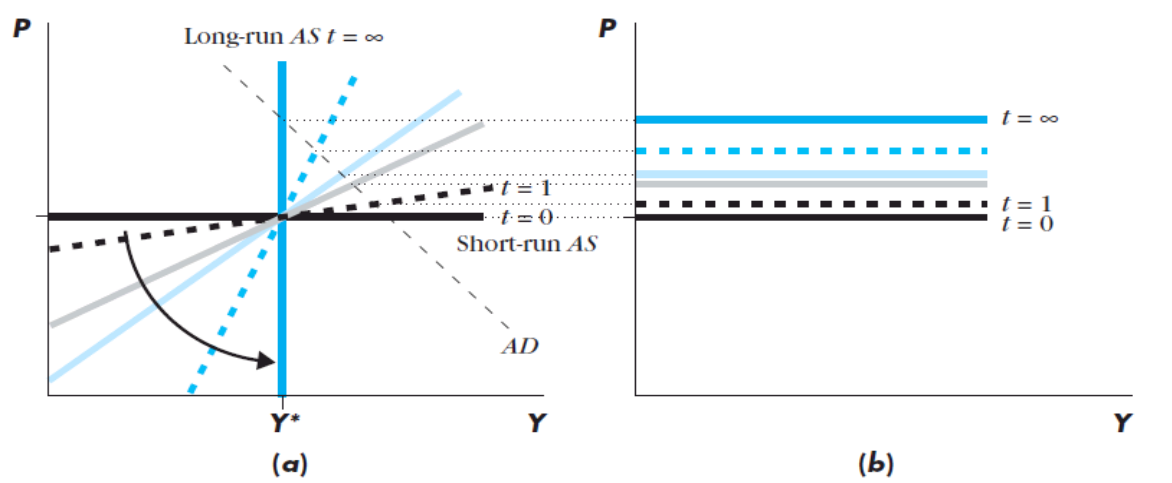


AS and the Price Adjustment Mechanism

$$P_{t+1} = P_t[1 + \lambda(Y - Y^*)] \quad (1)$$

- If output is above potential ($Y>Y^*$), prices increase, higher next period
- If output is below potential ($Y<Y^*$), prices fall, lower next period
- Prices continue to rise/fall over time until $Y=Y^*$
  - Today's price equals tomorrow's if output equals potential (ignoring price expectations)

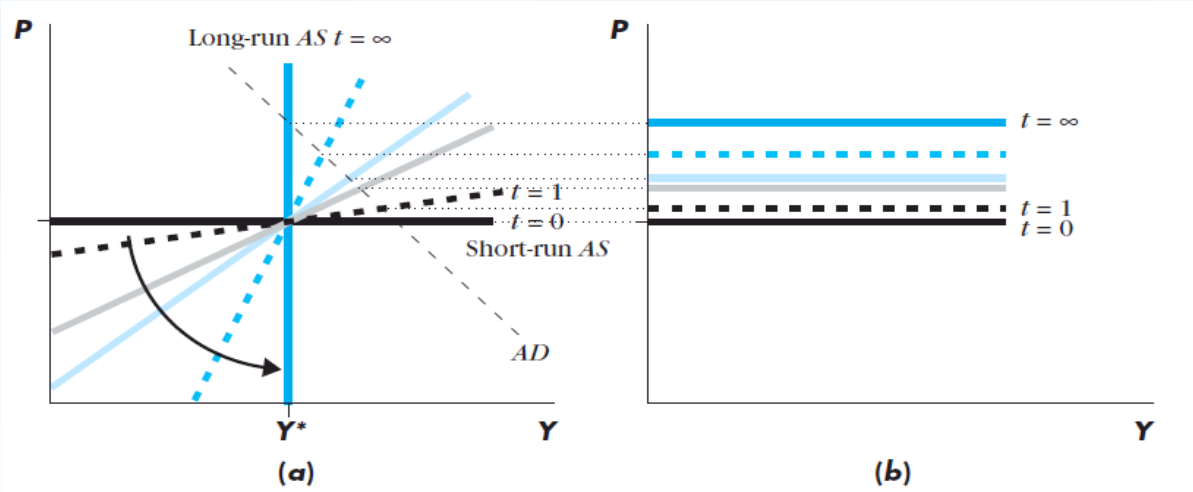
The difference between GDP and potential GDP, $Y-Y^*$, is called the output gap



