Aggregate Demand & Aggregate Supply Curves

Aggregate Demand

- Aggregate demand is the total desired quantity of goods and services that are bought by consumer households, private investors, government and foreigners at each possible price level, other thing being constant.

- The aggerate demand curve shows for any price level, P, the total quantity of goods and services, Y, demanded by households, firms and government.

- Macro concept – Whole Economy.

- The aggregate demand curve (AD) describes the total volume of aggregate expenditures in the economy at different price levels.

- Aggregate demand consists of the amount households plan to spend on goods (C), plus planned spending on capital investment, (I) + government spending, (G) + exports (X) minus imports (M) from abroad. The standard equation is:

$$\mathbf{AD = C + I + G + (X - M)}$$

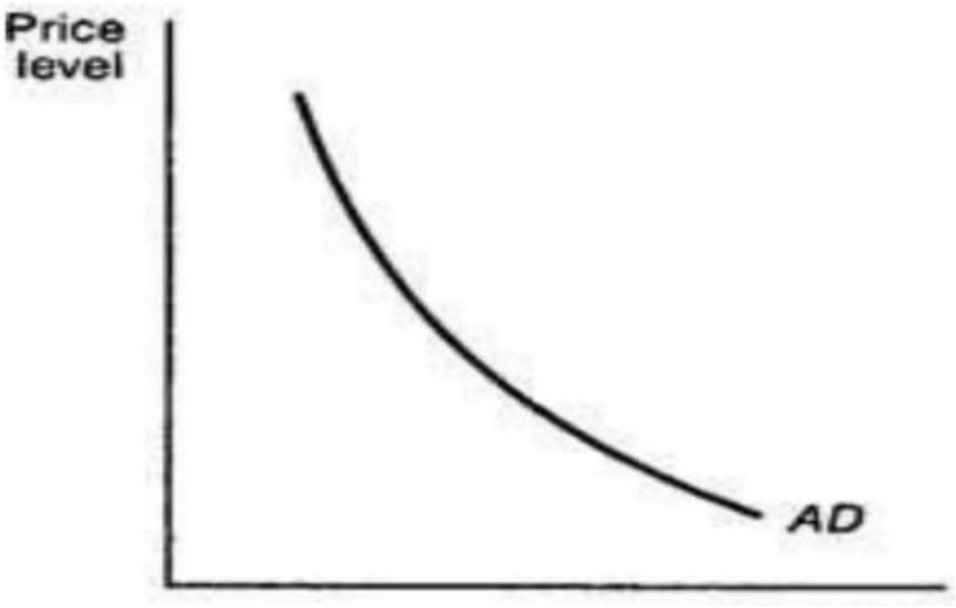
Aggregate Demand (AD) Curve

- The aggregate demand curve is plotted with real output on the horizontal axis and the price level on the vertical axis.
- the aggregate demand curve, *AD*, like the demand curves for individual goods, is downward sloping, implying that there is an inverse relationship between the price level and the quantity demanded of real GDP.

Numerical Example of aggregate demand

PRICE LEVEL	C	I	G	X	M	AD
200	300	50	100	50	450	50
180	320	60	105	100	425	160
160	340	70	110	150	400	270
140	360	80	115	200	375	380
120	380	90	120	250	350	490
100	400	100	125	300	325	600
80	420	110	130	350	300	710
60	440	120	135	400	275	820

AD Curve



Aggregate Output
(Real GDP)

Why the Aggregate-Demand Curve Is Downward Sloping

- The Price Level and Consumption: The Wealth Effect

- The Price Level and Investment: The Interest Rate Effect

- The Price Level and Net Exports: The Net-export Effect

The Wealth Effect

- The aggregate demand curve is drawn under the assumption that the government holds the **supply of money** constant. One can think of the supply of money as representing the economy's wealth at any moment in time. As the price level *rises*, the wealth of the economy, as measured by the supply of money, declines in value because the purchasing power of money falls. As buyers become poorer, they reduce their purchases of all goods and services. On the other hand, as the price level *falls*, the purchasing power of money rises. Buyers become wealthier and are able to purchase more goods and services than before. The wealth effect, therefore, provides one reason for the inverse relationship between the price level and real GDP that is reflected in the downward-sloping demand curve.

The Wealth Effect

- A decrease in the price level makes consumers feel more wealthy, which in turn encourages them to spend more.
- This increase in consumer spending means larger quantities of goods and services demanded.

The Interest Rate Effect

- As the price level rises, households and firms require more money to handle their transactions. However, the supply of money is fixed. The increased demand for a fixed supply of money causes the price of money, the **interest rate**, to rise. As the interest rate rises, investment that is sensitive to rate of interest will decline. Hence, the interest rate effect provides another reason for the inverse relationship between the price level and the demand for real GDP.

- A lower price level reduces the interest rate, which encourages greater spending on investment goods.

- This increase in investment spending means a larger quantity of goods and services demanded.

The net exports effect

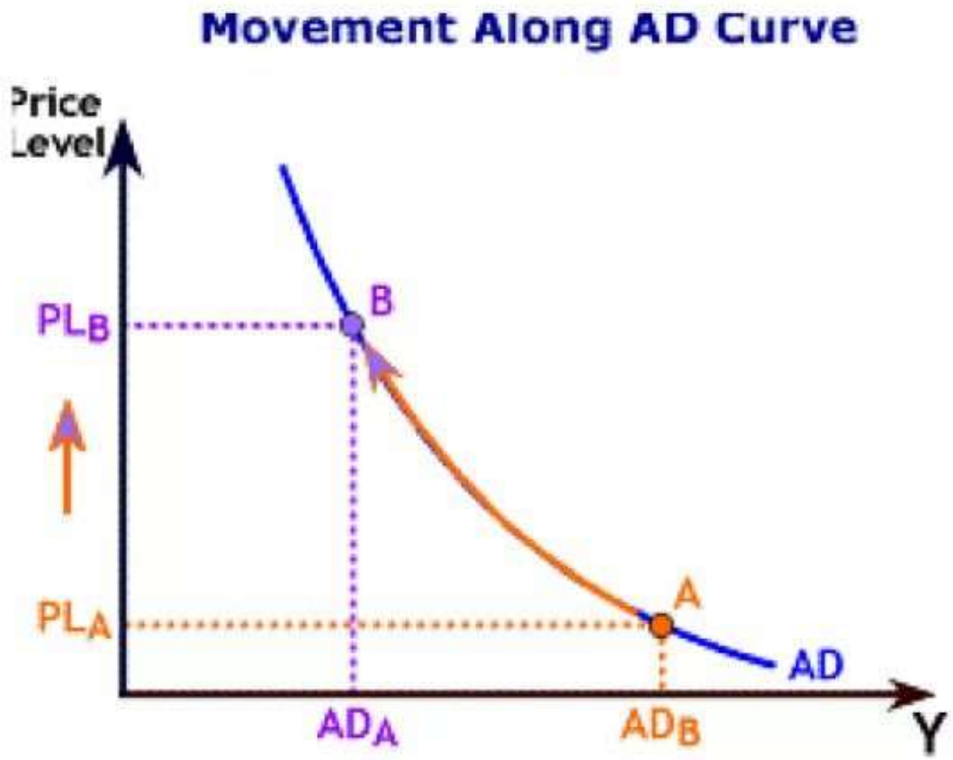
- As the domestic price level rises, foreign-made goods become relatively cheaper so that the demand for imports increases. However, the rise in the domestic price level also means that domestic-made goods are relatively more expensive to foreign buyers so that the demand for exports decreases. When exports decrease and imports increase, net exports (exports – imports) decrease. Because net exports are a component of real GDP, the demand for real GDP declines as net exports decline.

