Chapter 29: Aggregate Demand and Aggregate Supply

CHAPTER OVERVIEW

- The aggregate expenditures model developed in Chapter 28 is a fixed-price-level model.
  - Its focus is on changes in real GDP, not on changes in the price level.
- This chapter introduces a variable-price model in which it is possible to simultaneously analyze changes in real GDP and the price level.
  - What we learn in this chapter will help organize our thoughts about equilibrium GDP, the price level, and government macroeconomic policies.
  - The tools learned will be applied in later chapters.
- The present chapter introduces the concepts of aggregate demand and aggregate supply, explaining the shapes of the aggregate demand and aggregate supply curves and the forces causing them to shift.
- The equilibrium levels of prices and real GDP are considered.
- Finally, the chapter analyzes the effects of shifts in the aggregate demand and/or aggregate supply curves on the price level and size of real GDP.
Objectives

- Define aggregate demand and aggregate supply.
- Give three reasons why the aggregate demand curve slopes downward.
- State the determinants of the aggregate demand curve’s location, and explain how the curve will shift when one of these determinants changes.
- Distinguish between an initial shift in aggregate demand and the full shift after multiplier effects have been incorporated.
- Explain the shape of the long-run aggregate supply curve.
- Explain the shape of the short-run aggregate supply curve.
- Indicate the determinants of the aggregate supply curve’s location, and explain how the curve will shift when one of those determinants changes.
- Find an economy’s equilibrium price level and real domestic output using AD-AS.
- Explain how the multiplier effect is weakened when there is demand-pull inflation.
- Demonstrate and explain how a decrease in aggregate demand can cause a recession without a drop in the price level.
- Demonstrate and explain the effects of shifts in aggregates supply on the equilibrium price level and real domestic output of an economy.
- Explain how an economy can maintain full employment and stable prices under conditions of rising aggregate demand.
- Explain how the impact of oil price fluctuations has changed for the U.S. economy over the past couple decades.
- Define and identify terms and concepts at the end of the chapter and in the appendix.
Introduction to AD-AS Model

• **Learning objectives**
  
  – About aggregate demand (AD) and the factors that cause it to change.
  
  – About aggregate supply (AS) and the factors that cause it to change.
  
  – How AD and AS determine an economy’s equilibrium price level and level of real GDP.
  
  – How the AD-AS model explains periods of demand-pull inflation, cost-push inflation, and recession.

• AD-AS model is a variable price model. The aggregate expenditures model in Chapter 28 assumed constant price.

• AD-AS model provides insights on inflation, unemployment and economic growth.
Aggregate Demand

- **Aggregate demand** is a schedule or curve that shows the various amounts of real domestic output that domestic and foreign buyers collectively will desire to purchase at each possible price level.

  - The aggregate demand curve is shown in Figure 29.1 and PPT 29-4.

  - It shows an inverse relationship between price level and real domestic output.

    * When the price level rises, the quantity of real GDP demanded decreases, and vice versa.

  - The explanation of the inverse relationship is not the same as for demand for a single product, which centered on substitution and income effects.

    * When the price of an *individual* product falls, the consumer’s (constant) nominal income allows a larger purchase of the product (the income effect), and as price falls, the consumer wants to buy more of the product because it becomes less expensive than other goods (the substitution effect).
– **Substitution effect** doesn’t apply within the scope of domestically produced goods, since there is no substitute for “everything.”

– **Income effect** also doesn’t apply in the aggregate case, since income now varies with aggregate output.

* When consumers pay lower prices for goods and services, less nominal income flows to resource suppliers in the form of wages, rents, interest, and profits.

* As a result, a decline in the price level does not mean an increase in the nominal income.
What is the explanation of the inverse relationship between price level and real output in aggregate demand?

- **Real balances effect:**
  
  - When price level falls (rises), the purchasing power of existing financial balances [accumulated savings balance] rises (falls), which can increase (decrease) spending.
  
  * e.g., a higher prices level erodes the purchasing power of savings accounts or bonds, the public is poorer in real terms and will reduce its spending.

- **Interest rate effect:**
  
  - A decline (rise) in price level means lower (higher) interest rates that can increase (decrease) levels of certain types of spending.
  
  * A higher price level increases the demand for money. So, given a fixed supply of money, an increase in money demand will drive up the price (interest rate) paid for its use.

