Chapter 10: The S/R Macro Model

- Spending is very important in the S/R
  - Spending depends on income and income depends on spending

- Assumption
  - Only spending determines the output level
  - Prices do not change

- Types of spending
  - Consumption
  - Investment
  - Government
  - Net Exports
Consumption Spending

- Largest component of economy’s spending
  - 2/3 of total spending

- What determines consumption?
  - Disposable income (+)
    - Income after taxes
  - Disposable income = Income – Net taxes
    = Income – (Taxes – Transfers)
  - Wealth (+)
    - Total value of HH assets – outstanding liabilities
  - Interest rate (-)
    - As $r \uparrow$ $C \downarrow$
  - Expectations about future
    - Optimism (+) or pessimism (-)
The Consumption Function

- Represent consumption with an equation
  \[ C = a + b \times (\text{Disposable Income}) \]
  \[ C = a + b \times Y^D \]

- **a**: autonomous consumption
  - Part of consumption spending that is independent of income

- **b**: marginal propensity to consume (MPC)
  - Slope of consumption function = \( \frac{\Delta \text{Consumption}}{\Delta \text{Disposable income}} \)
The consumption function shows the (linear) relationship between real consumption spending and real disposable income. The vertical intercept ($2,000 billion) is autonomous consumption spending. The slope of the line (0.6) is the marginal propensity to consume.
The Consumption Function

- MPC: the amount by which $C$ rises when $Y^D$ rises by one dollar
  - $0 < MPC < 1$

- Ex: Robinson collects coconuts and eats 80% of them. What is his MPC?
  - What happens to his Consumption function if he becomes optimistic about future?
Consumption and *Income*

- Convert the relationship into Consumption-Income relationship
  
  \[ C = \bar{a} + b \times (\text{Income}) \]

  \[ C = \bar{a} + b \times Y \]

- Consider figure 2
The Consumption-Income Line

1. To draw the consumption-income line, we measure real income (instead of real disposable income) on the horizontal axis.

2. The line has the same slope as the consumption function in Figure 2 . . .

3. but a different vertical intercept.

Figure 2 The Consumption-Income Line
Consumption-Income Line

- **Movement along C-Y line**
  - $Y \uparrow \rightarrow Y^D \uparrow \rightarrow C \uparrow$
  - Change in income

- **Shifting C-Y line**
  - $T \downarrow \rightarrow Y^D$ at each income level $\uparrow \rightarrow C$ at each income level $\uparrow$
    - Transfers …
  - Also changes in
    - Wealth (+)
    - Interest rate (-)
    - Expectations (+ or -)
  - Changes autonomous consumption
Other components of Total Spending

- **Investment** = Planned investment or Investment Spending
  - Business purchases of plant and equipment and construction of new homes
  - Treat it as fixed
    - Determined outside the model
- **G**: all goods and services that government agencies buy during the year
  - Treat it as a fixed given value
  - Changes with world politics
Other components of Total Spending

- Net Exports
  - Total Exports – Total Imports
  - Imports—included in C, I^P and G—gives us an exaggerated measure of U.S. output
  - Treat it as fixed
    - Can change due to changes in preferences towards foreign goods, price of foreign currency (exchange rates)

- AE = C + I^P + G + NX
  - Similar to GDP definition except for…
Equilibrium GDP

- GDP level—that remains the same until something we assumed constant begins to change
  - $AE < GDP$
    - Output will _____ in the future
  - $AE > GDP$
    - Output will _____ in the future
Change in Inventories

- $\Delta$Inventories = GDP – AE
  - $AE < GDP \rightarrow \Delta$ Inventories $> 0 \rightarrow$ GDP $\downarrow$
  - $AE > GDP \rightarrow \Delta$ Inventories $< 0 \rightarrow$ GDP $\uparrow$
  - $AE = GDP \rightarrow \Delta$ Inventories $= 0 \rightarrow$ no change in GDP

- Graphing Equilibrium GDP
  - Consider figures 3 and 4
Deriving the Aggregate Expenditure Line

1. Start with the consumption-income line,

2. then add planned investment ($I^P$) . . .

3. government purchases ($G$) . . .

4. and net exports ($NX$) . . .

5. to get the aggregate expenditure line.

Figure 3 Deriving the Aggregate Expenditure Line
Determining Equilibrium Real GDP

Figure 4 Determining Equilibrium Real GDP

- **Figure 4** Determining Equilibrium Real GDP

The diagram illustrates the relationship between aggregate expenditure and total output. The 45° line represents equality, where aggregate expenditure equals total output. Points K, J, E, A, and H indicate different levels of equilibrium. The decrease in inventories and increase in inventories are shown, along with the concepts of aggregate expenditure and total output. The graph visually represents the determination of equilibrium real GDP.
Equilibrium GDP and Employment

- Equilibrium GDP is not necessarily the full-employment level of output
  - Spending is important
  - Cyclical unemployment is caused by insufficient spending
    - Production is low, unemployment is high
  - Economy overheats because spending is too high
    - Production is high (booms), unemployment is unusually low
Equilibrium GDP and Employment

**Figure 5** Equilibrium GDP Can Be Less Than Full Employment GDP

When the aggregate expenditure line is low . . .

- Equilibrium output ($8,000) is less than potential output,
- and equilibrium employment is less than full employment.

Aggregate Expenditure ($ billions)

- $10,000
- $8,000

Real GDP ($ billions)

- $10,000
- $8,000

Aggregate Production Function

- $150 Million
- 100 Million

Number of Workers

- Full Employment

Equilibrium GDP Can Be Less Than Full Employment GDP

Potential GDP

- $10,000
- $8,000

Real GDP

- $10,000
- $8,000

Equilibrium output ($8,000) is less than potential output, and equilibrium employment is less than full employment.
Figure 6: Equilibrium GDP and Employment

When the aggregate expenditure line is high . . .