Movements Along vs. Shifts in the Aggregate Demand Curve

- A change in the level of Aggregate Demand that is caused by a change in the price level is referred to as a movement along the Aggregate Demand curve.
- The figure titled "Movement Along AD Curve" illustrates a movement from point A to point B.

- As the price level rises, consumption, investment and net exports decline because of the wealth effect,

interest rate effect and foreign trade effect respectively. The economy moves along the aggregate demand curve.

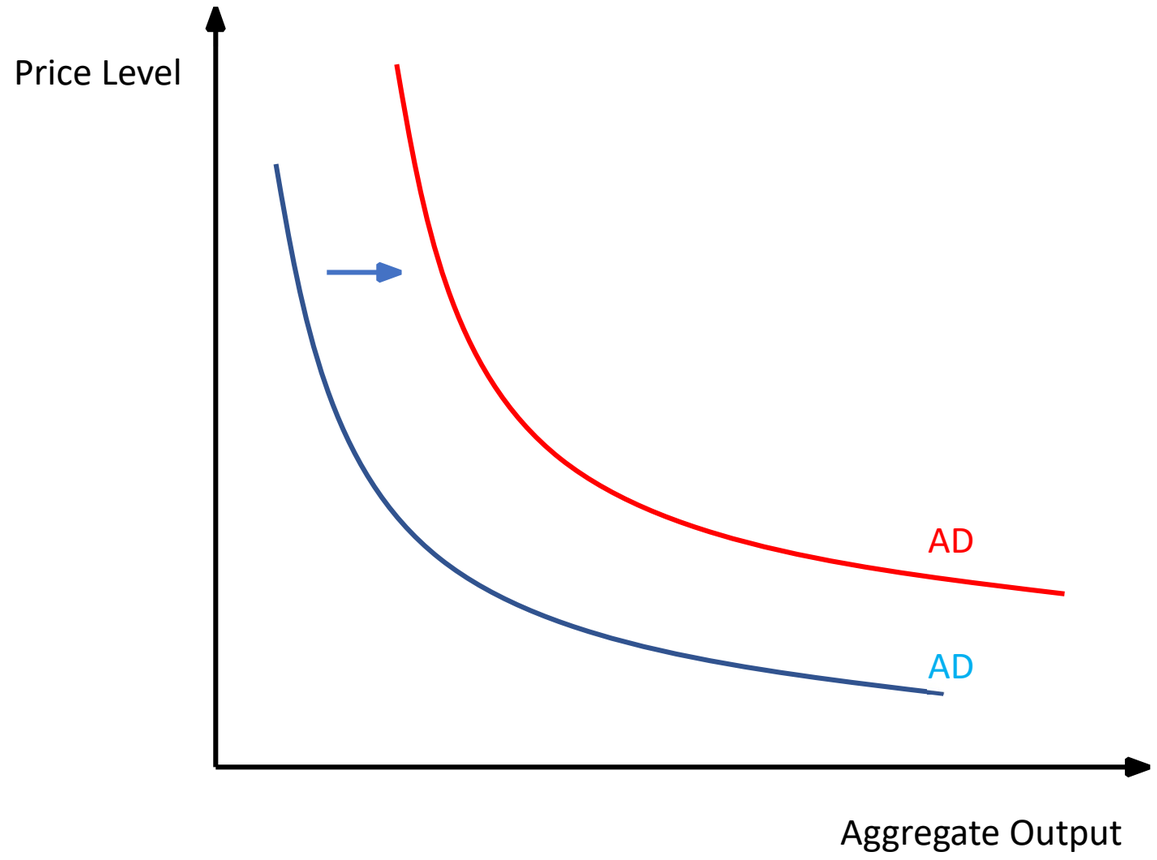

Movement Along AD Curve
Price Level
PLB
B
PLA
A
AD
ADA
ADB
Y

Shift of the Aggregate Demand curve

- A change in any factor other than a change in the price level that changes the level of Aggregate Demand results in a shift of the Aggregate Demand curve
- The figure titled "Shift of Aggregate Demand Curve" illustrates a rightward shift.

- When non-price factors such as government expenditure (G), taxation (T), investment (I) money supply(M) etc. changes aggregate demand curves shifts.

