Chapter Organization

- Determinants of Aggregate Demand in an Open Economy
- The Equation of Aggregate Demand
- How Output Is Determined in the Short Run
- Output Market Equilibrium in the Sort Run: The $DD$ Schedule
- Asset Market Equilibrium in the Short Run: The $AA$ Schedule
- Short-Run Equilibrium for an Open Economy: Putting the $DD$ and $AA$ Schedules Together
Chapter Organization

- Temporary Changes in Monetary and Fiscal Policy
- Inflation Bias and Other Problems of Policy Formulation
- Permanent Shifts in Monetary and Fiscal Policy
- Macroeconomic Policies and the Current Account
- Gradual Trade Flow Adjustment and Current Account Dynamics
- Summary
Chapter Organization

- Appendix I: The *IS-LM* Model and the *DD-AA* Model
- Appendix II: Intertemporal Trade and Consumption Demand
Introduction

- Macroeconomic changes that affect exchange rates, interest rates, and price levels may also affect output.
  - This chapter introduces a new theory of how the output market adjusts to demand changes when product prices are themselves slow to adjust.

- A short-run model of the output market in an open economy will be utilized to analyze:
  - The effects of macroeconomic policy tools on output and the current account
  - The use of macroeconomic policy tools to maintain full employment
Determinants of Aggregate Demand in an Open Economy

- **Aggregate demand**
  - The amount of a country’s goods and services demanded by households and firms throughout the world.

- The aggregate demand for an open economy’s output consists of four components:
  - Consumption demand \((C)\)
  - Investment demand \((I)\)
  - Government demand \((G)\)
  - Current account \((CA)\)
Determinants of Aggregate Demand in an Open Economy

- **Determinants of Consumption Demand**
  - Consumption demand increases as disposable income (i.e., national income less taxes) increases at the aggregate level.
    - The increase in consumption demand is less than the increase in the disposable income because part of the income increase is saved.
Determinants of Aggregate Demand in an Open Economy

- **Determinants of the Current Account**
  - The CA balance is viewed as the demand for a country’s exports \((EX)\) less that country's own demand for imports \((IM)\).
  - The CA balance is determined by two main factors:
    - The domestic currency’s real exchange rate against foreign currency \((q = EP*/P)\)
    - Domestic disposable income \((Y^d)\)
Determinants of Aggregate Demand in an Open Economy

How Real Exchange Rate Changes Affect the Current Account

• An increase in $q$ raises $EX$ and improves the domestic country’s $CA$.
  – Each unit of domestic output now purchases fewer units of foreign output, therefore, foreign will demand more exports.

• An increase $q$ can raise or lower $IM$ and has an ambiguous effect on $CA$.
  – $IM$ denotes the value of imports measured in terms of domestic output.
Determinants of Aggregate Demand in an Open Economy

- There are two effects of a real exchange rate:
  - Volume effect
    - The effect of consumer spending shifts on export and import quantities
  - Value effect
    - It changes the domestic output worth of a given volume of foreign imports.

- Whether the CA improves or worsens depends on which effect of a real exchange rate change is dominant.

- We assume that the volume effect of a real exchange rate change always outweighs the value effect.
Determinants of Aggregate Demand in an Open Economy

- How Disposable Income Changes Affect the Current Account
  - An increase in disposable income ($Y^d$) worsens the CA.
  - A rise in $Y^d$ causes domestic consumers to increase their spending on all goods.
### Table 16-1: Factors Determining the Current Account

<table>
<thead>
<tr>
<th>Change</th>
<th>Effect on current account, $CA$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real exchange rate, $EP^*/P\uparrow$</td>
<td>$CA\uparrow$</td>
</tr>
<tr>
<td>Real exchange rate, $EP^*/P\downarrow$</td>
<td>$CA\downarrow$</td>
</tr>
<tr>
<td>Disposable income, $Y^d\uparrow$</td>
<td>$CA\downarrow$</td>
</tr>
<tr>
<td>Disposable income, $Y^d\downarrow$</td>
<td>$CA\uparrow$</td>
</tr>
</tbody>
</table>
The Equation of Aggregate Demand

- The four components of aggregate demand are combined to get the total aggregate demand:
  \[ D = C(Y - T) + I + G + CA(EP^*/P, Y - T) \]

- This equation shows that aggregate demand for home output can be written as:
  \[ D = D(EP^*/P, Y - T, I, G) \]
The Equation of Aggregate Demand

