The Simple Keynesian Theory

• Some Basic Definitions
  – Endogenous variables
    • Output
    • Consumer Spending
  – To become endogenous variables
    • Investment spending
    • Net exports
    • Interest rates
    • Inflation

The Simple Keynesian Theory

• Some Basic Definitions (continued)
  – Exogenous variables (continued)
    • Demand shocks
      – Unpredictable changes in
        » Consumer spending
        » Investment spending
        » Net exports
        † Foreign economic activity
      – Abrupt changes in technology
      – Changes in regulations
      – Wars
      – Political crises

The Simple Keynesian Theory

• Some Basic Definitions (continued)
  – Exogenous variables
    • Policy instruments
      – Money supply
      – Government spending
      – Tax rates

The Simple Keynesian Theory

• Determining Equilibrium Income
  – By definition
    \[ E = C + I + G + NX \]
  – Now assume
    • C, G and NX are always equal to planned
    • Only I can differ from planned
    \[ I = I(p) + I(u) \]
    • Therefore
    \[ E(p) = C + I(p) + G + NX \]
The Simple Keynesian Theory

• Determining Equilibrium Income (con’t)
  – The Consumption Function
    • Autonomous consumption
    • Induced consumption
    – marginal propensity to consume
    • General linear form

\[ C = a + c \, ( Y - T ) \]

» Figure 3-1

The Simple Keynesian Theory

• Determining Equilibrium Income (con’t)
  – The Savings Function
    • Autonomous saving
    » Figure 3-3
    • Induced saving
    – marginal propensity to save
    • General linear form

\[ S = ( Y - T ) - C \]

\[ = ( Y - T ) - ( a - c ) \, ( Y - T ) \]

\[ = a - (1 - c) \, ( Y - T ) = -a + s \, ( Y - T ) \]

The Simple Keynesian Theory

• Determining Equilibrium Income (con’t)
  – Consumption & Savings (Figure 3-2)

\[ ( Y - T ) = C + S \]

\[ = a + c \, ( Y - T ) - a + s \, ( Y - T ) \]

\[ = ( c + s ) \, ( Y - T ) \]

\[ ( c + s ) = ( Y - T ) / ( Y - T ) \]

\[ = 1 \]

so \[ c + s = 1 ; \ c = 1 - s ; \ s = 1 - c \]

Figure 3-1
A Simple Hypothesis Regarding Consumption Behavior

Figure 3-2
The Relation Between Induced Consumption, Induced Saving, and the Consumption Function

Figure 3-3
Consumption, Saving, and Disposable Income, 1929–96
The Simple Keynesian Theory

- Determining Equilibrium Income (con’t)
  - Equilibrium
    - Equilibrium is a situation in which there is no pressure for change
  - Total Planned Expenditures
    \[ E(p) = C + I(p) + G + NX \]
    \[ = a + c(Y - T) + I(p) + G + NX \]
    \[ = a + cY - cT + I(p) + G + NX \]

  - Figure 3-4

The Simple Keynesian Theory

- Determining Equilibrium Income (con’t)
  - Equilibrium (continued)
    - Autonomous Planned Spending
      \[ A(p) = a - cT + I(p) + G + NX \]
    - Total Planned Expenditures
      \[ E(p) = A(p) + cY \]

The Simple Keynesian Theory

- Determining Equilibrium Income (con’t)
  - Disequilibrium Dynamics (continued)
    - Example
      - Figure 3-5
    - Does \( I(u) \) need to be reversed?

The Simple Keynesian Theory

- Determining Equilibrium Income (con’t)
  - Equilibrium (continued)
    - It is always true that
      \[ Y = E \]
      \[ Y = E(p) + I(u) \]
    - where \( I(u) \) is unintended inventory investment
    - Equilibrium exists only when
      \[ Y = E(p) \quad \text{or} \quad I(u) = 0 \]
The Simple Keynesian Theory
• Determining Equilibrium Income (cont’d)
  • Equilibrium (continued)
    • Autonomous planned spending equals induced saving in equilibrium
      \[ Y = E(p) \]
      \[ Y - cY = E(p) - cY \]
      \[ (1 - c)Y = A(p) \]
      remember
      \[ s = 1 - c \]

The Simple Keynesian Theory
• Autonomous planned spending equals induced saving in equilibrium (continued)
  \[ sY = A(p) \]
  \[ \text{Induced saving} = \text{autonomous spending} \]
  \[ \text{Leakages} = \text{injections} \]
  \[ Y(e) = A(p) / s \]

The Simple Keynesian Theory
• The Multiplier Effect
  • An example
  • Calculating the Multiplier
    • How much does income change?
      \[ Y(1) = A(p)(1) / s \]
      \[ Y(0) = A(p)(0) / s \]
      \[ \text{Change in} \ Y = \text{Change in} \ A(p) / s \]

The Simple Keynesian Theory
• The Multiplier (continued)
  \[ k = \frac{\text{Change in} \ Y}{\text{Change in} \ A(p)} \]
  \[ \text{from} \]
  \[ \text{Change in} \ Y = \text{Change in} \ A(p) / s \]
  \[ k = \frac{\text{Change in} \ A(p)}{s} / \text{Change in} \ A(p) \]
  \[ k = 1 / s \]
  • Relationship between leakages and the multiplier?
  \[ \text{Figure 3-6} \]

The Simple Keynesian Theory
• Fiscal Policy
  • Fiscal Policy Definitions
    • Changes in government spending
    • Changes in autonomous tax revenues
    • Changes in tax rates
  • Now
    \[ A(p) = a - cT + I(p) + G + NX \]
The Simple Keynesian Theory

