Econ. 1A Chapter 13 AS-AD model

1. The purpose of chapter 13 is to develop the AS-AD model and to use this model to explain how RGDP (Y) and the price level (P) are determined and how they interact. We also can use this model to analyze how the behavior of producers, consumers and the government **influences** the economy's short-run performance.

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	2008	2009	2010
Y (RDP, billion of 2005$)	13,162	12,703	13,008
P (GDP rice index, 2005=100)	108.6	109.7	111.0
Unemployment rate (%)	5.8	9.3	9.6

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AS – AD model: The workhorse model of macroeconomics

2. **Aggregate Supply** (AS) is the relationship between the quantity of RGDP supplied (Y_s) and the price level (P).

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3. The quantity of RGDP supplied (Y_s) is the total quantity of goods and services that firms plan to produce during a given time period. This quantity depends on the quantity of labor employed (L), the quantity of physical and human capital (K), and the state of technology (t).

$Y_s = F(L; K, N, E, t)$, Y_s = RGDP, L = labor, K = physical and human capital, N = land, E = entrepreneurial talent, t = technology.

Note: At any given time period, K, N, E and t are fixed. But L is determined by the supply and demand for labor. At full employment, labor market is in equilibrium, i.e., $L_d = L_s = L_f$, $Y_s = Y_p$ = potential GDP.

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4. **The long-run aggregate supply curve** (LRAS) shows the relationship between the aggregate price level (P) and quantity of aggregate supplied (Y_s) when money wages (W) changes in step with the price level (P) to achieve full employment. It is vertical at potential output, Y_p, because in the long run a change in the aggregate price level has no effect on quantity of aggregate supplied.

   $Y_s = Y_p$

   where Y_p = potential output, i.e., the level of RGDP the economy would produce if all prices, including money wage, were fully flexible.

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5. **Long-run**: All prices are fully flexible and change in same proportion.

6. Why $P\uparrow \rightarrow Y_s = Y_p$ unchanged in the long-run?

   Because along LRAS the price level (P) and the money wage rate (W) change by the same percentage, the real wage rate (W/P) remain constant at its full employment equilibrium level.

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7. **The short-run aggregate supply curve** (AS) is the *positive* relationship between the quantity of RGDP supplied (Y_s) and the price level (P) when the money wage rate (W), the prices of other resources (P_R) and potential GDP (Y_p) remain the same during a given time period.

   $Y_s = Y(P; W, P_R, Y_p)$, where Y_s = quantity of RGDP supplied, P = the price level (GDP deflator or CPI), W = money wage rate, P_R = the money price of other resources.

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8. **Short-run**: Many prices, especially W, are sticky at some predetermined level.

9. Why $p\uparrow \rightarrow Y_s\uparrow$ in the short-run?
   If the typical producer receives a higher price for his final goods and services and the production cost per unit of goods and services doesn't rise in same proportion as the rise in the price of final goods and services due to **many production costs are fixed**. As a result, profit per unit of output rises and the producer increases output, then Y increases in the short run, i.e., $p\uparrow \rightarrow Y_s\uparrow$

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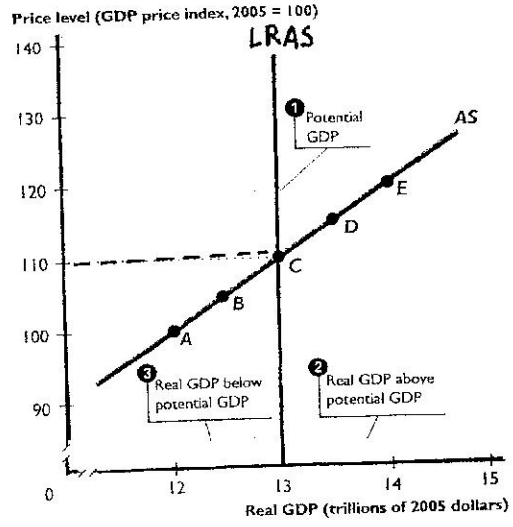
Aggregate Supply Schedule and Aggregate Supply Curve