AS and the Price Adjustment Mechanism

$$P_{t+1} = P_t[1 + \lambda(Y - Y^*)] \quad (1)$$

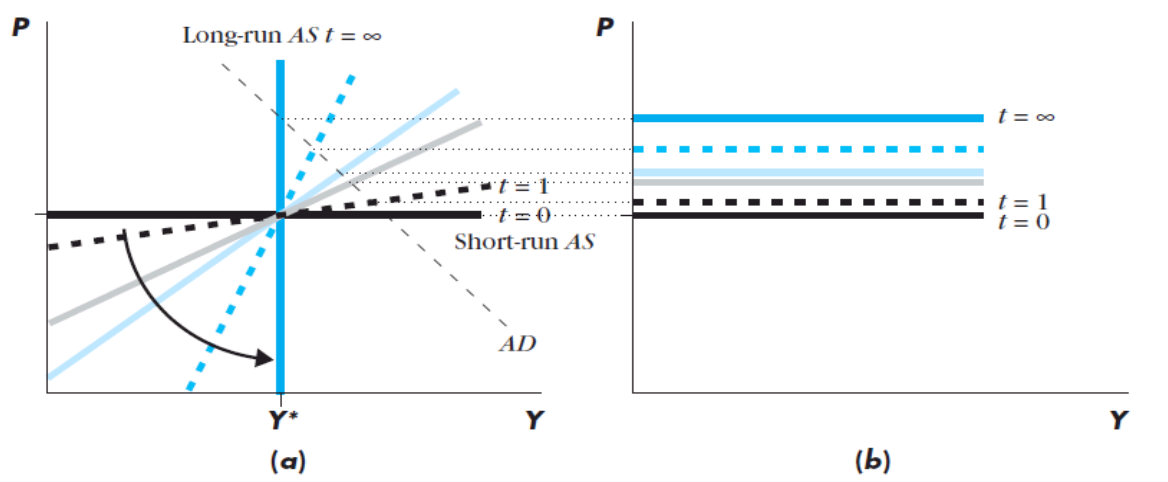
- Upward shifting horizontal lines in Figure 5-6 (b) correspond to successive snapshots of equation (1)
- Beginning with the horizontal black line at time t=0, at $Y>Y^*$, price higher (AS shifting up) by t=1
- Process continues until $Y=Y^*$



AS and the Price Adjustment Mechanism

$$P_{t+1} = P_t[1 + \lambda(Y - Y^*)] \quad (1)$$

- Speed of the price adjustment mechanism controlled by the parameter λ
  - If λ is large, AS moves quickly (the counter clock-wise rotations in Figure 5-6 (a))
  - If λ is small, prices adjust slowly
- λ is of importance to policy makers:
  - If λ is large, the AS mechanism will return the economy to Y^* relatively quickly
  - If λ is small, might want to use AD policy to speed up the adjustment process

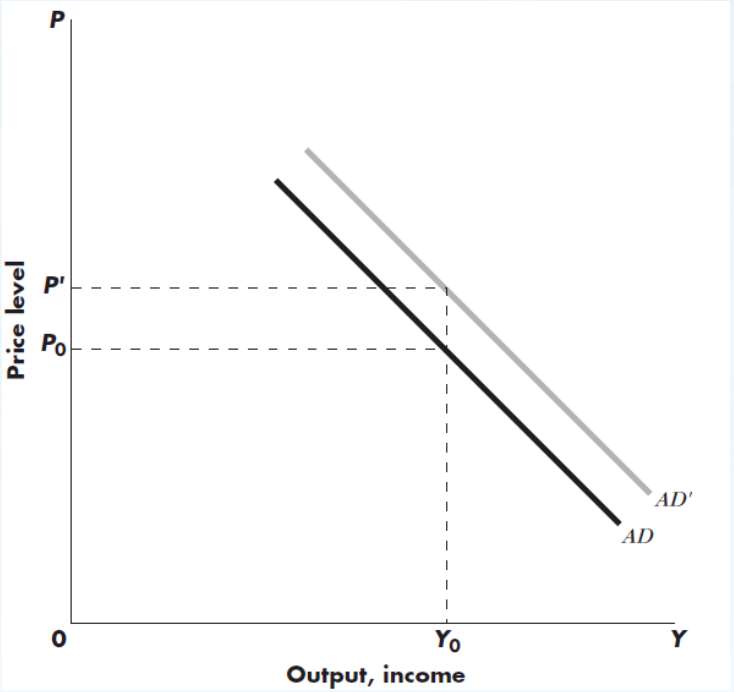


AD Curve and Shifts in AD

- AD shows the combination of the price level and level of output at which the goods and money markets are simultaneously in equilibrium

