

The Aggregate Demand-Aggregate Supply (AD-AS) Model

Chapter 9

The AD-AS Model

- The AD-AS Model addresses two deficiencies of the AE Model:
 - No explicit modeling of aggregate supply.
 - Fixed price level.

2

The AD-AS Model

- The AD-AS model consists of three curves:
 - The aggregate demand curve, AD.
 - The short-run aggregate supply curve, SAS.
 - The long-run aggregate supply curve, LAS.

3

The AD-AS Model

- The AD-AS model is fundamentally different from the microeconomic supply/demand model.

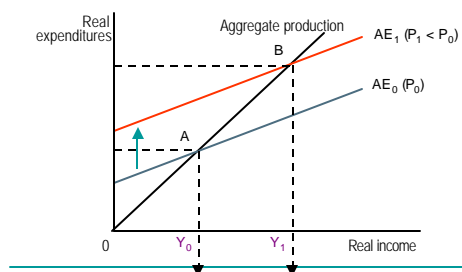
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The Aggregate Demand Curve

- The **aggregate demand (AD) curve** shows combinations of price levels and real income where the goods market is in equilibrium.
- The AD curve is an equilibrium curve.
- The AD curve can be derived from the AE model:

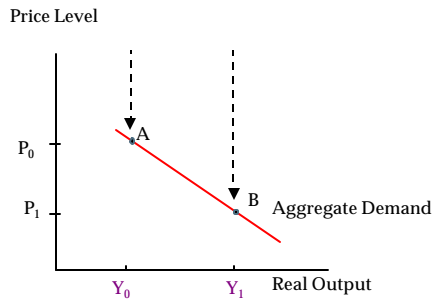
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Derive the Aggregate Demand Curve



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Derive the Aggregate Demand Curve



7

The Slope of the AD Curve

- The AD is a downward sloping curve.
- Aggregate demand is composed of the sum of aggregate expenditures:

$$\text{Expenditures} = C + I + G + (X - IM)$$

8

The Slope of the AD Curve

- The slope of the AD curve is determined by
 - the wealth effect,
 - the interest rate effect,
 - the international effect, and
 - the multiplier effect.

9

The Wealth Effect

- **Wealth effect** – a fall in the price level will make the holders of money and other financial assets richer, so they buy more goods and services.
- Most economists accept the logic of the wealth effect, however, they do not see the effect as strong.

10

The Interest Rate Effect

- **Interest rate effect** – a lower price level raises real money balances, lowers the interest rate, and increases investment spending.

11

The Interest Rate Effect

- The interest rate effect works as follows:

*a decrease in the price level \bar{P}
increase of real cash \bar{P}
banks have more money to lend \bar{P}
interest rates fall \bar{P}
investment expenditures increase.*

12

The International Effect

- **International effect** – as the Canadian price level falls (assuming exchange rates do not change), net exports will rise.
 - Exports rise
 - Imports fall

13

The International Effect

- The international effect works as follows:
 - a decrease in the price level in Canada P
 - the fall in price of our goods relative to foreign goods P
 - our goods become more competitive internationally P
 - Canadian exports rise and imports fall.

14

The Multiplier Effect

- Initial changes in expenditures set in motion a process in the economy that amplifies the initial effects.
- **Multiplier effect** – the amplification of initial changes in expenditures.

15

The Multiplier Effect

- The multiplier effect works as follows:
 - an increase in the price level in the Canada P
 - exports fall and imports rise P
 - Canadian firms lose sales and cut output P
 - our incomes fall P
 - households buy less P
 - firms cut back again P and so on.

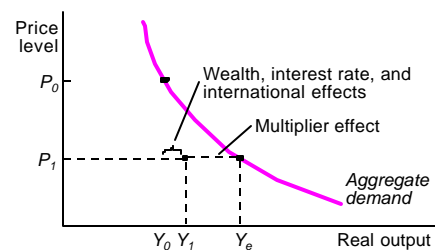
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The Multiplier Effect

- The multiplier effect amplifies the initial wealth, interest rate, and international effects, making the AD curve flatter than it would have been.

17

The AD Curve



18

Shifts in the AD Curve

- **Except for a change in the price level,** anything that changes aggregate expenditures shifts the AD curve.
- The main shift factors are:
 - Foreign income.
 - Exchange rate fluctuations.
 - Expectations about future output or prices.
 - The distribution of income.
 - Monetary and fiscal policies.