	Price level (GDP price index, 2005 = 100)	Quantity of real GDP supplied (trillions of 2005 dollars)
E	120	14.0
D	115	13.5
C	110	13.0
B	105	12.5
A	100	12.0



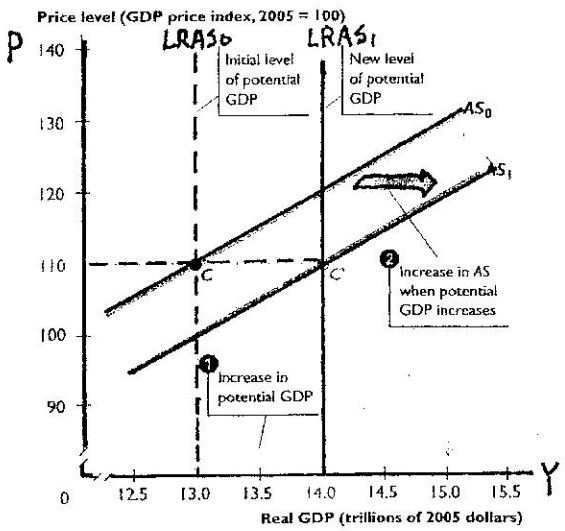
The aggregate supply schedule and aggregate supply curve, AS, show the relationship between the quantity of real GDP supplied and the price level when all other influences on production plans remain the same. Each point A through E on the AS curve corresponds to the row identified by the same letter in the schedule.

1. Potential GDP is $13 trillion, and when the price level is 110, real GDP equals potential GDP.
2. If the price level is above 110, real GDP exceeds potential GDP.
3. If the price level is below 110, real GDP is less than potential GDP.

Changes in AS

10. $L_F\uparrow(\downarrow)$, $K\uparrow(\downarrow)$ or $t\uparrow(\downarrow) \rightarrow$ LRAS and AS shift rightward (leftward) by the same amount.

An Increase in Potential GDP

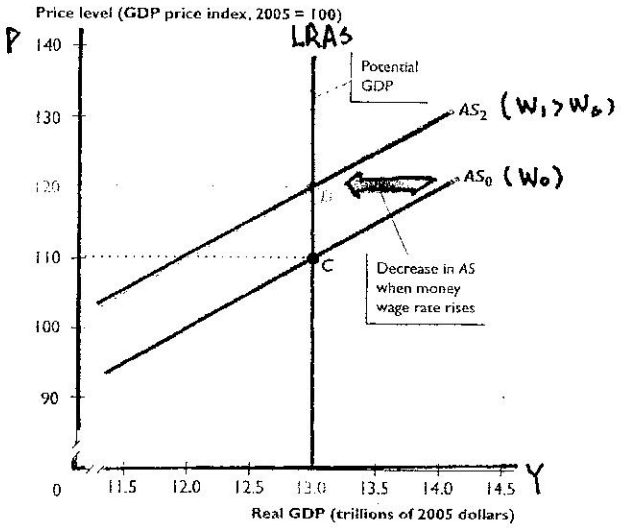


❶ An increase in potential GDP increases aggregate supply.
❷ When potential GDP increases from $13 trillion to $14 trillion, the aggregate supply curve shifts rightward from AS_0 to AS_1.

11. $W\uparrow(\downarrow)$ or $P_R\uparrow(\downarrow) \rightarrow$ AS shifts leftward (rightward).

A Change in the Money Wage Rate

A rise in the money wage rate decreases aggregate supply. The aggregate supply curve shifts leftward from AS_0 to AS_2. A rise in the money wage rate does not change potential GDP.



13. **Aggregate Demand** (AD) is the *negative* relationship between the quantity of RGDP demanded (Y_d) and the price level (P) when other things remain the same during a given time.
$Y_d = Y(P; Ex, M_s, G, T, TR, Y^*)$ where Y_d = quantity of RGDP demanded, P = the price level, Ex = expectation, M_s = the quantity of money, G = government purchase, T = taxes, TR = transfer payments, Y* = RGDP in foreign country.
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14. **The quantity of RGDP demanded (Y_d)** is $Y_d = C + I + G + X - M$. Y_d is the total quantity of final goods and services produced in this economy that people, businesses, governments and foreigners plan to buy during a given time period.