  Shifts in AD due to:
  1. Policy measures (changes in G, T, and MS)
  2. Consumer and investor confidence

- Figure 5-8 shows an outward shift in AD resulting from an increase in the money supply



AD Relationship Between Output and Prices

- Key to the AD relationship between output and prices is the dependency of AD on <u>real money supply</u>
  - Real money supply = value of money provided by the central bank and the banking system
  - Real money supply is written as $\frac{\overline{M}}{P}$ where $\overline{M}$ is the nominal money supply, and P is the price level
  - $\uparrow \frac{\overline{M}}{P} \rightarrow \downarrow r \rightarrow \uparrow I \rightarrow \uparrow AD$ AND $\downarrow \frac{\overline{M}}{P} \rightarrow \uparrow r \rightarrow \downarrow I \rightarrow \downarrow AD$
- For a given level of $\overline{M}$ high prices result in low $\frac{\overline{M}}{P}$ OR high prices mean that the value of the number of available dollars is low and thus a high P = low level of AD

AD and the Money Market

- For the moment, ignore the goods market and focus on the money market and the determination of AD
- The *quantity theory of money* offers a simple explanation of the link between the money market and AD
  - The total number of dollars spent in a year, NGDP, is P*Y
  - The total number of times the average dollar changes hands in a year is the velocity of money, V
  - The central bank provides M dollars

→ The fundamental equation underlying the quantity theory of money is the quantity equation: $M \times V = P \times Y$

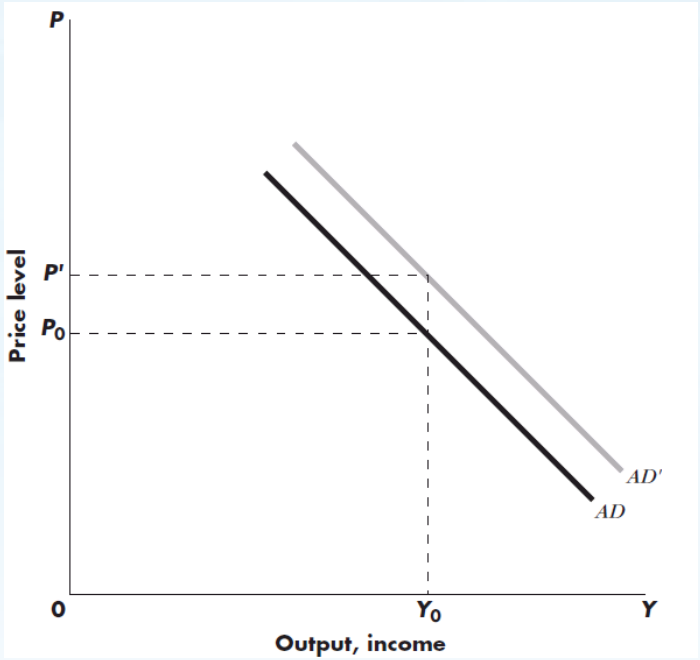
AD and the Money Market

$$M \times V = P \times Y \quad (2)$$

- If the velocity of money is assumed constant, equation (2) becomes $M \times \overline{V} = P \times Y$, and is an equation for the AD curve
- For a given level of M, an increase in Y must be offset by a decrease in P, and vice versa
  - Inverse relationship between Y and P as illustrated by downward sloping AD curve
- An increase in M shifts the AD curve upward for any value of Y

Changes in the Money Stock and AD

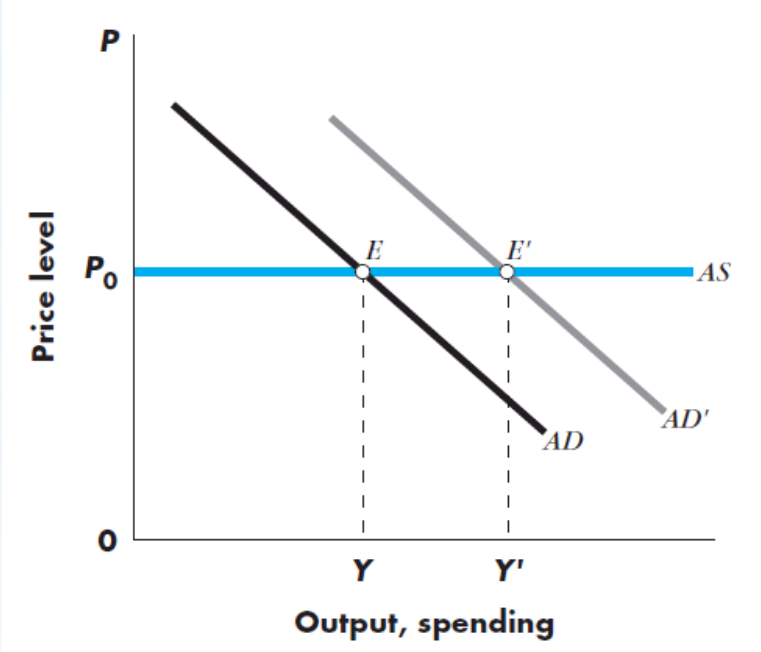
- An increase in the nominal money stock shifts the AD schedule up in proportion to the increase in nominal money
  - Suppose $\overline{M}_0$ corresponds to AD and the economy is operating at P_0 and Y_0
  - If money stock increases by 10% to $\overline{M}' = 1.1\overline{M}_0$, AD shifts to AD′ → the value of P corresponding to Y_0 must be $P' = 1.1P_0$ $\frac{\overline{M}'}{P'} = \frac{1.1\overline{M}_0}{1.1P_0} = \frac{\overline{M}_0}{P_0}$
  - Therefore → real money balances and Y are unchanged