Rightward shift in Aggregate demand Curve

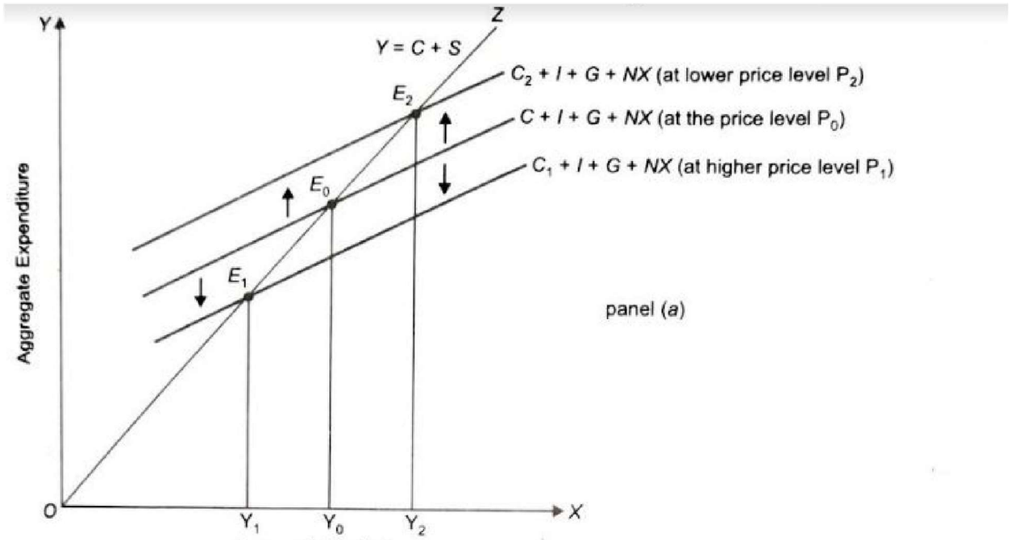


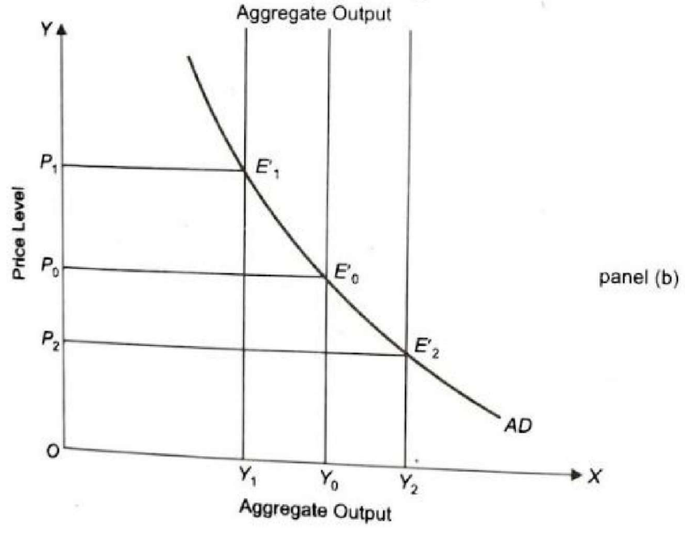
DERIVATION OF AGGREGATE DEMAND CURVE

▪ We can derive the aggregate demand curve using Keynesian income expenditure framework and incorporating price level into the model.

▪ Let us suppose price level falls. People will feel richer. The lower price level will induce people to consume more at each level of national income. ▪ That is consumption function curve in the income expenditure model will shift above which in turn will cause upward shift in the aggregate planned expenditure curve(C+I+G+NX).

Derivation of aggregate demand curve


Y
Z
Y = C + S
$C_2 + I + G + NX$ (at lower price level P_2)
E_2
$C + I + G + NX$ (at the price level P_0)
E_0
$C_1 + I + G + NX$ (at higher price level P_1)
E_1
Aggregate Expenditure
panel (a)
O
Y_1
Y_0
Y_2
X
Aggregate Output

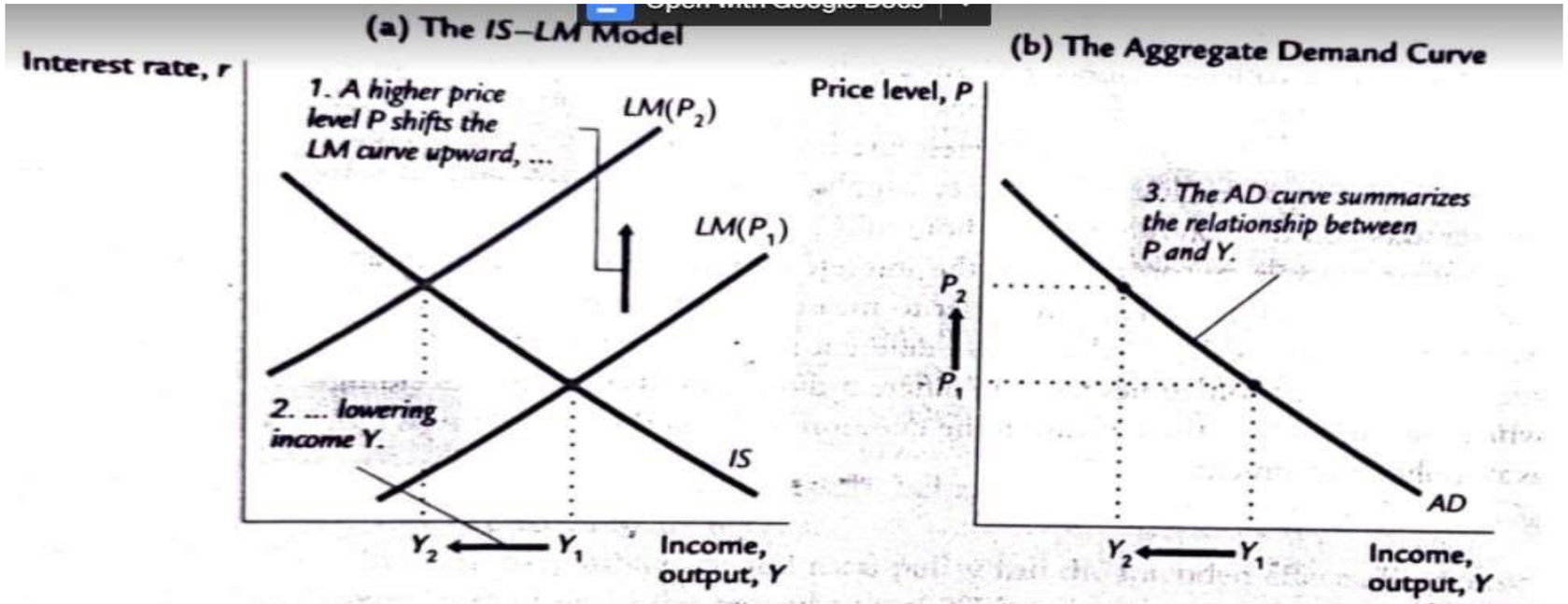

Y
P_1
E'_1
Price Level
P_0
E'_0
panel (b)
P_2
E'_2
AD
O
Y_1
Y_0
Y_2
X
Aggregate Output

From the *IS-LM* Model to the Aggregate Demand Curve

Recall from Chapter 9 that the aggregate demand curve describes a relationship between the price level and the level of national income. In Chapter 9 this relationship was derived from the quantity theory of money. 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 decreases in the money supply shift the aggregate demand curve to the left.