• Government Spending Multiplier
  – If
    \[ \text{Change in } Y = \frac{\text{Change in } A(p)}{s} \]
  – then
    \[ \text{Change in } A(p) = \text{Change in } G \]
    \[ \text{Change in } Y = \frac{\text{Change in } G}{s} \]
    \[ k = \frac{\text{Change in } G / s}{\text{Change in } G} = \frac{1}{s} \]

The Simple Keynesian Theory

• Government Spending Multiplier (con’t)
  – The Government Budget Deficit
    \[ (G - T) = S - I - NX \]
    \[ \text{Change in } G - \text{Change in } T = \text{Change in } S - \text{Change in } I - \text{Change in } NX \]
    \[ \text{but} \]
    \[ \text{Changes in } T, I, \text{and } NX = 0 \]
    \[ \text{therefore,} \]

The Simple Keynesian Theory

• The Tax Multiplier
  – Autonomous Taxes
    \[ \text{Change in } A(p) = -c \left( \text{Change in } T \right) \]

The Simple Keynesian Theory

• The Tax Multiplier (continued)
  – Autonomous Tax Multiplier
    \[ k(T) = \frac{\text{Change in } Y}{\text{Change in } T} \]
    \[ \text{Remember} \]
    \[ \text{Change in } Y = \frac{\text{Change in } A(p)}{s} = \frac{-c \left( \text{Change in } T \right)}{s} \]
    \[ \text{therefore} \]
    \[ k(T) = -\frac{c}{s} \left( \text{Change in } T \right) / s \left( \text{Change in } T \right) = -\frac{c}{s} \]

The Simple Keynesian Theory

• Balanced Budget Multiplier
  \[ k(G) = \frac{1}{s} \& \ k(T) = -\frac{c}{s} \]
  – therefore,
  \[ k(G) + k(T) = \left[ \frac{1}{s} \right] + \left[ -\frac{c}{s} \right] = \left[ \frac{1 - c}{s} \right] / s = \frac{s}{s} = 1 \]
  – Figure 3-7
The Simple Keynesian Theory

• The Tax Multiplier (continued)
  – Effect of Income Taxes (continued)
  • Autonomous taxes
  • Induced taxes
  • General linear form

\[ T = T(a) + tY \]

• Now
\[ YD = Y - T \]
\[ = Y - T(a) - tY \]
\[ = (1 - t) Y - T(a) \]

The Simple Keynesian Theory

• The Tax Multiplier (continued)
  – Effect of Income Taxes (continued)
  • Induced consumption

\[ C = a + c(Y - T) \]
\[ = a + c(Y - T(a) - tY) \]
\[ = a + c(1 - t)Y \]

The Simple Keynesian Theory

• The Tax Multiplier (continued)
  – Effect of Income Taxes (continued)
  • Induced saving

\[ S = (Y - T) - C \]
\[ = Y - T(a) - tY - a - c(1 - t)Y \]
\[ = a + (1 - t)Y - c(1 - t)Y \]
\[ = -a + (1 - c)(1 - t)Y \]
\[ = -a + s(1 - t)Y \]

The Simple Keynesian Theory

• The Tax Multiplier (continued)
  – Effect of Income Taxes (continued)
  • Total induced changes

\[ \frac{c(1 - t) + s(1 - t) + t}{(c + s)(1 - t) + t} = \frac{(1 - t) + t}{1} \]
The Simple Keynesian Theory

• The Tax Multiplier (continued)
  – Equilibrium Income with Income Taxes
    \[ Y = E(p) \]
    \[ Y - c (1 - t) Y = E(p) - c (1 - t) Y \]
    \[ [1 - c (1 - t)] Y = A(p) \]
  • so
    \[ Y(e) = A(p) / [1 - c (1 - t)] \]
    \[ = A(p) / [s (1 - t) + t] \]

The Simple Keynesian Theory

• The Tax Multiplier (continued)
  – Income Taxes and the Multiplier
    Change in \( Y = \frac{\text{Change in } A(p)}{s (1 - t) + t} \)
  • so
    \[ k = \frac{1}{s (1 - t) + t} \]
  • or
    \[ = \frac{1}{\text{marginal leakage rate}} \]

The Simple Keynesian Theory

• The Tax Multiplier (continued)
  – Income Taxes, the Multiplier and Stabilization Policy
    – Income taxes reduce the size of the multiplier
      – A smaller multiplier means business cycles are dampened
      – Income taxes are an automatic stabilizer.
    – \( Y(e) \) changes when tax rates change
      – \( Y(e) \) increases when tax rates are reduced
      – \( Y(e) \) decreases when tax rates are increased

The Simple Keynesian Theory

• The International Trade Multiplier
  – Autonomous net exports
    • exports
    • autonomous imports
  – Induced net exports
    • imports
  – General linear form
    \[ NX = NX(a) - nxY \]

The Simple Keynesian Theory

• The International Trade Multiplier
  – The multiplier now becomes
    \[ k = \frac{1}{s (1 - t) + t + nx} \]
  – The multiplier becomes smaller the larger is the economy’s elasticity to import.
The Simple Keynesian Theory

- Summarizing the Multiplier
  \[ k = 1 / \text{marginal leakage rate} \]

<table>
<thead>
<tr>
<th>Types of leakages</th>
<th>Marginal leakage rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saving only</td>
<td>( s )</td>
</tr>
<tr>
<td>Saving and income tax</td>
<td>( s(1 - t) + t )</td>
</tr>
<tr>
<td>Saving, income tax, and imports</td>
<td>( s(1 - t) + t + nx )</td>
</tr>
</tbody>
</table>

- Implications for business cycles
- Implications for stabilization policy