- The Real Exchange Rate and Aggregate Demand
  - An increase in $q$ raises CA and $D$.
    - It makes domestic goods and services cheaper relative to foreign goods and services.
    - It shifts both domestic and foreign spending from foreign goods to domestic goods.
    - A real depreciation of the home currency raises aggregate demand for home output.
      - A real appreciation lowers aggregate demand for home output.
The Equation of Aggregate Demand

- **Real Income and Aggregate Demand**
  - A rise in domestic real income raises aggregate demand for home output.
  - A fall in domestic real income lowers aggregate demand for home output.
The Equation of Aggregate Demand

Figure 16-1: Aggregate Demand as a Function of Output

Aggregate demand function, \( D(EP^*/P, Y - T, I, G) \)

Output (real income), \( Y \)
Output market is in equilibrium in the short-run when real output, \( Y \), equals the aggregate demand for domestic output:

\[
Y = D\left(EP*/P, Y - T, I, G\right) \tag{16-1}
\]
How Output Is Determined in the Short Run

Figure 16-2: The Determination of Output in the Short Run

Aggregate demand, $D$

Aggregate demand = aggregate output, $D = Y$

Aggregate demand

Output, $Y$

Copyright © 2003 Pearson Education, Inc.
Output Market Equilibrium in the Short Run: The $DD$ Schedule

- **Output, the Exchange Rate, and Output Market Equilibrium**
  - With fixed price levels at home and abroad, a rise in the nominal exchange rate makes foreign goods and services more expensive relative to domestic goods and services.
    - Any rise in $q$ will cause an upward shift in the aggregate demand function and an expansion of output.
    - Any fall in $q$ will cause output to contract.
Output Market Equilibrium in the Short Run: The $DD$ Schedule

Figure 16-3: Output Effect of a Currency Depreciation with Fixed Output Prices

Aggregate demand, $D$

Currency depreciates

$D = Y$

Aggregate demand ($E^2$)

Aggregate demand ($E^1$)

45°
Output Market Equilibrium in the Short Run: The $DD$ Schedule

- **Deriving the $DD$ Schedule**
  - $DD$ schedule
    - It shows all combinations of output and the exchange rate for which the output market is in short-run equilibrium (aggregate demand = aggregate output).
    - It slopes upward because a rise in the exchange rate causes output to rise.
Output Market Equilibrium in the Short Run: The $DD$ Schedule

Figure 16-4: Deriving the $DD$ Schedule

Aggregate demand, $D$

Exchange rate, $E$

Output, $Y$

$D = Y$

Aggregate demand ($E^2$)

Aggregate demand ($E^1$)

$E^1$

$E^2$

$Y^1$

$Y^2$

Copyright © 2003 Pearson Education, Inc.
Output Market Equilibrium in the Short Run: The $DD$ Schedule

- Factors that Shift the $DD$ Schedule
  - Government purchases
  - Taxes
  - Investment
  - Domestic price levels
  - Foreign price levels
  - Domestic consumption
  - Demand shift between foreign and domestic goods

- A disturbance that raises (lowers) aggregate demand for domestic output shifts the $DD$ schedule to the right (left).
Output Market Equilibrium in the Short Run: The DD Schedule

Figure 16-5: Government Demand and the Position of the DD Schedule

- **Aggregate demand, D**
  - Government spending rises

- **Aggregated demand curves**
  - \( D = Y \)
  - \( D(E^0P*/P, Y - T, I, G^2) \)
  - \( D(E^0P*/P, Y - T, I, G^1) \)

- **Exchange rate, E**
  - \( E^0 \)
  - Points 1 and 2

- **Output, Y**
  - \( Y^1 \)
  - \( Y^2 \)
  - DD\(^1\)
  - DD\(^2\)
Asset Market Equilibrium in the Short Run: The $AA$ Schedule

- $AA$ Schedule
  - It shows all combinations of exchange rate and output that are consistent with equilibrium in the domestic money market and the foreign exchange market.
Output, the Exchange Rate, and Asset Market Equilibrium

- We will combine the interest parity condition with the money market to derive the asset market equilibrium in the short-run.