To understand the determinants of aggregate demand more fully, we now use the *IS-LM* model, rather than the quantity theory, to derive the aggregate demand curve. First, we use the *IS-LM* model to show why national income falls as the price level rises—that is, why the aggregate demand curve is downward sloping. Second, we examine what causes the aggregate demand curve to shift.

To explain why the aggregate demand curve slopes downward, we examine what happens in the *IS-LM* model when the price level changes. This is done in Figure 11-5. 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 balances shifts the *LM* curve upward, which raises the equilibrium interest rate and lowers the equilibrium level of income, as shown in panel (a). Here the price level rises from P_1 to P_2, and



Deriving the Aggregate Demand Curve with the *IS-LM* Model Panel (a) shows the *IS-LM* model: an increase in the price level from P_1 to P_2 lowers real money balances and thus shifts the *LM* curve upward. The shift in the *LM* curve lowers income from Y_1 to Y_2. Panel (b) shows the aggregate demand curve summarizing this relationship between the price level and income: the higher the price level, the lower the level of income.

income falls from Y_1 to Y_2. The aggregate demand curve in panel (b) plots this negative relationship between national income and the price level. In other words, the aggregate demand curve shows the set of equilibrium points that arise in the *IS-LM* model as we vary the price level and see what happens to income.

Aggregate Supply

- **Meaning:**
  Aggregate supply (AS) is defined as the total amount of goods and services produced and supplied by an economy's firms over a period of time. The aggregate supply curve shows the relationship between the aggregate price level and the quantity of aggregate output supplied in the economy.

Key points

- **Aggregate supply** is the total quantity of output firms will produce and sell —in other words, the real GDP.

- The upward-sloping **aggregate supply curve**—also known as the **short run aggregate supply curve**—shows the positive relationship between price level and real GDP in the short run.

- The aggregate supply curve slopes up because when the price level for outputs increases while the price level of inputs remains fixed, the opportunity for additional profits encourages more production.

- A significant difference exists between the short-run Aggregate Supply curve and the long-run Aggregate Supply curve. In the short run the Aggregate Supply curve is upward sloping. In the long run the Aggregate Supply curve is vertical.

The Aggregate Supply curve in the short run

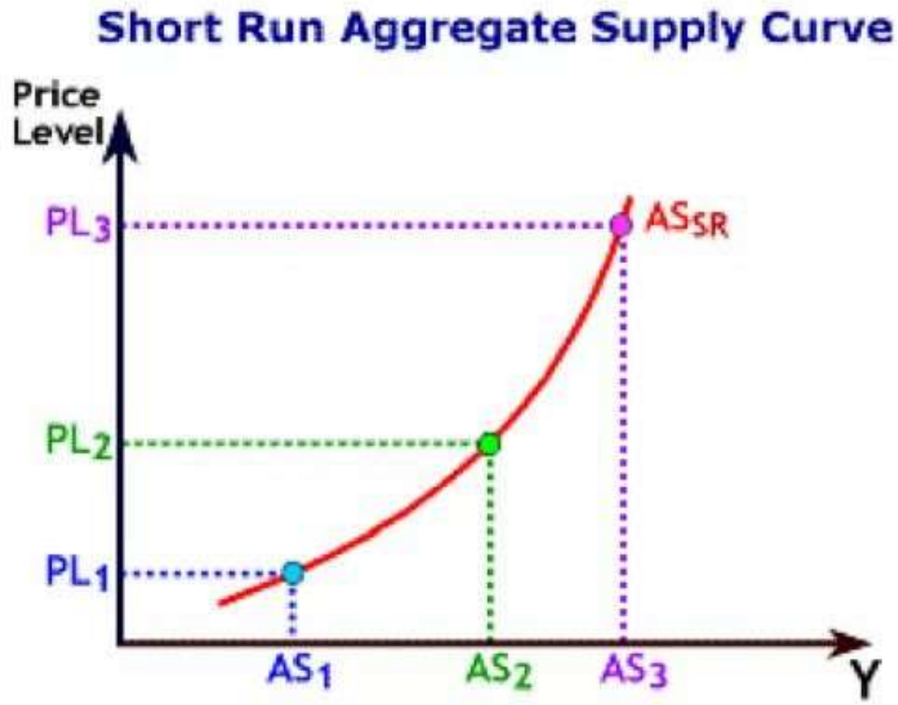
- The Aggregate Supply curve in the short run is a time period in which the costs of production wages, raw materials, energy, and so on are held constant; only output prices vary. When prices rise, the level of Aggregate Supply also rises because firms seek to take advantage of the profit opportunities. A firm's profit is the difference between its revenues and costs over a given time period, say one year.

For Example

- Suppose that a firm produces picture frames and it uses only one input, labor. Each picture frame requires one labor hour to produce, and wages are $8 per hour. The firm sells each picture frame for $10 so the profit per picture frame is $2 ($10 – $8). If the firm sells 2,000 picture frames in the first year, its total profit is $4,000 (2,000 x $2). In the second year, the firm increases the price per picture frame to $11. By assumption, wages are unchanged at $8 per hour. The firm's profit per frame produced is $3. The chance for the firm to increase its profits provides an incentive for the firm to increase production.

- By producing and selling 2,500 picture frames in the second year, the firm's profits rise to $7,500 (2,500 x $3). An increase in the price level, therefore, leads to a short run increase in Aggregate Supply. The Figure labeled "Short Run Aggregate Supply Curve" is upward sloping, which illustrates the positive relationship between the price level and Aggregate Supply.