15. Law of AD: P↑ → Y_d↓. This is due (1) wealth effect; and (2) substitution effect.
(1)Wealth effect: P↑→ real wealth (A/P)↓→ to restore A, people will decrease consumption (C) and increase saving (S) → Y_d↓.
(2) Substitution effect:
(i) P↑→ (M/P)↓→ via money market → i↑→ I↓ → Y_d↓.
(ii) P↑→ P > P*→ domestic goods are more expansive than foreign good → M↑ and X↓ → (X-M)↓→Y_d↓
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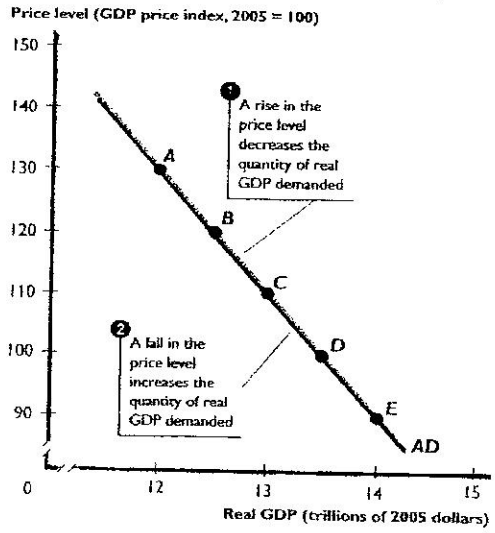
Aggregate Demand Schedule and Aggregate Demand Curve

	Price level (GDP price index, 2005 = 100)	Quantity of real GDP demanded (trillions of 2005 dollars)
A	130	12.0
B	120	12.5
C	110	13.0
D	100	13.5
E	90	14.0

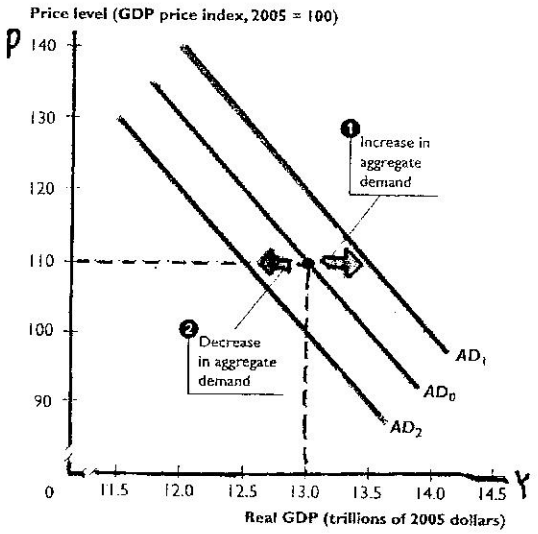


The aggregate demand schedule and aggregate demand curve, AD, show the relationship between the quantity of real GDP demanded and the price level when all other influences on expenditure plans remain the same. Each point A through E on the AD curve corresponds to the row identified by the same letter in the schedule.

The quantity of real GDP demanded
1. decreases when the price level rises and
2. increases when the price level falls.

Changes in AD

16. An increase in the expected future income (Y^e), inflation rate (π) and future profits will increase AD and AD curve shifts rightward
17. An increase in M_s, or G or TR or Y* and a decrease in T will increase AD and shift AD rightward. A decrease in M_s, or G or TR or Y* and an increase in T will decrease AD and shift AD leftward.



1 Aggregate demand *increases if*

- Expected future income, inflation, or profits increase.
- The government or the Federal Reserve takes steps that increase planned expenditure.
- The exchange rate falls or the global economy expands.

2 Aggregate demand *decreases if*

- Expected future income, inflation, or profits decrease.
- The government or the Federal Reserve takes steps that decrease planned expenditure.
- The exchange rate rises or the global economy contracts.

Note that

(1) **Monetary policy**: The Fed conducts the monetary policy to influence the economy by changing federal funds rate and adjusting quantity of money (M_s).

(2) **Fiscal policy:** The government's attempt to influence the economy by setting and changing taxes (T), making transfer payments (TR), and purchasing goods and services (G).