When the aggregate expenditure line is high . . .

and equilibrium employment is greater than full employment.

When the aggregate expenditure line is high . . .

equilibrium output ($12,000) is greater than potential output,

Figure 6: Equilibrium GDP and Employment

Aggregate Expenditure ($ Billions)

Real GDP ($ Billions)

$2,000

$10,000

$12,000

When the aggregate expenditure line is high . . .

equilibrium output ($12,000) is greater than potential output,

Figure 6: Equilibrium GDP and Employment

Aggregate Expenditure ($ Billions)

Real GDP ($ Billions)

$2,000

$10,000

$12,000

When the aggregate expenditure line is high . . .

equilibrium output ($12,000) is greater than potential output,

Figure 6: Equilibrium GDP and Employment

Aggregate Expenditure ($ Billions)

Real GDP ($ Billions)

$2,000

$10,000

$12,000

When the aggregate expenditure line is high . . .

equilibrium output ($12,000) is greater than potential output,
Finding Equilibrium GDP Algebraically

\[ C = a + bY^D \]
\[ Y^D = Y - T \]
\[ \Rightarrow C = a + b(Y - T) \]

\[ C = (a - bT) + bY \]
\[ AE = C + I^P + G + NX \]
\[ \Rightarrow Y = \frac{a - bT + I^P + G + NX}{1 - b} \]

Exogenous variables: \( a, b, T, I^P, G, NX \)
Finding Equilibrium GDP Algebraically

- Suppose the following equations describe the economy of Round Island in millions of dollars.
  
  Net taxes (T) are taxes minus transfer payments.

  \[ C = 55 + 0.8(Y - T) \]
  \[ I = 52 \]
  \[ G = 50 \]
  \[ NX = 5 \]
  \[ Net \ taxes = 15 \]

- Equilibrium GDP?
- If T raises to $ 90 million, what is the equilibrium GDP?
A Change in Investment Spending

- Increase investment spending
  - Sales revenue ↑
  - Income/disposable income ↑
  - C↑
  - Chain reaction
  - Increased spending and income
    - Equilibrium GDP ↑ more than original ↑ in I^P

- Decrease investment spending
  - Equilibrium GDP ↓ more than original ↓ in I^P
A Change in Investment Spending

**Figure 7** The Effect of a Change in Investment Spending

<table>
<thead>
<tr>
<th>Increase in Annual GDP</th>
<th>Initial Rise in $I^P$</th>
<th>After Round 2</th>
<th>After Round 3</th>
<th>After Round 4</th>
<th>After Round 5</th>
<th>After All Rounds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,000</td>
<td>1,600</td>
<td>1,960</td>
<td>2,176</td>
<td>2,306</td>
<td>2,500</td>
</tr>
</tbody>
</table>
Expenditure Multiplier

- Expenditure multiplier
  - Change in equilibrium real GDP
  - For $1 change in a, I^P, G, or NX

\[
\text{Multiplier} = \frac{1}{(1 - \text{MPC})}
\]

\[
\Delta \text{GDP} = \left[ \frac{1}{(1 - \text{MPC})} \right] \times \Delta I^P
\]
Other Spending Changes

- An increase in $a$, $I^p$, $G$, or $NX$
  - Shift the AE line upward by the initial increase in spending
  - Equilibrium GDP rises:

\[
\Delta GDP = \left[ \frac{1}{(1 - MPC)} \right] \times \Delta \text{Spending}
\]
A Graphical View of the Multiplier

**Figure 8** A Graphical View of the Multiplier

A diagram illustrating the multiplier effect with lines labeled $AE_1$ and $AE_2$. The diagram shows an increase in equilibrium GDP by $2,500$ Billion. The point $E$ is marked on the graph, and the increase in real aggregate expenditure is shown as $1,000$ Billion.
Automatic Stabilizers and the Multiplier

- Automatic stabilizers
  - Reduce the size of the multiplier
    - Smaller multiplier → smaller change in GDP
  - Real world automatic stabilizers
    - Taxes
    - Transfer payments
    - Interest rates
    - Imports
    - Forward-looking behavior
- In the real world, due to automatic stabilizers, spending changes have much weaker impacts on the economy
Automatic Stabilizers and the Multiplier

- Time
  - Most important automatic stabilizer
  - In the L/R, our multipliers have a value of zero
  - Output = Potential output ($\Delta \text{GDP}=0$)
Countercyclical Fiscal Policy

- Short-run
  - Demand-side effects on output and employment

- Long-run
  - Eventually economy will reach full-employment level

- Countercyclical fiscal policy
  - Change G or T
    - To reverse or prevent a recession or a boom

- $\Delta GDP = \text{Multiplier} \times \Delta G$
Countercyclical Fiscal Policy

Figure 9 Countercyclical Fiscal Policy

Real Aggregate Expenditure ($ billions)

Real GDP ($ billions)

AE₁
AE₂

45°

9,000 (Recession Output)
10,000 (Full-Employment Output)
Problems with Countercyclical Fiscal Policy

- Timing Problems
  - Takes many months for fiscal changes to be enacted
    - might as well destabilize the economy
- Irreversibility
  - Reversing changes in government purchases or taxes is difficult
- Reaction of the Federal Reserve
  - FED can act more rapidly and flexibly than can Congress
Tax Multiplier

- Tax multiplier = -(Spending multiplier-1)

\[
\text{Tax Multiplier} = \frac{-\text{MPC}}{1 - \text{MPC}}
\]

\[
\Delta\text{GDP} = \frac{-\text{MPC}}{1 - \text{MPC}} \times \Delta T
\]