- **Foreign purchases effect:**
  
  - When price level falls, other things being equal, U.S. prices will fall relative to foreign prices, which will tend to increase spending on U.S. exports and also decrease import spending in favor of U.S. products that compete with imports. (Similar to the substitution effect.)
• **Joint effects:**
  
  – e.g., a decline in the price level increases consumption through the real-balances effect and interest-rate effect, increases investment through the interest rate effect, and raises net exports by increasing exports and decreasing imports through the foreign purchases effect.
Determinants of aggregate demand

- **Determinants** (*aggregate demand shifters*) are the “other things” (besides price level) that can cause a shift or change in demand.
  - Involve 2 components:

1. Change in fixed variable
2. Multiplier effect

   - A multiplier effect produces a greater ultimate change in aggregate demand than the initiating change in spending.

   - see Figure 29.2 in text or ppt 29-8.
Effects of the following determinants:

- **Changes in consumer spending,**
  
  - see Figure 29.2 in text or ppt 29-8.
  
  - If consumers buy more (less) output, the AD curve will shift to the right (left), from $AD_1$ to $AD_2$ ($AD_3$).

which can be caused by changes in several factors.

- **Consumer wealth**
  
  * Consumer wealth is the total dollar value of all assets (stocks, bonds, real estate) owned by consumers in the economy less the dollar value of their liabilities [debt] (mortgages, car loans, credit card balances).
  
  * *wealth effect* shifts the AD curve to the right.
  
  * *reverse wealth effect* shifts the AD curve to the left.

- **Household borrowing**
  
  * Increase (decrease) in borrowing for consumption shifts the AD curve to the right (left).

- **Consumer expectations**
  
  * Expecting future real incomes to rise (fall) shifts the AD curve to the right (left).
  
  * Expecting inflation to rise (fall) shifts the AD curve to the right (left).
– **Household debt**

  * Increase (decrease) their savings rates to pay off their debts shifts the AD curve to the left (right).

– **Taxes**

  * Reduction (increase) in personal income tax rates raises (reduces) consumer purchases, shifts the AD curve to the right (left).

• **Changes in investment spending,**

  – see Figure 29.2 in text or ppt 29-8.

  – A decline (increase) in investment spending will shift the AD curve to the left (right), from $AD_1$ to $AD_3$ ($AD_2$),

  which can be caused by the following factors:

  – **Interest rates**

    * An increase (decrease) in real interest rates will lower (raise) investment spending and reduce (increase) AD.

    * Here, we are not referring “interest-rate effect” that results from a change in the price level.

    * A change in real interest rates result from, say, a change in a nation’s money supply.

    * An increase (decrease) in the money supply lowers (raises) the interest rate, thereby increasing (reducing) investment and AD.
– **Expected returns**

* Higher (lowers) expected return on investment project will increase (decrease) the demand for capital goods and shift the AD curve to the right (left),

which are a function of

* **Expected future business conditions**
  
  · If firms are optimistic (pessimistic) about future business conditions, they are more likely to forecast high (low) rates of return and therefore may invest more (less) today.

* **Technology**

  · New and improved technologies enhance expected returns on investment and thus increase AD.

* **Degree of excess capacity**

  · A rise in excess capacity - unused capital - will reduce the expected returns on new investment and thus decrease AD.

* **Business taxes**

  · An increase (decrease) in business taxes will reduce (increase) after-tax profits from capital investment and lower (raise) the expected returns and thus investment and AD will decline (increase).
• **Changes in government spending.**
  
  – see Figure 29.2 in text or ppt 29-8.
  
  – An increase (reduction) in government purchase will shift the AD curve to the right (left), from $AD_1$ to $AD_2$ ($AD_3$).

• **Changes in net export spending** unrelated to price level,

  – see Figure 29.2 in text or ppt 29-8.
  
  – A rise (decrease) in net exports will shift the AD curve to the right (left), from $AD_1$ to $AD_2$ ($AD_3$).

which can be caused by the following factors:

  – **National income abroad:**
    * Rising (reducing) national income abroad encourages (discourages) foreigners to buy more products, including overseas products.