18. **AS – AD model**

Assumptions

a. Other things remain the same
   AS: W, P_R,
   AD: Ex, M_s, G, T, TR and Y* remain the same.
b. Given time period.
c. The laws of AS and AD apply.

Table:

P(GDP deflator)	Y_d	Y_s
120	12.0	14.0
115	12.5	13.5
110	13.0	13.0
105	13.5	12.5
100	14.0	12.0

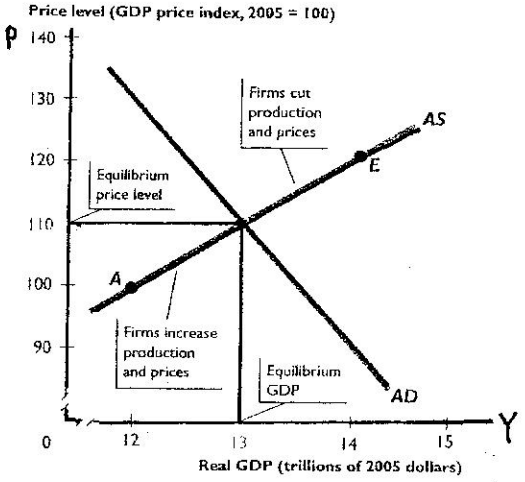
Understanding the Business Cycle

19. **Macroeconomic Equilibrium**: when the quantity of RGDP demanded equals the quantity of RGDP supplied. At the point of intersection of AD and AS curves, i.e., $Y_s = Y_d = 13$, P = 110.

20. **There are three types of macroeconomic equilibrium**

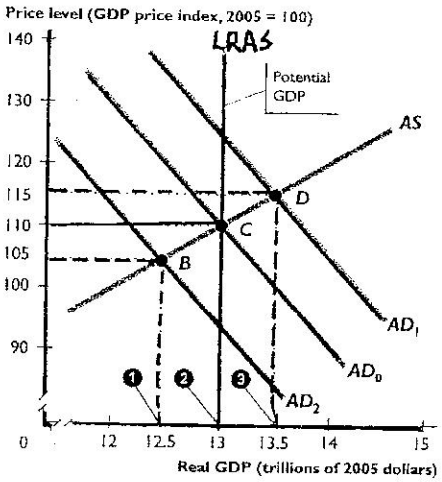
(1) **Full employment equilibrium**: When $Y_s = Y_d = Y_p$ (potential RGDP) & UR = NUR→ full employment.
(2) **Above full employment equilibrium**: When $Y_s = Y_d > Y_p$ & UR < NUR → inflationary gap.
(3) **Below full-employment equilibrium**: When $Y_s = Y_d < Y_p$ & UR > NUR → recessionary gap.

Macroeconomic Equilibrium



(a) Macroeconomic equilibrium

Macroeconomic equilibrium occurs at the intersection of the AD and AS curves. Macroeconomic equilibrium might be below full employment, at full employment, or above full employment.



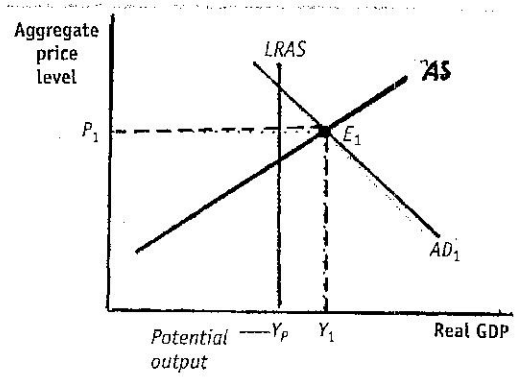
(b) Three types of macroeconomic equilibrium

1 Below full-employment equilibrium
2 Full-employment equilibrium
3 Above full-employment equilibrium

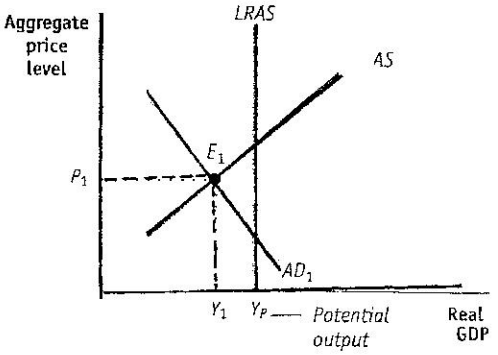
21.