19

Foreign Income

- When our trading partners go into a recession, the demand for Canadian goods (exports) will fall.
- The Canadian AD curve shifts to the left.

20

Exchange Rates

- When a country's currency loses value relative to other currencies:
 - Export goods produced in that country become less expensive.
 - Imports into that country become more expensive.
- The AD curve will shift to the right.

21

Exchange Rates

- When a country's currency gains value, the AD curve shifts to the left.
 - Foreign demand for its goods decreases.
 - Its demand for foreign goods increases.

22

Expectations

- If businesses expect demand to be high in the future, they will want to increase their capacity to produce, so the demand for investment will increase.
- For consumer, expectations of a strong economy or higher incomes or prices in the future will cause consumption to increase.
- In both cases, the AD curve will shift to the right.

23

Distribution of Income

- Wage earners tend to spend a greater percentage of their income than earners of profit income, who tend to be wealthy.
- It is likely that AD will shift to the right if the distribution of income moves from earners of profit to wage earners.

24

Monetary and Fiscal Policy

- **Macro policy** is the deliberate shifting of the AD curve to influence the level of income in the economy.
 - **Expansionary macro policy** shifts the curve to the right.
 - **Contractionary macro policy** shifts it to the left.

25

Fiscal Policy

- If the federal government spends lots of money, AD shifts to the right.
- If it raises taxes, household incomes will fall, they will spend less, and AD shifts to the left.

26

Monetary Policy

- When the Bank of Canada expands the money supply, it can lower interest rates.
- AD will shift to the right.

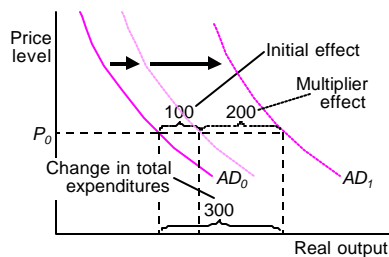
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Multiplier Effects of Shift Factors

- Because of the multiplier effect, a change in a shift factor of the AD curve moves the curve by more than the initial shift.

28

Effect of a Shift Factor on the AD Curve



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Short-Run Aggregate Supply Curve

- The **short-run aggregate supply (SAS) curve** specifies how a shift in the aggregate demand curve affects the price level and real output in the short run, other things constant.

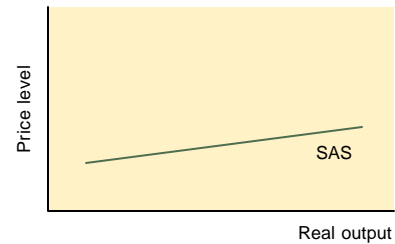
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Short-Run Aggregate Supply Curve

- The **Short-run aggregate supply (SAS) curve** shows how firms adjust the quantity of real output they will supply when the price level changes, holding all input prices fixed.

31

Short-Run Aggregate Supply Curve



32

Slope of the SAS Curve

- The SAS curve is upward-sloping.
- The SAS curve reflects the fact that firms adjust both price and quantity in response to changes in aggregate demand.

33

Slope of the SAS Curve

- Price adjustments may happen quickly or slowly.
- High **menu costs** – the costs associated with changing prices – can result in reluctance to change prices.

34

Shifts in the SAS Curve

- The SAS curve shifts when a shift factor changes – other things are not constant:
 - Changes in costs of production.
 - Changes in expectations of inflation.
 - Productivity.
 - Excise and sales taxes.
 - Import prices.

35

Shifts in the SAS Curve

- Costs of production include wage rates, interest rates, energy prices, and prices of other factors of production.
- SAS will shift in response to the change in productivity, as well as change in costs of production.

36

Shifts in the SAS Curve

- When input prices are raised, the curve shifts up.
- When input prices are lowered, the curve shifts down.

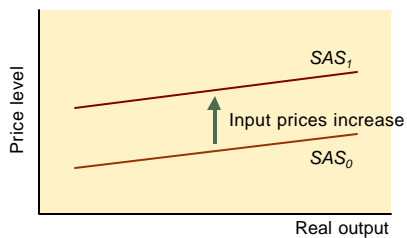
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Shifts in the SAS Curve

- An increase in productivity reduces the cost of production and shifts the SAS curve down.
- A decrease in productivity shifts the curve up.