- The interest parity condition describing foreign exchange market equilibrium is:

  \[ R = R^* + \frac{(E_e - E)}{E} \]

  where: \( E_e \) is the expected future exchange rate
  \( R \) is the interest rate on domestic currency deposits
  \( R^* \) is the interest rate on foreign currency deposits
Asset Market Equilibrium in the Short Run: The $AA$ Schedule

- The $R$ satisfying the interest parity condition must also equate the real domestic money supply to aggregate real money demand:

$$\frac{M^s}{P} = L(R, Y)$$

- Aggregate real money demand $L(R, Y)$ rises when the interest rate falls because a fall in $R$ makes interest-bearing nonmoney assets less attractive to hold.
Asset Market Equilibrium in the Short Run: The AA Schedule

Figure 16-6: Output and the Exchange Rate in Asset Market Equilibrium

Exchange Rate, $E$

Domestic-currency return on foreign-currency deposits

Domestic-interest rate, $R$

Output rises

Real money supply

Foreign exchange market

Money market

Real domestic money holdings
Asset Market Equilibrium in the Short Run: The \( AA \) Schedule

- For asset markets to remain in equilibrium:
  - A rise in domestic output must be accompanied by an appreciation of the domestic currency.
  - A fall in domestic output must be accompanied by a depreciation of the domestic currency.
Asset Market Equilibrium in the Short Run: The $AA$ Schedule

- **Deriving the $AA$ Schedule**
  - It relates exchange rates and output levels that keep the money and foreign exchange markets in equilibrium.
  - It slopes downward because a rise in output causes a rise in the home interest rate and a domestic currency appreciation.
Asset Market Equilibrium in the Short Run: The AA Schedule

Figure 16-7: The AA Schedule

Exchange Rate, $E$

Output, $Y$

$E^1$, $E^2$

$Y^1$, $Y^2$
Asset Market Equilibrium in the Short Run: The AA Schedule

- Factors that Shift the AA Schedule
  - Domestic money supply
  - Domestic price level
  - Expected future exchange rate
  - Foreign interest rate
  - Shifts in the aggregate real money demand schedule
A short-run equilibrium for the economy as a whole must bring equilibrium simultaneously in the output and asset markets.

• That is, it must lie on both DD and AA schedules.
Short-Run Equilibrium for an Open Economy: Putting the $DD$ and $AA$ Schedules Together

Figure 16-8: Short-Run Equilibrium: The Intersection of $DD$ and $AA$
Short-Run Equilibrium for an Open Economy: Putting the DD and AA Schedules Together

Figure 16-9: How the Economy Reaches Its Short-Run Equilibrium

Exchange Rate, $E$

$E^1$

$E^2$

$E^3$

Output, $Y$

$Y^1$

$DD$

$AA$
Temporary Changes in Monetary and Fiscal Policy

- Two types of government policy:
  - **Monetary policy**
    - It works through changes in the money supply.
  - **Fiscal policy**
    - It works through changes in government spending or taxes.
  - Temporary policy shifts are those that the public expects to be reversed in the near future and do not affect the long-run expected exchange rate.
  - Assume that policy shifts do not influence the foreign interest rate and the foreign price level.
Temporary Changes in Monetary and Fiscal Policy

- **Monetary Policy**
  - An increase in money supply (i.e., expansionary monetary policy) raises the economy’s output.
    - The increase in money supply creates an excess supply of money, which lowers the home interest rate.
      - As a result, the domestic currency must depreciate (i.e., home products become cheaper relative to foreign products) and aggregate demand increases.
Temporary Changes in Monetary and Fiscal Policy

Figure 16-10: Effects of a Temporary Increase in the Money Supply

[Graph showing the effects of a temporary increase in the money supply on the exchange rate and output.]
Temporary Changes in Monetary and Fiscal Policy

- Fiscal Policy
  - An increase in government spending, a cut in taxes, or some combination of the two (i.e., expansionary fiscal policy) raises output.
    - The increase in output raises the transactions demand for real money holdings, which in turn increases the home interest rate.
      - As a result, the domestic currency must appreciate.
Temporary Changes in Monetary and Fiscal Policy

Figure 16-11: Effects of a Temporary Fiscal Expansion

Exchange Rate, $E$

Output, $Y$

$E^1$ $E^2$ $Y^1$ $Y^2$ $DD^1$ $DD^2$ AA
Temporary Changes in Monetary and Fiscal Policy

- Policies to Maintain Full Employment
  - Temporary disturbances that lead to recession can be offset through expansionary monetary or fiscal policies.
    - Temporary disturbances that lead to overemployment can be offset through contractionary monetary or fiscal policies.
Temporary Changes in Monetary and Fiscal Policy