(1) **Inflationary gap**: A gap exists when $Y > Y_p$ and that brings a rising price level, i.e., P↑.
(2) **Recessionary gap**: A gap exists when $Y < Y_p$ and that brings a falling price level, i.e., P↓.

Inflationary Gap



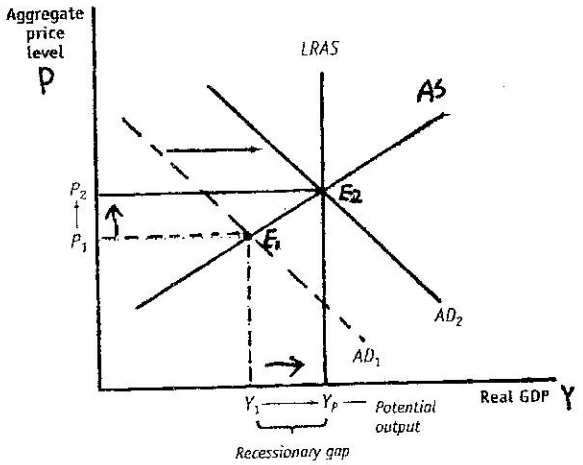
Recessionary Gap



22. **Using macroeconomic policy to close the recessionary or inflationary gap.**

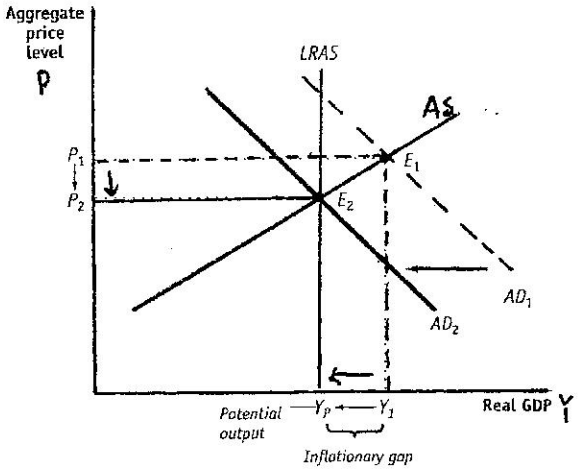
Economists generally believe government can use macroeconomic policy, i.e., monetary policy and fiscal policy, to manage short-run economic fluctuations and adverse events in the economy. In other words, government can use macroeconomic policy to smooth out the business cycle.

(1) If there is a recessionary gap we can use expansionary fiscal policy (i.e., T↓, G↑, TR↑) and expansionary monetary policy (i.e., M↑) to close the recessionary gap.



At E_1, $Y_1 < Y_p$, there is a recessionary gap of $Y_1 - Y_p < 0$. An expansionary fiscal policy or monetary policy shifts AD rightward. The recessionary gap can be closed by shifting AD_1 to AD_2 moving the economy to a full macroeconomic equilibrium E_2

(2) If there is an inflationary gap we can use contractionary fiscal policy (i.e., T↑, G↓, TR↓) and contractionary monetary policy (i.e., M↓) to close the inflationary gap.



At E_1, $Y_1 > Y_p$, there is an inflationary gap of $Y_1 - Y_p > 0$. A contractionary fiscal policy or monetary policy shifts AD leftward. The inflationary gap can be closed by shifting AD_1 to AD_2 moving the economy to a full macroeconomic equilibrium E_2

23. **Business cycle**

The business cycle occurs because AD and AS fluctuate but the money wage rate (W) does not adjust quickly enough to keep RGDP = potential GDP (Y_p).

Aggregate Demand (AD) Fluctuations

24. Fluctuations in AD:

(1) **Positive demand shock:**

Cause: A↑ → AD↑

Effect:

(a) Full **macroeconomic equilibrium**: $P = P_0 = 110$, $Y = Y_p = 13$ and UR = NUR.