  – **Exchange rates:**
    * Depreciation of the dollar encourages U.S. exports since U.S. products become less expensive when foreign buyers can obtain more dollars for their currency.
    * Conversely, dollar depreciation discourages import buying in the U.S. because our dollars can’t be exchanged for as much foreign currency.
Aggregate Supply

- Aggregate supply is a schedule or curve showing the level of real domestic output available at each possible price level.

- **Aggregate supply in the immediate short-run**
  - The aggregate supply curve $AS_{ISR}$ is horizontal at a given price level due to the rigidity of prices.
  - Last anywhere from a few days to a few months, as long as both input and output prices are fixed.
  - Input prices could also be fixed in the immediate short-run, e.g., salaries are fixed by contracts for months or years.
  - Output prices could also be fixed in the immediate short-run, e.g., firms set fixed prices for their customers in the immediate short-run.
  - Refer to ppt p29-13 or Figure 29.3, the aggregate supply curve $AS_{ISR}$ is a horizontal line at price $P_I$, which is calculated from all of the individual prices set by the various firms in the economy.
  - The amount of output could be higher than or lower than the economy’s full-employment output level $Q_f$.
  - As long as firms are able to change their product prices, they can respond to changes in aggregate spending not only by increasing or decreasing output but also by raising or lowering prices → upward sloping short-run aggregate supply curve.
• **Aggregate supply in the short run**

  – Refer to Figure 29.4 or ppt p29-12.

  – The short run aggregate supply curve $AS$ is upward sloping.
    * When the price level rises (falls), real output rises (falls).

  – **input prices are fixed or highly inflexible,**
    * e.g., salaries are fixed by contracts

  – **but output prices can vary.**

  – The lag between product prices and resource prices makes it profitable for firms to increase output when the price level rises.

  – **To the left of full-employment output level $Q_f$, the curve is relatively flat.**
    * The relative abundance of idle inputs means that firms can increase output without substantial increases in production costs.
    * With little pressure on **per-unit production cost** including profit “costs”.

    \[
    \text{per-unit production cost} = \frac{\text{total input cost}}{\text{units of output}}
    \]

  – **To the right of full-employment output level $Q_f$, the curve is relatively steep.**
    * Shortages of inputs and production bottlenecks will require substantially higher prices to induce firms to produce.

  – References to ‘aggregate supply” in the remainder of the chapter apply to the short run curve unless otherwise noted.
• **Aggregate supply in the long run**
  
  – Refer to Figure 29.5 or ppt p29-10.
  
  – In the long run the aggregate supply curve \( AS_{LR} \) is vertical at the economy’s full-employment output \( Q_f \).
  
  – In the long run the economy will product the full-employment output \( Q_f \).
  
  – **Both input and output prices can vary.**
  
  – The curve is vertical because in the long run resources prices adjust to changes in the price level, leaving no incentive for firms to change their output.
Determinants of aggregate supply

- **Determinants of aggregate supply** or **aggregate supply shifters** are the “other things” besides price level that cause changes or shifts in aggregate supply.

  - Refer to ppt p29-15 or see Figure 29.6 in text.
  - These changes raise (lower) per-unit production costs at each price level or at each level of output, affect profits, thereby lead firms to alter the amount of producing output.

- **A change in input prices**

  - which can be caused by changes in several factors:

    1. **Domestic resource prices**
       * Wages and salaries make up about 75% of all business costs.
       * Immigration, pension income, etc, affect per-unit production costs.
       * The prices of land and capital inputs change.

    2. **Prices of imported resources**
       * A decrease (increase) in the price of imported resources, e.g., oil, tin, copper, increases (reduces) aggregate supply.
       * e.g., increase in the price of oil in 1970s drove up per-unit production costs and jolted the aggregate supply to the left.
3. Market power in certain industries.