AD Policy & the Keynesian Supply Curve

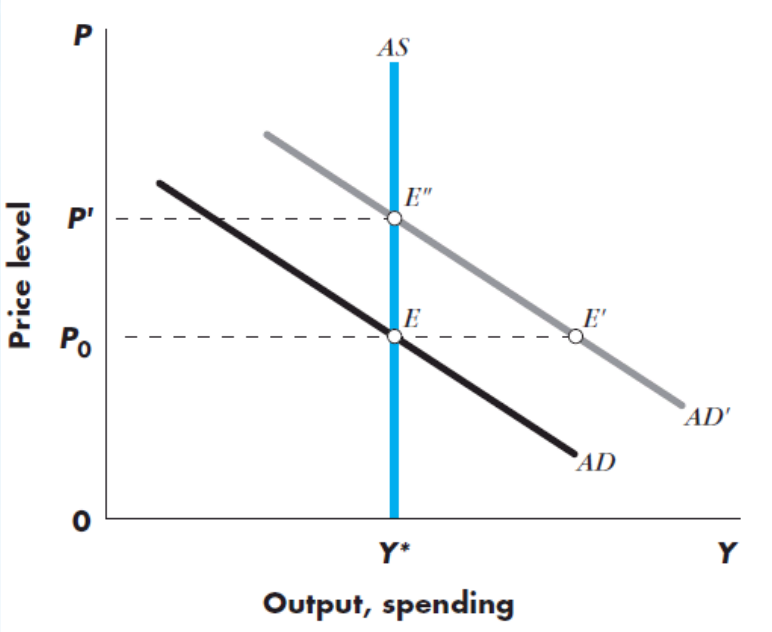
- Figure 5-9 shows the AD schedule and the Keynesian supply schedule
  - Initial equilibrium is at point E (AS = AD)
  - Suppose an aggregate demand policy increases AD to AD′ $\left(\uparrow G, \downarrow T, \uparrow M^S\right)$

The new equilibrium point, E′, corresponds to the same price level, and a higher level of output (employment is also likely to increase)