(b) **Short-run effect**: AD↑→ P↑ and ($P_1 = 115 > P_0 = 110$); Y↑ and $Y_1 = 13.5 > Y_p = 13$ (inflationary gap) → W remains the same → the economy moves along AS curve.

(c) **Long-run effect**: the economy can not produces $Y_1 > Y_p$ forever because P↑ and W remains the same → (W/P)↓→ UR < NUR→ unemployment↓→ workers demand higher wages W↑ → AS↓ → P↑ and $P_2 = 125 > P_1 = 115 > P_0 = 110$; Y↓ and UR↑→ $Y_2 = Y_p = 13$ and UR = NUR.

(2) Negative demand shock

Cause: $A\downarrow \rightarrow AD\downarrow$

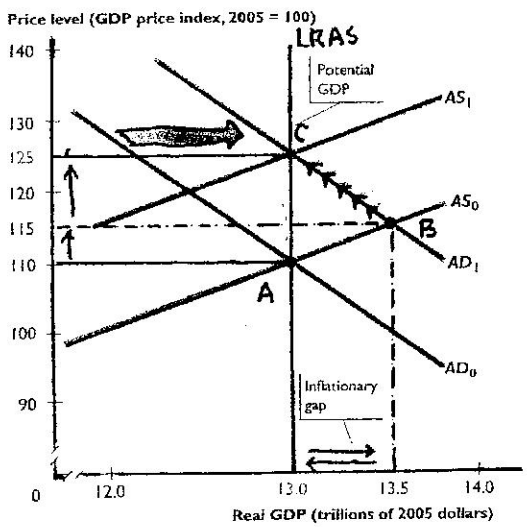
Effect:

(a) Full **macroeconomic equilibrium**: $P = P_0 = 125$, $Y = Y_p = 13$ and $UR = NUR$.

(b) **Short-run effect**: $AD\downarrow \rightarrow P\downarrow$ and ($P_1 = 120 > P_0 = 125$); $Y\downarrow$ and $Y_1 = 12.5 < Y_p = 13$ (recessionary gap) $\rightarrow$ W remains the same $\rightarrow$ the economy moves along AS curve.

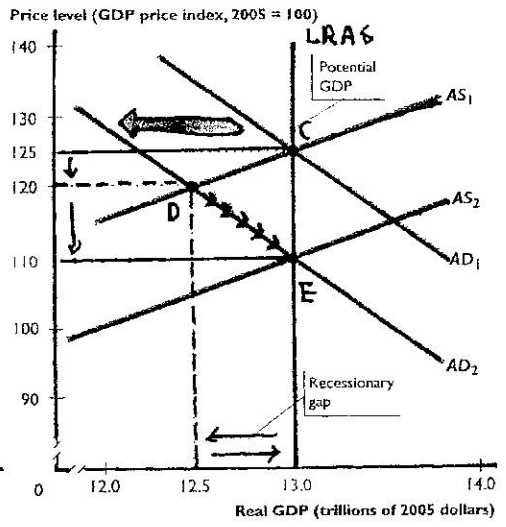
(c) **Long-run effect**: the economy can not produces $Y_1 < Y_p$ forever because $P\downarrow$ and W remains the same $\rightarrow (W/P)\uparrow \rightarrow UR > NUR \rightarrow$ unemployment$\uparrow \rightarrow$ workers accept lower wages $W\downarrow \rightarrow AS\uparrow \rightarrow P\downarrow$ and $P_2 = 110 > P_1 = 120 > P_0 = 125$; $Y\uparrow$ and $UR\downarrow \rightarrow Y_2 = Y_p = 13$ and $UR = NUR$.