- **Changes in productivity**

  \[
  \text{productivity} = \frac{\text{total output}}{\text{total input}}
  \]

  - Measure the relationship between a nation’s level of real output and the amount of resources used to produce that output.
  - measure the average real output, or real output per unit of input.
  
  can cause changes in per-unit production cost

  \[
  \text{production cost per unit} = \frac{\text{total input cost}}{\text{total output}}
  \]

  - If productivity rises, unit production costs will fall.
  - This can shift aggregate supply to the right and lower prices.
  - The reverse is true when productivity falls.
- Example: real output is 10 units, that 5 units of input are needed to produce that quantity, and that the price of each input unit is $2. then,

\[
\text{productivity} = \frac{\text{total output}}{\text{total input}} = \frac{10}{5} = 2
\]

\[
\text{production cost per unit} = \frac{\text{total input cost}}{\text{total output}} = \frac{2 \times 5}{10} = $1
\]

* Suppose productivity increases and real output doubles to 20 units while the price and quantity of the input remain constant. We have

\[
\text{productivity} = \frac{\text{total output}}{\text{total input}} = \frac{20}{5} = 4
\]

\[
\text{production cost per unit} = \frac{\text{total input cost}}{\text{total output}} = \frac{2 \times 5}{20} = $.5
\]

* AS curve shifts to the right.

- Productivity improvement is very important in business efforts to reduce costs.

- **Change in legal institutional environment**

- can be caused by changes in other factors:

  1. **Business taxes and/or subsidies**

     * Higher (lower) business taxes, e.g. sales, excise, and payroll taxes, increase (reduce) per-unit costs and reduce (increase) short-run AS, shift AS curve to the left (right).

     * A business subsidy – a payment or tax break by government to producers - lower production costs and increase short-run AS, shift AS curve to the right.
2. Government regulation

* More (less) regulation tends to increase (reduce) per-unit production costs and shift the AS curve to the left (right).

* However, deregulation could result in accounting manipulations, monopolization, and business failures and shift the AS curve to the left.
Equilibrium: Real Output and the Price Level

• *Equilibrium price and quantity are found where the aggregate demand and supply curves intersect*
  
  – See Key Graph 29.7 and PPT 29-17 for illustration of why quantity will seek equilibrium where curves intersect.
  
  – The equilibrium price level, $P$, is 100 and the equilibrium amount of GDP, $Q$, is $510 billion.

• *Increases in aggregate demand cause demand-pull inflation*
  
  – see Figure 29.8 or PPT 29-18.
  
  – Increases in aggregate demand increase real output and create upward pressure on prices, especially when the economy operates at or above its full employment level of output.
  
  * e.g., the escalation of the war in Vietnam resulted in a 40% increase in defense spending between 1965-1967 and 15% increase in 1968, shift the economy’s AD curve to the right.
  
  * Actual GDP exceeded potential GDP, thereby creating an inflationary GDP gap.
  
  – The multiplier effect weakens the further right the aggregate demand curve moves along the aggregate supply curve. More of the increase in spending is absorbed into price increases instead of generating greater real output.
The increase in AD from $AD_1$ to $AD_2$ increases real output only to $Q_1$, not to $Q_2$.

**Decreases in AD: recession and cyclical unemployment**

- If AD decreases, recession and cyclical unemployment may result.
- See Figure 29.9 or or PPT 29-19.
- Prices don’t fall easily.
  * Fear of price wars keeps prices from being reduced.
  * Menu costs discourage repeated price changes.
  * Wage contracts are not flexible so businesses can’t afford to reduce prices.
  * Employers are reluctant to cut wages because of impact on employee effort, etc. Employers seek to pay efficiency wages - wages that maximize work effort and productivity, minimizing cost.
  * Minimum wage laws keep wages above that level.
- AD shift to the left from $AD_1$ to $AD_2$, the output decline from $Q_f$ to $Q_1$ with no change in the price level.
  * Deflation, a decline in the price level, is a rarity in the American economy.
  * the decline of real output from $Q_f$ to $Q_1$ constitutes a *recession*, leads to it cyclical unemployment.
\( Q_1 - Q_f \) is a recessionary GDP gap, the amount by which actual output falls short of potential output.

* The multiplier is at full-strength.
  
  - This full-strength multiplier will exist when AD increases from \( AD_2 \) back to \( AD_1 \) since none of the increase in output would be dissipated as inflation.

- All recent recessions in the USA have mimicked the “GDP gap but no deflation” scenario

  * e.g., in 2001, GDP fell short of potential GDP by $67 billion, unemployment increased by 1.8 million workers, unemployment rate rose from 4.2% to 5.8%.

  * Although the rate of inflation fell (called \textit{disinflation}), the price level did not decline.

- **Decreases in AS: Cost-Push Inflation**

  - E.g., high energy prices would spread through the economy, driving up production and distribution costs.