Figure 16-12: Maintaining Full Employment After a Temporary Fall in World Demand for Domestic Products
Temporary Changes in Monetary and Fiscal Policy

Figure 16-13: Policies to Maintain Full Employment After a Money-Demand Increase
Inflation Bias and Other Problems of Policy Formulation

- Problems of policy formulation:
  - **Inflation bias**
    - High inflation with no average gain in output that results from governments’ policies to prevent recession
  - Identifying the sources of economic changes
  - Identifying the durations of economic changes
  - The impact of fiscal policy on the government budget
  - Time lags in implementing policies
A permanent policy shift affects not only the current value of the government’s policy instrument but also the long-run exchange rate.

- This affects expectations about future exchange rates.

A Permanent Increase in the Money Supply

- A permanent increase in the money supply causes the expected future exchange rate to rise proportionally.
  - As a result, the upward shift in the $AA$ schedule is greater than that caused by an equal, but transitory, increase (compare point 2 with point 3 in Figure 16-14).
Permanent Shifts in Monetary and Fiscal Policy

Figure 16-14: Short-Run Effects of a Permanent Increase in the Money Supply

Exchange Rate, $E$

Output, $Y$

$E^1$ $E^2$

$D^D^1$

$A^A^1$ $A^A^2$

$Y_f$ $Y^2$
Permanent Shifts in Monetary and Fiscal Policy

- **Adjustment to a Permanent Increase in the Money Supply**
  - The permanent increase in the money supply raises output above its full-employment level.
    - As a result, the price level increases to bring the economy back to full employment.
  - Figure 16-15 shows the adjustment back to full employment.
Permanent Shifts in Monetary and Fiscal Policy

Figure 16-15: Long-Run Adjustment to a Permanent Increase in the Money Supply

Exchange Rate, $E$

Output, $Y$

$DD^1$, $DD^2$

$AA^1$, $AA^2$, $AA^3$

$Y^f$, $Y^2$
A Permanent Fiscal Expansion

- A permanent fiscal expansion changes the long-run expected exchange rate.
  - If the economy starts at long-run equilibrium, a permanent change in fiscal policy has no effect on output.
  - It causes an immediate and permanent exchange rate jump that offsets exactly the fiscal policy’s direct effect on aggregate demand.
Permanent Shifts in Monetary and Fiscal Policy

Figure 16-16: Effects of a Permanent Fiscal Expansion Changing the Capital Stock

- Exchange Rate, $E$
- Output, $Y$
- $E^1$ and $E^2$
- $DD^1$, $DD^2$, $AA^1$, $AA^2$
Macroeconomic Policies and the Current Account

- **$XX$ schedule**
  - It shows combinations of the exchange rate and output at which the $CA$ balance would be equal to some desired level.
  - It slopes upward because a rise in output encourages spending on imports and thus worsens the current account (if it is not accompanied by a currency depreciation).
  - It is flatter than $DD$. 
Macroeconomic Policies and the Current Account

- Monetary expansion causes the $CA$ balance to increase in the short run (point 2 in Figure 16-17).
- Expansionary fiscal policy reduces the $CA$ balance.
  - If it is temporary, the $DD$ schedule shifts to the right (point 3 in Figure 16-17).
  - If it is permanent, both $AA$ and $DD$ schedules shift (point 4 in Figure 16-17).
Macroeconomic Policies and the Current Account

Figure 16-17: How Macroeconomic Policies Affect the Current Account
Gradual Trade Flow Adjustment and Current Account Dynamics

- **The J-Curve**

  - If imports and exports adjust gradually to real exchange rate changes, the CA may follow a J-curve pattern after a real currency depreciation, first worsening and then improving.

    - Currency depreciation may have a contractionary initial effect on output, and exchange rate overshooting will be amplified.

  - It describes the time lag with which a real currency depreciation improves the CA.
Gradual Trade Flow Adjustment and Current Account Dynamics

**Figure 16-18: The J-Curve**

- Current account (in domestic output units)
- Long-run effect of real depreciation on the current account
- Real depreciation takes place and J-curve begins
- End of J-curve
Gradual Trade Flow Adjustment and Current Account Dynamics

- Exchange Rate Pass-Through and Inflation
  - The CA in the DD-AA model has assumed that nominal exchange rate changes cause proportional changes in the real exchange rates in the short run.
  - Degree of Pass-through
    - It is the percentage by which import prices rise when the home currency depreciates by 1%.
      - In the DD-AA model, the degree of pass-through is 1.
    - Exchange rate pass-through can be incomplete because of international market segmentation.
      - Currency movements have less-than-proportional effects on the relative prices determining trade volumes.
Summary

- The aggregate demand for an open economy’s output consists of four components: consumption demand, investment demand, government demand, and the current account.
- Output is determined in the short run by the equality of aggregate demand and aggregate supply.
- The economy’s short-run equilibrium occurs at the exchange rate and output level.
A temporary increase in the money supply causes a depreciation of the currency and a rise in output.