Adjustment Toward Full Employment



(a) Adjustment to full employment from increase in *AD*

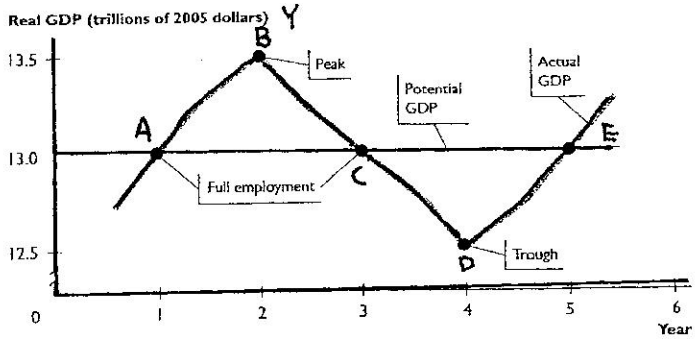
In part (a), real GDP exceeds potential GDP—an inflationary gap. The money wage rate rises, aggregate supply decreases, real GDP decreases to $13 trillion and the price level rises to 125.



(b) Adjustment to full employment from decrease in *AD*

In part (b), potential GDP exceeds real GDP—a recessionary gap. The money wage rate falls, aggregate supply increases, real GDP increases to $13 trillion and the price level falls to 110.

An Aggregate Demand Cycle



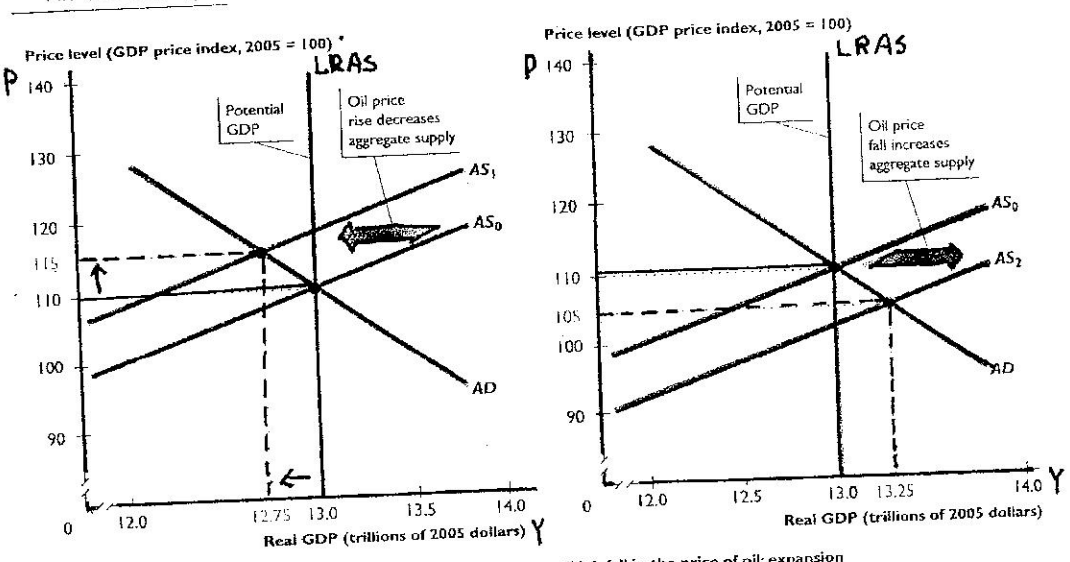
Aggregate Supply Fluctuations

26. Fluctuations in AS:

(1) **Negative Supply Shock**
Cause: $P_R\uparrow$(oil price rises) → AS↓
Effect:
(a) Full **macroeconomic equilibrium:** $P = P_0 = 110$, $Y = Y_p = 13$ and UR = NUR.
(b) **Short-run effect:** AS↓ → P↑ and ($P_1 = 115 > P_0 = 110$); Y↓ and $Y_1 = 12.75 < Y_p = 13$ → Y↓ and UR > NUR, the economy experiences recession and P↑, the economy experiences inflation → the economy moves along AD curve. →
A combination of recession and inflation is called ***stagflation***.

(2) **Positive Supply Shock**
Cause: $P_R\downarrow$(oil price rises) → AS↑
Effect:
(a) Full **macroeconomic equilibrium:** $P = P_0 = 110$, $Y = Y_p = 13$ and UR = NUR.
(b) **Short-run effect:** AS↑ → P↓ and ($P_1 = 105 < P_0 = 110$); Y↑ and $Y_1 = 13.25 > Y_p = 13$ → Y↑ and UR< NUR, the economy experiences expansion and moves above full Employment.