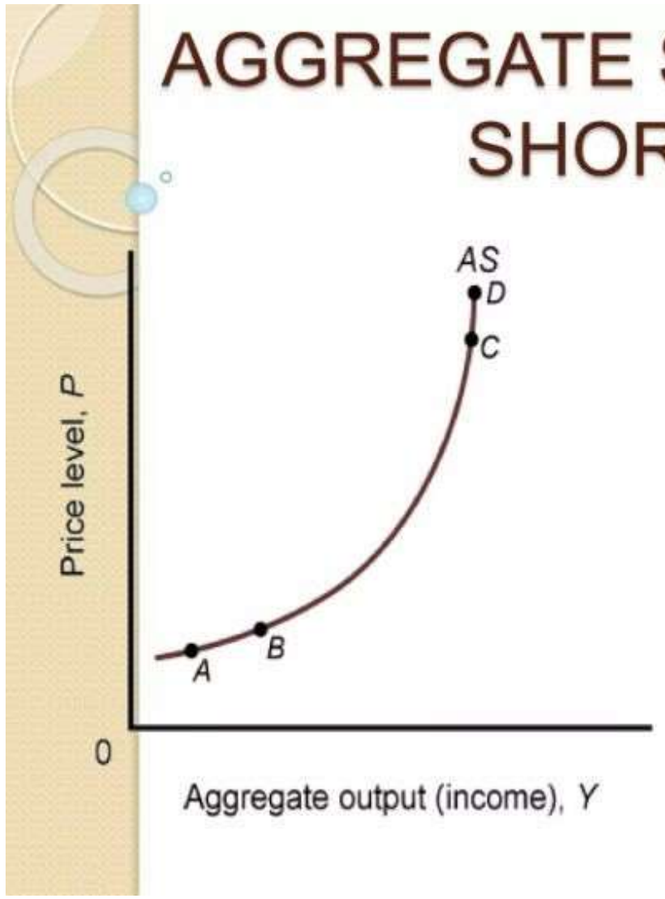
Short run AS


Short Run Aggregate Supply Curve
Price Level
PL3
PL2
PL1
ASSR
AS1
AS2
AS3
Y

AGGREGATE SUPPLY IN THE SHORT RUN

- Macroeconomists focus on whether or not the economy as a whole is operating at full capacity.
- As the economy approaches maximum capacity, firms respond to further increases in demand only by raising prices.

AGGREGATE SUPPLY IN THE SHORT RUN



- At low levels of aggregate output the curve is fairly flat.
- As economy approaches capacity, the curve becomes nearly vertical.
- At capacity, the curve is vertical.

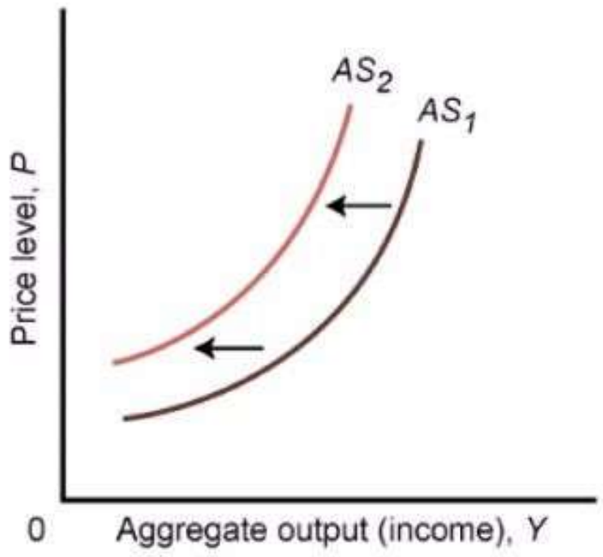
- There must be a lag between changes in input prices and changes in output prices, otherwise the aggregate supply (price/output response) curve would be vertical.
- Wage rates may increase at exactly the same rate as the overall price level if the price-level increase is *fully anticipated.* Most input prices, however, tend to lag increases in output prices.

WHY IS THE SHORT RUN CURVE UPWARD SLOPING?

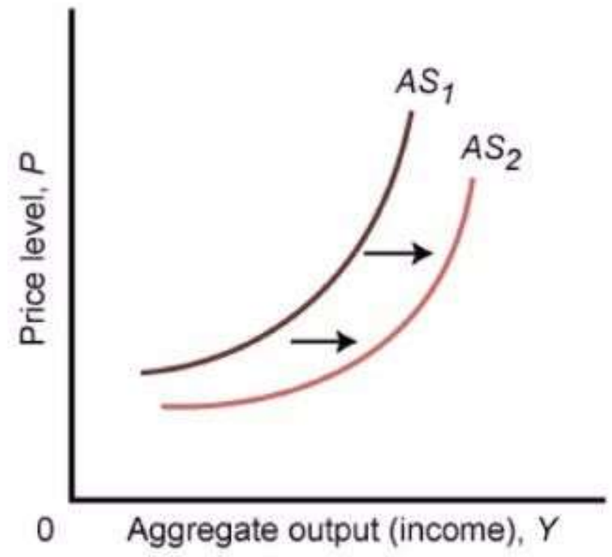
Short-run aggregate supply curve slopes upward because:

- Contracts make some wages and prices "sticky."
- Firms are often slow to adjust wages.
- Menu costs make some prices sticky