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Shifts in the SAS Curve



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Long-Run Aggregate Supply Curve

- The *long-run supply curve* shows the amount of goods and services an economy can produce when both labour and capital are fully employed.

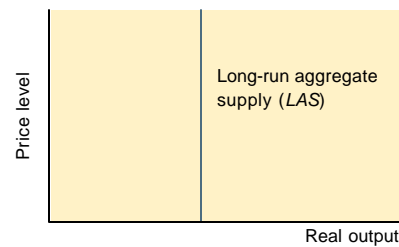
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Long-Run Aggregate Supply Curve

- The *LAS* is vertical.
- At potential output, a rise in the price level means that all prices, including input prices rise.
- Available resources do not rise, thus, neither does the potential output.

41

Long-Run Aggregate Supply Curve



42

Potential Output and the LAS Curve

- The position of the long-run aggregate supply curve is determined by potential output.
- **Potential output** – the amount of goods and services an economy can produce when both labor and capital are fully employed.

43

Shifts in the LAS Curve

- The *LAS* curve will shift whenever there is a changes in:
 - Capital
 - Available resources
 - Growth-compatible institutions
 - Technology
 - Entrepreneurship.
- Recall, this is the same as discussion about growth in Chapter 7.

44

Equilibrium in the Aggregate Economy

- Changes in the *AD*, *SAS*, and *LAS* curves affect short-run and long-run equilibrium.

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Short-Run Equilibrium

- Short-run equilibrium is where the *SAS* and *AD* curves intersect.

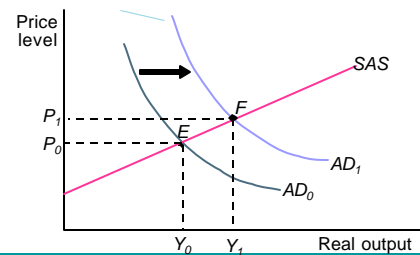
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Short-Run Equilibrium

- Increases in aggregate demand lead to higher real output and a higher price level.
- An upward shift in the *SAS* curve leads to lower real output and a higher price level.

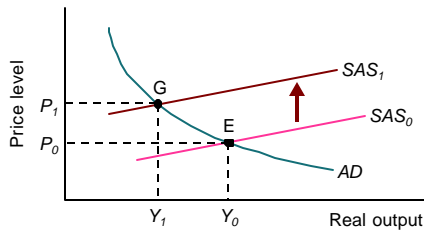
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Short-Run Equilibrium: Shift in Aggregate Demand



48

Short-Run Equilibrium: Shift in Aggregate Supply



49

Long-Run Equilibrium

- Long-run equilibrium is where the *AD* and long-run aggregate supply curves intersect.
- In the long run, output is fixed and the price level is variable.
- *SAS* will adjust to meet *AD* at *LAS* in the long run.

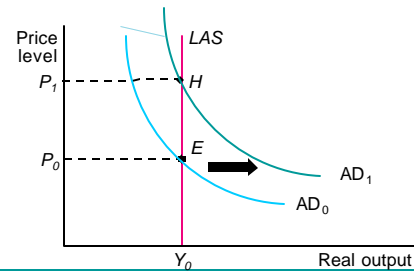
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Long-Run Equilibrium

- Aggregate demand determines the price level.
- Increases in aggregate demand lead to higher prices.

51

Long-Run Equilibrium: Shift in Aggregate Demand



52

Integrating the Short-Run and Long-Run Frameworks

- The economy is in both short-run and long-run equilibrium when all three curves intersect in the same location.

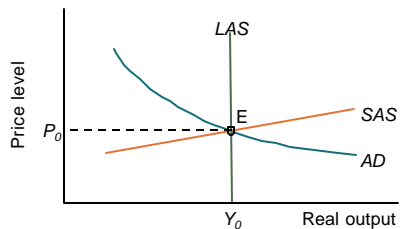
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Integrating the Short-Run and Long-Run Frameworks

- The ideal situation is for aggregate demand to grow at the same rate as aggregate supply and potential output.
- Unemployment and growth are at their target rates with no inflation.