An Oil Price Cycle



(a) A rise in the price of oil: stagflation

In part (a), a rise in the price of oil decreases aggregate supply and shifts the AS curve leftward to AS_1. Real GDP decreases to $12.75 trillion, and the price level rises to 115.

(b) A fall in the price of oil: expansion

In part (b), a fall in the price of oil increases aggregate supply and shifts the AS curve rightward to AS_2. Real GDP increases to $13.25 trillion, and the price level falls to 105.

27. We have seen that the economy is self-correcting in the long run; it will eventually trend back to potential GDP. Most economists believe that the process of self-correction takes several years – typically a decade or more. In particular, if RGDP (Y) is below potential GDP (Yp), the economy can suffer an extended period of depress aggregate output and high unemployment before it return to normal. This belief is the background to one of the most famous quotations in economics. JM Keynes's declaration, "In the long run we are all dead." Economists usually interpret Keynes as having recommended that government does not wait for the economy to correct itself. Instead, it is argued by many economists, but not all, that government should use monetary and fiscal policy to get the economy back to potential GDP, (i.e., full employment).

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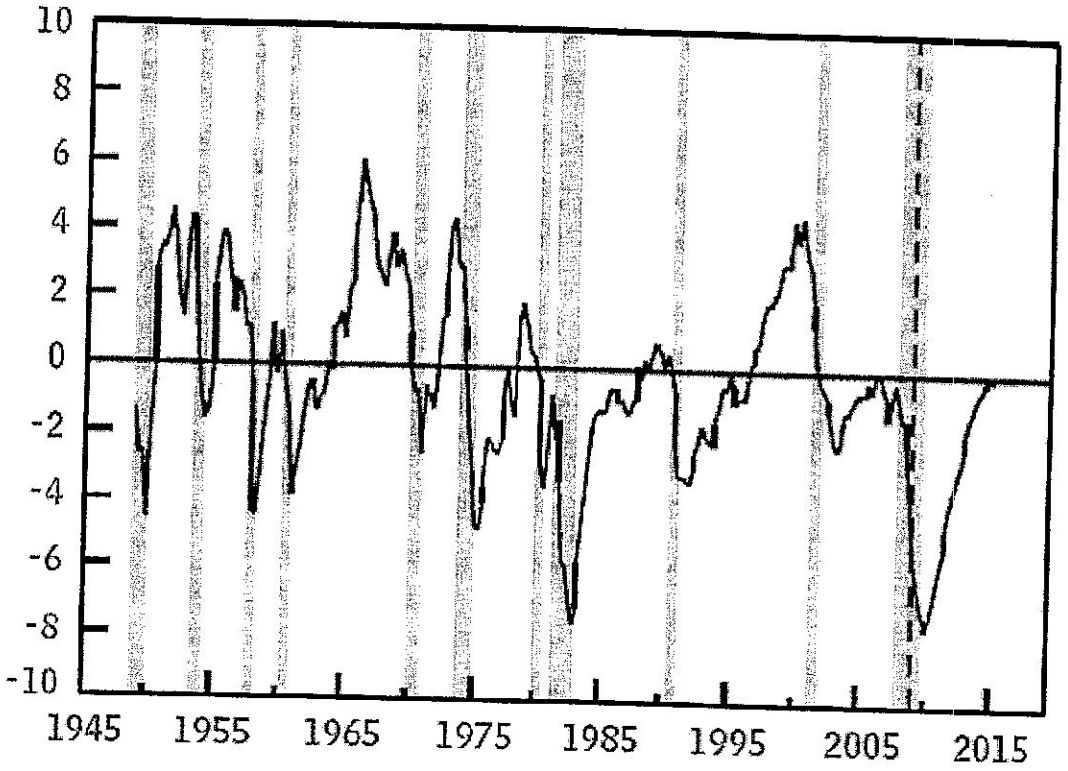
Output Gap = [(Y-Yp)/Yp]x100%

The GDP Gap, 1949 to 2019

(Percentage of potential gross domestic product)



Sources: Congressional Budget Office; Department of Commerce, Bureau of Economic Analysis.