Shifts of the Short-Run Aggregate Supply Curve

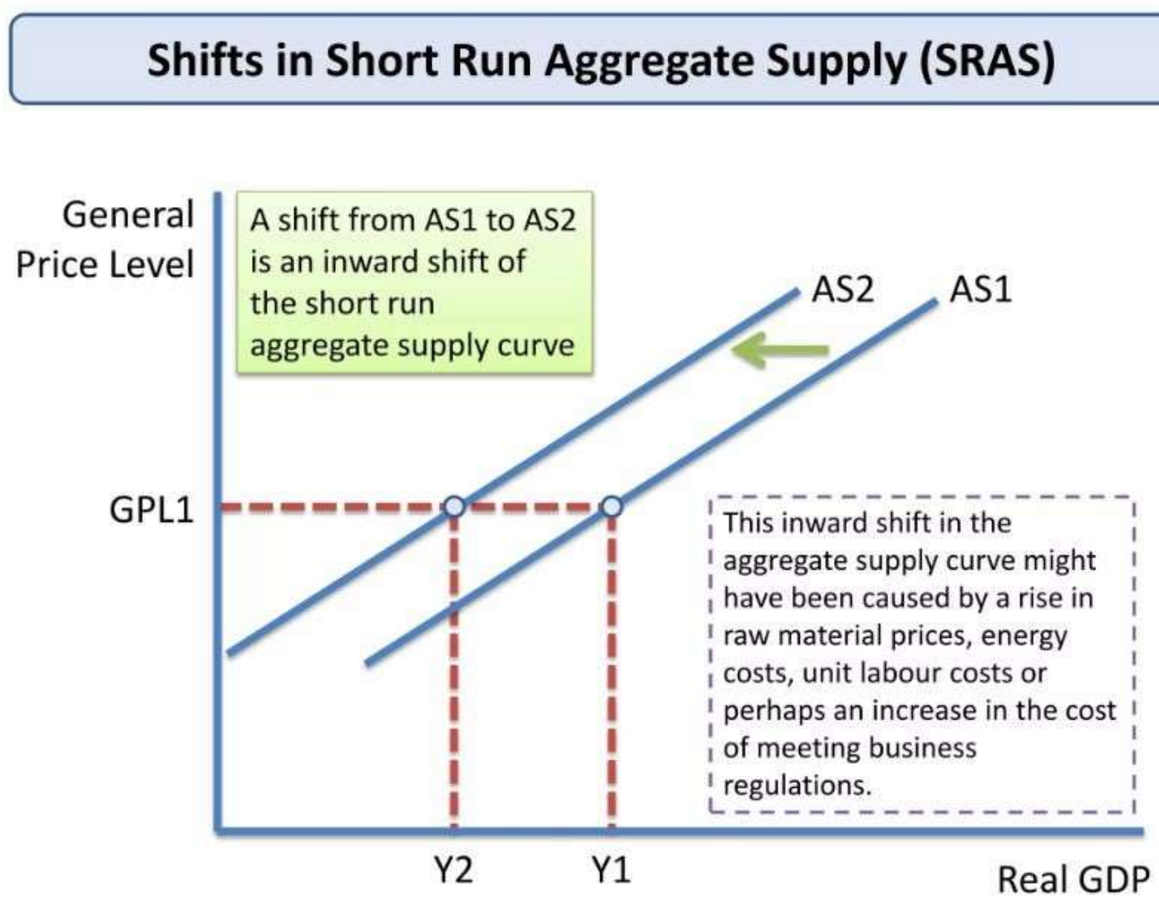


A decrease in aggregate supply

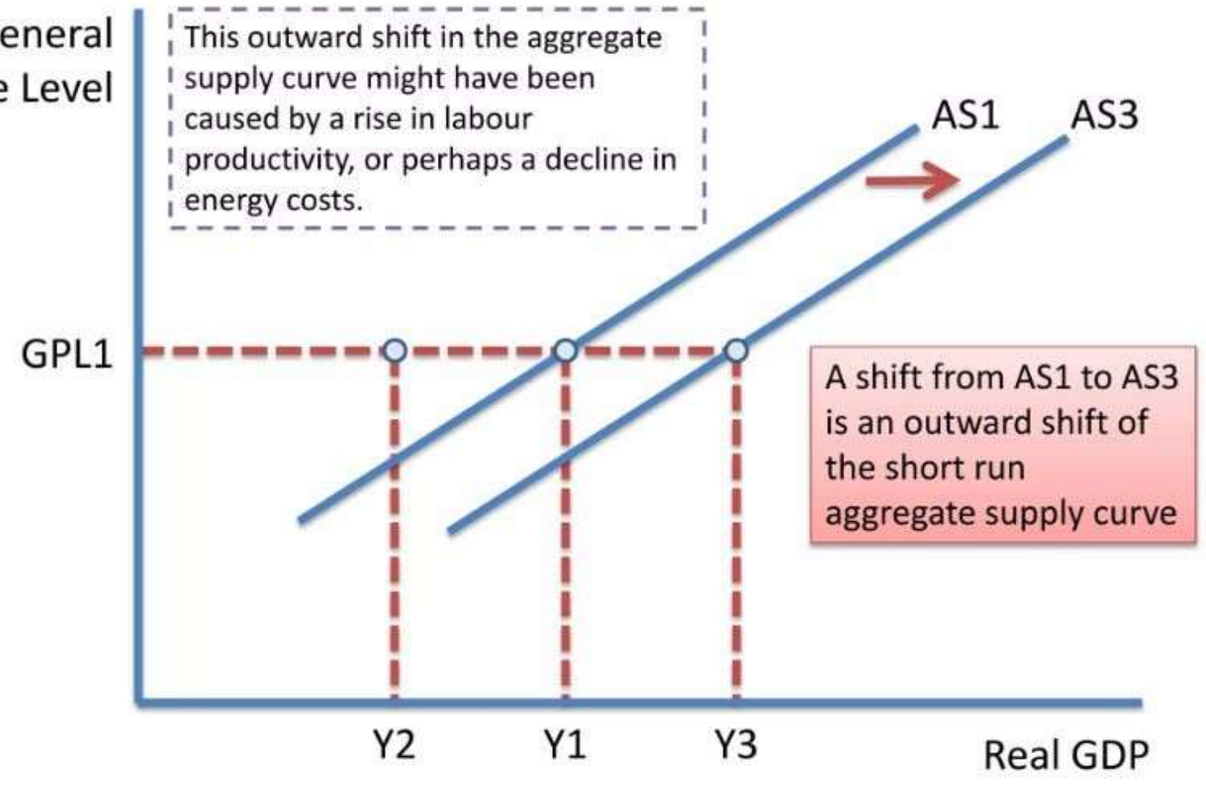


An increase in aggregate supply

Shifts in Short Run Aggregate Supply (SRAS)



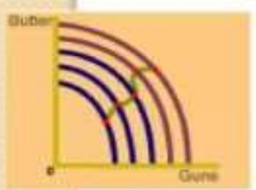
Shifts in Short Run Aggregate Supply (SRAS)