54

Long-Run Equilibrium



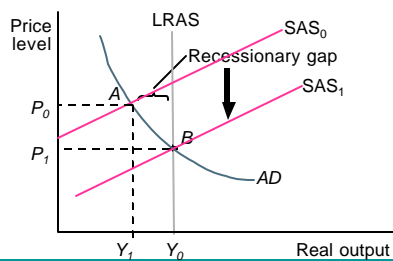
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Recessionary Gap

- A **recessionary gap** is the amount by which equilibrium output is below potential output.
- If the economy remains at this level for a long time, there would be an excess supply of factors of production (i.e., unemployment).
- Costs and wages would tend to fall.
- As factor prices fall, the SAS curve will shift down to eliminate the recessionary gap.

56

Recessionary Gap



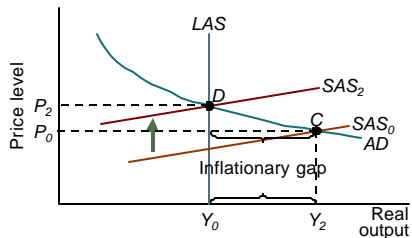
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The Inflationary Gap

- An **inflationary gap** occurs when equilibrium output is above potential.
- Factor prices rise as firms compete for resources, causing the SAS curve to shift up.
- The price level rises, and the inflationary gap is eliminated.

58

The Inflationary Gap



59

59

The Economy Beyond Potential

- When the economy operates below potential, firms can hire additional factors of production without increasing its costs.
- Once the economy reaches its potential, firms compete for inputs and costs rise.
- This cause the short-run AS curve to shift up.
- The economy will slow down by itself or the government will introduce policies to reduce output and eliminate the inflationary gap.

60

Aggregate Demand Policy

- **Fiscal policy** – the deliberate change in either government spending or taxes to stimulate or slow down the economy.

61

Aggregate Demand Policy

- **Expansionary fiscal policy** is appropriate if aggregate income is too low.
- The government can decrease taxes or increase government spending, but the deficit will increase.
- The AD curve shifts to the right.

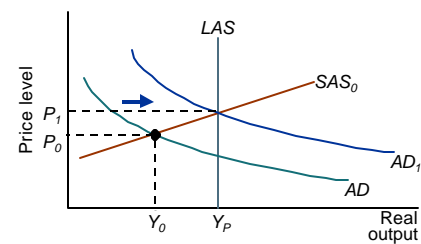
62

Expansionary Fiscal Policy

- Suppose unemployment is 12 percent and there is no inflation.
- What policy would you recommend?
- *Use expansionary fiscal policy to shift the AD curve rightward to its potential income.*

63

Expansionary Fiscal Policy



64

64

Aggregate Demand Policy

- **Contractionary fiscal policy** is appropriate if aggregate income is too high.
- The government can increase taxes or decrease government spending and the deficit will decrease.
- The AD curve shifts to the left.

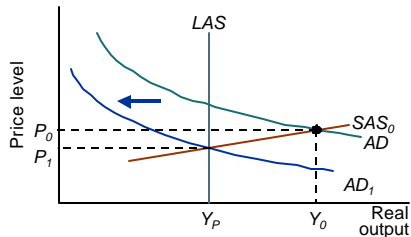
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Contractionary Fiscal Policy

- Suppose unemployment is below its target rate and it is likely that consumer expenditures will rise further.
- What policy would you recommend?
- *Use contractionary fiscal policy to shift the AD curve leftward to counteract the expected additional increase in AD.*

66

Contractionary Fiscal Policy



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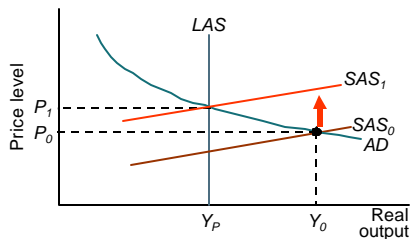
67

Economy Above Potential

- What would have happened if the government didn't institute a contractionary fiscal policy?
- *There would be an inflationary gap which would increase factor prices.*
- *The SAS curve would shift up until it intersects the AD curve at Y_P .*

68

Economy Above Potential



69

68

Macro Policy Is More Complicated Than It Looks

- The problem in the AS/AD model is that we have no way of knowing the level of potential output.
- As a result, it is difficult to predict whether the SAS curve will be shifting up or not when aggregate demand increases.