  - see Figure 29.10 or or PPT 29-21.

  - The AS curve shifts leftward from \( AS_1 \) to \( AS_2 \), the economy moves from a to b, illustrates cost push inflation.

    * The price level rises from \( P_1 \) to \( P_2 \) and the real output declines from \( Q_f \) to \( Q_1 \).

  - e.g., in the USA in the mid-1970s when the price of oil rocketed upward – “aggregate supply shocks.”
- **Increases in AS: Full Employment with Price-Level Stability**

  - In the late 1990s, the USA experienced a combination of full employment, strong economic growth, and very low inflation.
    * incompatible with the AD-AS model???

  - Rightward shift in AD curve from $AD_1$ to $AD_2$ move the economy from a to b.
    * the real output would rise from full-employment output $Q_1$ to beyond-full-employment output $Q_2$.
    * The economy would experience inflation by the increase in the price level from $P_1$ to $P_3$.

  - see Figure 29.11 or or PPT 29-22,
    * also see Figure 29.8 or or PPT 29-18.

  - Higher inflation is the inevitable price paid for expanding output beyond the full-employment level.
    * But inflation remained mild in the late 1990s.

  - It is because the larger-than-usual increases in productivity, related to internet, occurred to move the AS curve rightward from $AS_1$ to $AS_2$.
    * The economy moves from a to c.
    * the real output increased from $Q_1$ to $Q_3$.
    * the price level increased from $P_1$ to $P_3$, mild inflation.
Has the Impact of Oil Prices Diminished?

- In the mid- and late 1970s, oil price shocks caused cost-push inflation, rising unemployment, and a negative GDP gap (stagflation).

- In the late 1980s and through most of the 1990s, oil prices fell, prompting OPEC (along with Mexico, Norway, and Russia) to restrict output and raise prices (up to $34 per barrel in March 2000). This price shock did not cause the cost-push inflation and recessionary conditions as with previous shocks.

- In 2005, conflict in the Middle East, combined with rapidly rising demand for oil in India and China, pushed oil prices above $60 per barrel (and over $70 per barrel in July 2006). U.S. inflation rose in 2005, but not core inflation (inflation rate minus price changes in food and energy).

- A number of reasons explain why oil price shocks have had less of an impact:
  
  1. Lower production costs from productivity increases have
offset inflationary pressures from oil price increases.

2. The amount of gas and oil used to produce each dollar of output has declined by about 50 percent since 1970. (from 14,000 BTUs to 7,000 BTUs per dollar of GDP).

3. Federal reserve monetary policy helped keep oil price increases from becoming generalized.
APPENDIX

The Relationship of the Aggregate Demand Curve to the Aggregate Expenditures Model

- Deriving AD-curve from aggregate expenditures model.
  - See Appendix Figure 1.
  - Both models measure real GDP on horizontal axis.
  - Suppose initial price level is P1 and aggregate expenditures AE1 as shown in Appendix Figure 1a. Equilibrium real domestic output is Q1. There will be a corresponding point on the aggregate demand curve (Point 1 on Appendix Figure 1b).
  - If price rises to P2, aggregate expenditures will fall to AE2 because purchasing power of wealth falls, interest rates may rise, and net exports fall. (See Appendix Figure 1a.) Then new equilibrium is at Q2. That generates a point (Point 2) up and to the left of Point 1 on Appendix Figure 1b.
  - If price rises to P3, real asset balance value falls, interest rates rise again, net exports fall and new equilibrium is at Q3. Again see Appendix Figures 1a and 1b.
  - Technically, the aggregate demand curve is found by drawing a line (or curve) through Points 1, 2, and 3 on Appendix Figure 1b.

Aggregate demand shifts and the aggregate expenditures model
Appendix Figure 2.

When there is a change in one of the determinants of aggregate demand, there will be a change in the aggregate expenditures as well. Look at Appendix Figure 2a.

The change in aggregate expenditures is multiplied and aggregate demand shifts by more than the initial change in spending (see Appendix Figure 2b). The text illustrates the multiplier effect of a change in investment spending.

Shift of AD curve = initial change in spending x multiplier

The effect of the shift on real domestic output and the price level will depend on the starting point relative to full-employment output, as well as the relative steepness of the aggregate supply curve.