Shifts of the Short-Run Aggregate Supply Curve

Factors That Shift the Aggregate Supply Curve

Shifts to the Right
Increases in Aggregate Supply



Lower costs
- lower input prices
- lower wage rates

Economic growth
- more capital
- more labor
- technological change

Public policy
- supply-side policies
- tax cuts
- deregulation

Good weather

Shifts to the Left
Decreases in Aggregate Supply

Higher costs
- higher input prices
- higher wage rates

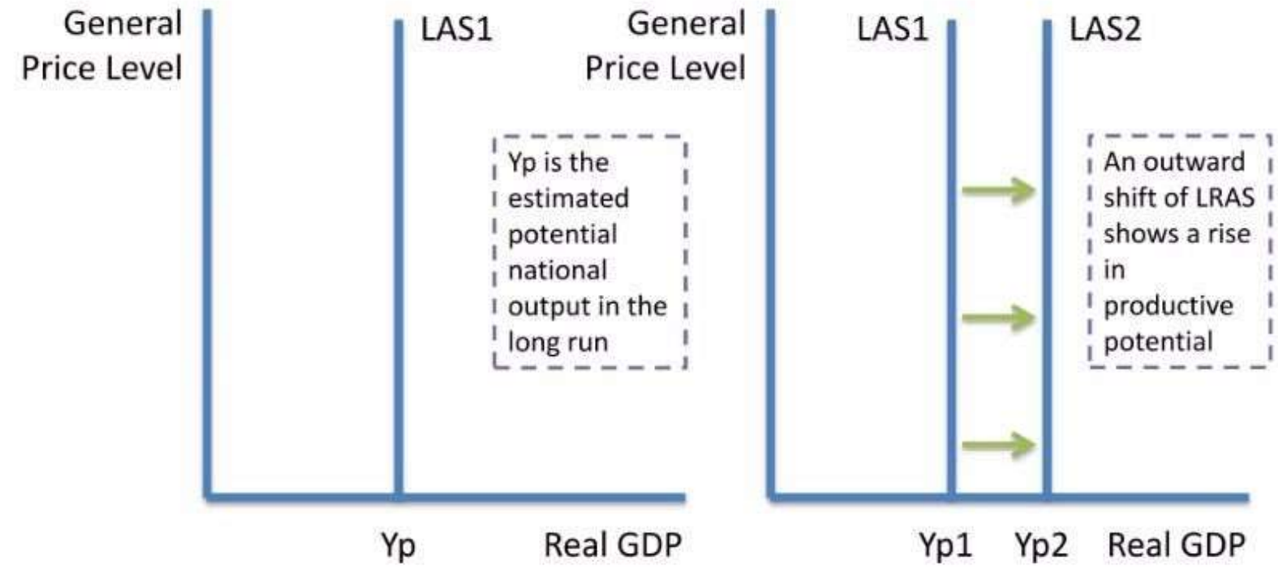
Stagnation
- capital deterioration

Public policy
- waste and inefficiency
- over-regulation

Bad weather, natural disasters, destruction from wars

Long-Run Aggregate Supply (LRAS)

In the long run, the ability of an economy to produce goods and services to meet demand is based on the state of production technology and the availability and quality of factor inputs.



DERIVATION OF SHORT-RUN AGGREGATE SUPPLY CURVE : THE STICKY WAGE MODEL

We have studied above that while the long-run supply curve (*LAS*) is a vertical straight line at the level of potential GNP (or at the natural rate of unemployment), the short-run aggregate supply curve (*SAS*) slopes upward to the right. There are three models of aggregate supply but all of them depends on the following short-run aggregate supply equation.

$$Y = \bar{Y} + \alpha (P - Pe), \qquad \alpha > 0$$

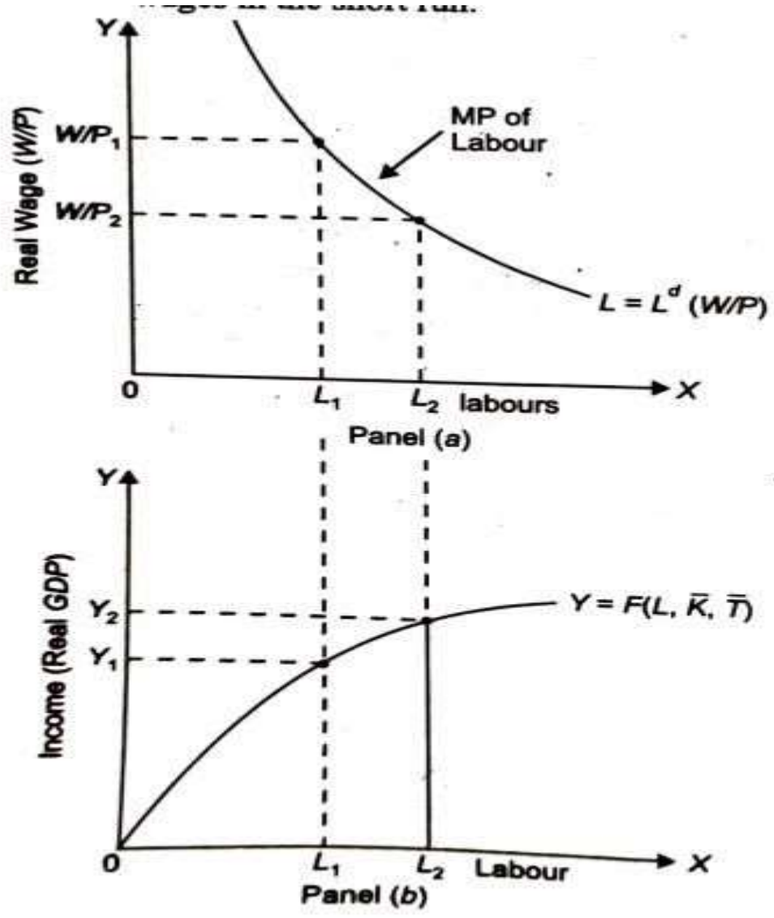
where Y is national output, $\bar{Y}$ is level of potential GNP, P is the price level and P^e is the expected price level. The parameter α shows how much output changes in response to the unexpected changes in the price level. $\frac{1}{\alpha}$ will measure the slope of the short-run aggregate supply curve.

An important model of aggregate supply curve assumes that nominal (*i.e.* money) wages are sticky in the short run and emphasise that nominal wages are *slow in adjustment to the unexpected changes in the price level.* The sticky nature of nominal wages is due to the following reasons :

1. The nominal wages are fixed by long-term contracts. Therefore, nominal wages cannot adjust quickly when there is unexpected change in the price level.
2. In the industries where formal labour contracts do not prevail, there are implicit agreements between workers and employers about nominal wages. These prevent the quick adjustment in nominal wages when economic conditions warrant.
3. Wages also depend on social norms and notions of equity. These also prevent changes in wages in the short run.