70

Three Policy Ranges

- An economy has three policy ranges where the effect of an expansion of AD on the price level will be different:
 - The Keynesian range
 - The Classical range
 - The intermediate range.

71

Three Policy Ranges

- The **Keynesian range** – when the economy is far from potential income, and there is little fear that an increase in aggregate demand will cause the SAS curve to shift up and cause inflationary pressure.
- The SAS is horizontal in this range, because all firms are quantity adjusters and will not increase prices.

72

Three Policy Ranges

- In the Keynesian range an increase in aggregate demand will increase income and have no effect on the price level.
- The price/output path of the economy is horizontal so that prices are fixed.
- The Keynesian range corresponds to the recessionary gap and it is because of this that Keynesian economics is sometimes called depression or recession economics.

73

Three Policy Ranges

- The **Classical range** –the economy is above the level of potential output so that any increase in aggregate demand will increase factor prices.
- The SAS curve is pushed up by the full amount of the aggregate demand increase.

74

Three Policy Ranges

- In the Classical range, an increase in aggregate demand will push up the price level and not affect real output.
- The price/output path is vertical so that prices are flexible.
- The Classical range corresponds to the inflationary gap.

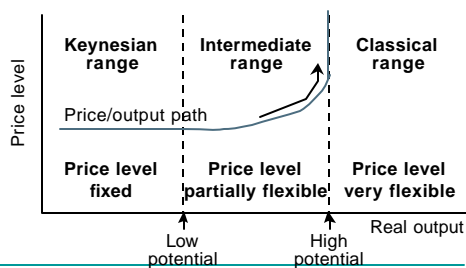
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Three Policy Ranges

- The **intermediate range** – when the economy is between the two ranges, both the price level and real output will rise.
- The ratio between the two increases is determined by how close the economy is to its potential income.
- In the intermediate range, the price/output path of the economy is upward sloping.
- The economy is usually in this range.

76

Three Ranges of the Economy



77

The Problem of Estimating Potential Output

- A key to policy is determining which range we are in, which requires us to determine the level of potential output, although estimating it is difficult.
- One way of estimating potential output is to estimate the rate of unemployment below which inflation has begun to accelerate in the past.
- This is called the **target rate of unemployment**.

78

The Problem of Estimating Potential Output

- One can then calculate output at the target rate of unemployment, adjust for productivity growth, and estimate potential output.
- Unfortunately, the target rate of unemployment fluctuates and is difficult to predict.
- For example, we don't know if we are dealing with structural or cyclical unemployment.

79

The Problem of Estimating Potential Output

- Another way to determine potential output is to add the normal growth factor (3%) to the economy's previous level.
- Estimating the economy's potential from past growth rates is complicated by potentially dramatic changes in regulations, technology, and expectations.

80

Some Real-World Examples: Canada

In the mid-1990s:

- Unemployment was 9% — high by normal standards — while inflation was 2%.
- Economists felt that the output was in the intermediate range, and near its potential.
- If the economy expanded, the result would be inflation, not strong growth.

81

Some Real-World Examples: Japan

In the late 1990s:

- Unemployment was at 4.6% and inflation was less than 1%.
- The majority of economists believed that the economy had room for expansion and was far below potential compared to other industrial countries.

82

Some Real-World Examples: Europe

In the mid-1990s:

- Unemployment was above 10 percent leading economists to think the EU was in the Keynesian range.
- The EU was undergoing a restructuring of its economy.

83

Some Real-World Examples: U.S.

In the mid-1990s:

- The economy was expanding slowly albeit accompanied with major structural changes.
- As firms expanded, they often simultaneously laid off workers.
- These structurally unemployed workers needed retraining which took time.

84

Some Real-World Examples: U.S.

- Economists maintained that unemployment below 6.5 percent would generate inflation.
- The unemployment rate fell to 5 percent – with no inflation
- Then to almost 4 percent – and still no inflation.

85

Debates About Potential Output

- Knowing potential output is crucial in knowing what policy to advocate.
- According to *real business cycle economists*, the best estimate of potential output is the actual income in the economy.
- Their Classical supply-side explanation is called *real business cycle theory*.
 - All changes in the economy result from real shifts—shifts in potential output—that reflect real causes, such as technological changes.

86

The Aggregate Demand- Aggregate Supply (AD-AS) Model

End of Chapter 9