Permanent shifts in the money supply cause sharper exchange rate movements and therefore have stronger short-run effects on output than transitory shifts.

If exports and imports adjust gradually to real exchange rate changes, the current account may follow a J-curve pattern after a real currency depreciation, first worsening and then improving.
Appendix I: The IS-LM Model and the DD-AA Model

Figure 16AI-1: Short-Run Equilibrium in the IS-LM Model

![Graph showing short-run equilibrium in the IS-LM Model](image)
Appendix I: The *IS-LM* Model and the *DD-AA* Model

**Figure 16AI-2:** Effects of Permanent and Temporary Increases in the Money Supply in the *IS-LM* Model

- Expected domestic-currency return on foreign-currency deposits

---

Exchange rate, $E \quad (\leftarrow \text{increasing})$

Interest rate, $R$

Output, $Y$

Copyright © 2003 Pearson Education, Inc.
Appendix I: The IS-LM Model and the DD-AA Model

Figure 16AI-3: Effects of Permanent and Temporary Fiscal Expansions in the IS-LM Model

Expected domestic-currency return on foreign-currency deposits

Exchange rate, $E$  (← increasing)

Interest rate, $R$

Output, $Y$

Copyright © 2003 Pearson Education, Inc.
Appendix II: Intertemporal Trade and Consumption Demand

Figure 16AII-1: Change in Output and Saving

Future consumption

$D^1_F = Q^1_F$

$D^2_F$

Intertemporal budget constraints

Indifference curves

$D^1_P = Q^1_P$

$D^2_P$

$Q^2_P$

Present consumption
### Appendix III: The Marshall-Lerner Condition and Empirical Estimates of Trade Elasticities

#### Table 16AIII-1: Estimated Price Elasticities for International Trade in Manufactured Goods

<table>
<thead>
<tr>
<th>Country</th>
<th>η</th>
<th>Impact</th>
<th>Short-run</th>
<th>Long-run</th>
<th>η*</th>
<th>Impact</th>
<th>Short-run</th>
<th>Long-run</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>0.39</td>
<td>0.71</td>
<td>1.37</td>
<td>0.03</td>
<td>0.36</td>
<td>0.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>0.18</td>
<td>0.59</td>
<td>1.55</td>
<td>—</td>
<td>—</td>
<td>0.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Britain</td>
<td>—</td>
<td>—</td>
<td>0.31</td>
<td>0.60</td>
<td>0.75</td>
<td>0.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>0.08</td>
<td>0.40</td>
<td>0.71</td>
<td>0.72</td>
<td>0.72</td>
<td>0.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>0.82</td>
<td>1.13</td>
<td>1.13</td>
<td>0.55</td>
<td>0.93</td>
<td>1.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>0.20</td>
<td>0.48</td>
<td>1.25</td>
<td>—</td>
<td>0.49</td>
<td>0.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>—</td>
<td>—</td>
<td>1.41</td>
<td>0.57</td>
<td>0.77</td>
<td>0.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>—</td>
<td>0.56</td>
<td>0.64</td>
<td>0.94</td>
<td>0.94</td>
<td>0.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>0.59</td>
<td>1.01</td>
<td>1.61</td>
<td>0.16</td>
<td>0.72</td>
<td>0.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>0.24</td>
<td>0.49</td>
<td>0.89</td>
<td>0.71</td>
<td>1.22</td>
<td>1.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>0.40</td>
<td>0.74</td>
<td>1.49</td>
<td>—</td>
<td>0.01</td>
<td>0.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>0.27</td>
<td>0.73</td>
<td>1.59</td>
<td>—</td>
<td>—</td>
<td>0.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switzerland</td>
<td>0.28</td>
<td>0.42</td>
<td>0.73</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>0.18</td>
<td>0.48</td>
<td>1.67</td>
<td>—</td>
<td>1.06</td>
<td>1.06</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>