To understand the model let us consider what happens to the amount of output produced when the p rises

- ✓ When nominal wage is sticky , a rise in the p lowers the real wage (W/P), making labor cheaper.
- ✓ The lower real wage induces firms to hire more labor because labor demand is a function of (W/P).
- ✓ The additional labor hired produces more output since output(Y) is a function of employment (L)



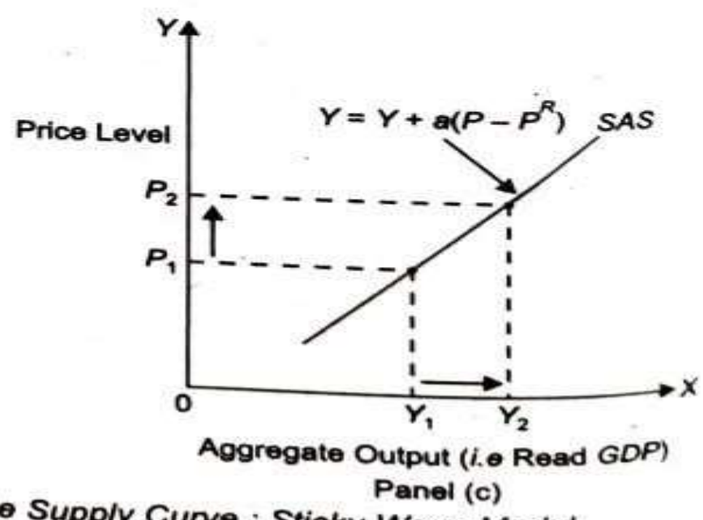


Figure 10.18. *Deriving Short-Run Aggregate Supply Curve : Sticky Wage Model*

- Panel (a) shows the labor demand curve.
  - ✓ Because the nominal wage W is stuck, an increase in the P from p1 to p2 reduces real wage from w/p1 to W/p2.
  - ✓ The lower real wage raises the quantity of labor demanded from L1 to L2.
- Panel (b) shows the production function.
  - ✓ An increase in the quantity of labor from L1 to L2 raises output from Y1 to Y2.
- Panel (c) on the other hand shows the aggregate supply curve that summarizes the relationship between the price level and output.
  - ✓ An increase in the price level from p1 to p2 raises output from Y1 to Y2.

$$Y = \bar{Y} + \alpha(p - p^e)$$

- The equation states that output deviates from its natural rate when the price level deviates from the expected price level.

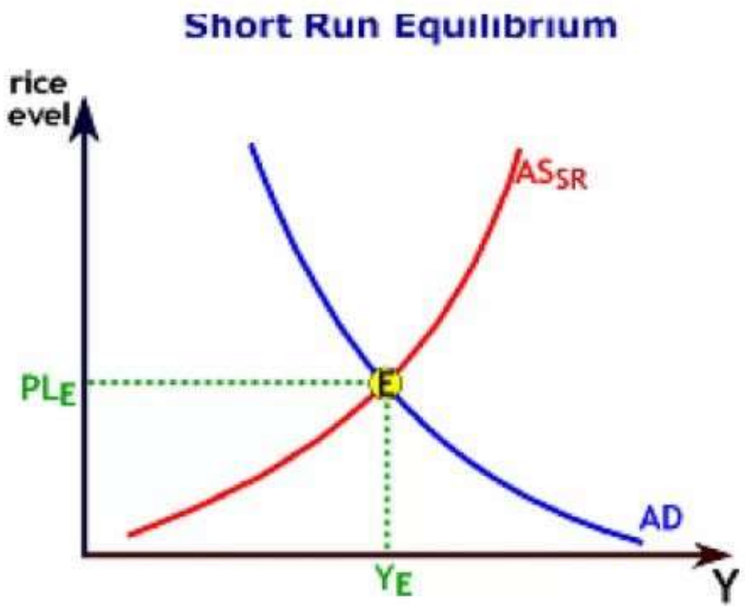
Equilibrium and Disequilibrium in the Aggregate Demand/Aggregate Supply Model

- Equilibrium in the macroeconomic sense occurs when the demand for final goods and services equals the supply of final goods and services. A short-run equilibrium, however, differs from a long-run equilibrium because in the long run the economy must be producing at the potential level of output so that all factors of production are fully employed.

Short-Run Equilibrium

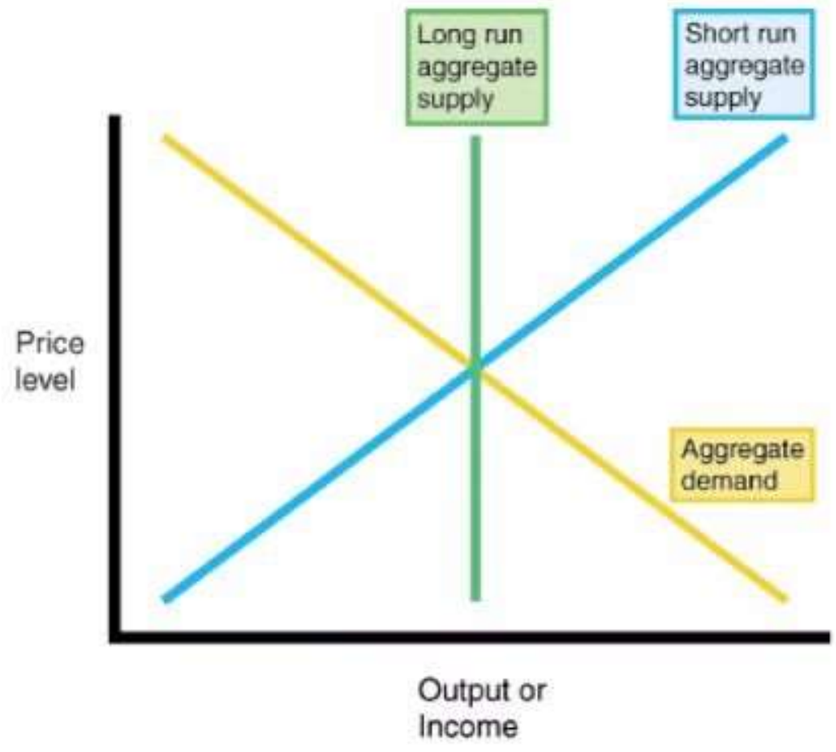
- The short-run equilibrium occurs where the Aggregate Demand curve crosses the short-run Aggregate Supply curve. The intersection of Aggregate Demand and Aggregate Supply in the figure labeled "Short Run Equilibrium" determines both the price level and the equilibrium level of GDP in the economy. The level of output can be above or below potential output.

Short run Equilibrium



Long-Run Equilibrium

- The long-run equilibrium can only occur where the Aggregate Demand curve crosses the vertical Long Run Aggregate Supply curve because in the long run, equilibrium output must equal potential output where all resources are fully employed. This condition holds because in the short run, production input costs are held constant, but in the long run, input costs can vary


Long run aggregate supply
Short run aggregate supply
Price level
Aggregate demand
Output or Income

Thank you

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