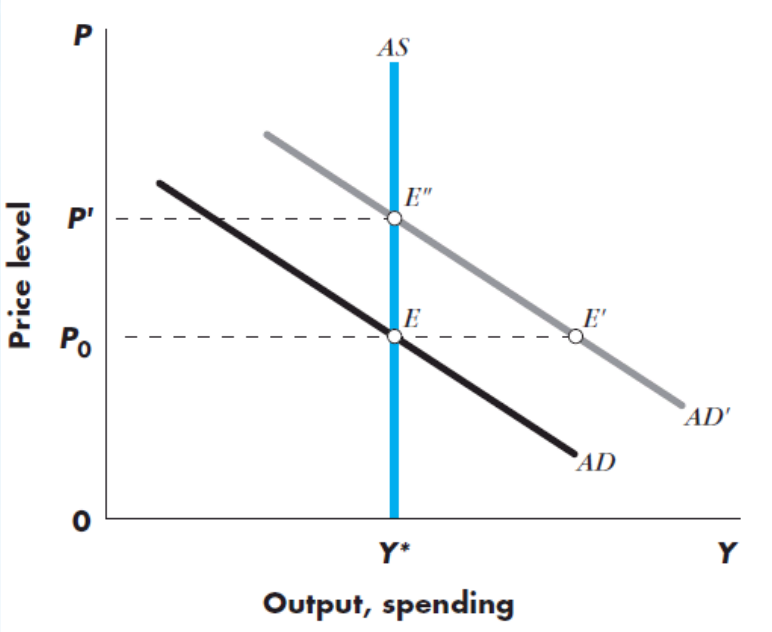
AD Policy & the Classical Supply Curve

- In the classical case, AS schedule is vertical at FE level of output
  - Unlike the Keynesian case, the price level is not given, but depends upon the interaction between AS and AD
- Suppose AD increases to AD′
  - Spending increases to E′ BUT firms can not obtain the N required to meet the increased demand
  - Firms hire more workers & wages and costs of production rise → firms must charge higher price
  - Move up AS and AD curves to E′′ where AS = AD′



AD Policy & the Classical Supply Curve

- The increase in price from the increase in AD reduces the real money stock, $\downarrow\left(\frac{\bar{M}}{\uparrow P}\right)$, and leads to a reduction in spending
- The economy only moves up AD until prices have risen enough, and M/P has fallen enough, to reduce total spending to a level consistent with full employment



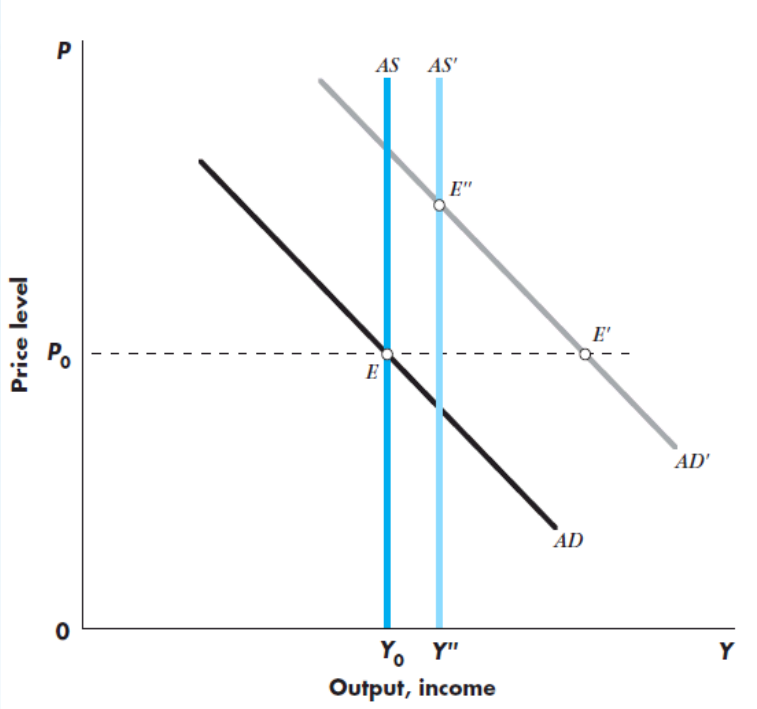
→ *this is true at E″, where AD = AS*

Supply Side Economics

- Supply side economics focuses on AS as the driver in the economy
- Supply side policies are those that encourage growth in potential output → shift AS to right
  - Such policy measures include:
    - Removing unnecessary regulation
    - Maintaining efficient legal system
    - Encouraging technological progress
- Politicians use the term supply side economics in reference to the idea that cutting taxes will increase AS enough that tax collections will actually increase, rather than fall

Supply Side Economics

- Cutting tax rates has an impact on both AS and AD
  - AD shifts to AD′ due to increase in disposable income
    - Shift is relatively large compared to that of the AS
  - AS shifts to AS′ as the incentive to work increases
- In short run, move to E′: GDP increases, tax revenues fall proportionately less than tax cut (AD effect)
- In the LR, moves to E′′: GDP is higher, but by a small amount, tax collections fall as the deficit rises, and prices rise (AS effect)



Supply Side Economics

- Supply side policies are useful, despite previous example
  - Only supply side policies can permanently increase output
  - Demand side policies are useful for short run results
- Many economists support cutting taxes for the incentive effect, but with a simultaneous reduction in government spending
  - Tax collections fall, but the reduction in government spending minimizes the impact on the deficit

AS and AD in the Long Run

- In the LR, AS curve moves to the right at a slow, but steady pace
- Movements in AD over long periods can be large or small, depending largely on movements in money supply
- Figure 5-12 shows a set of AS/AD curves for the period 1970-2000
  - Movements in AS slightly higher after 1990
  - Big shifts in AD between 1970 and 1980
  - Prices increase when AD moves out more than AS
  - Output determined by AS, while prices determined by the relative shifts in AS and AD