Chapter 27
Basic Macroeconomic Relationships

CHAPTER OVERVIEW

- The central purpose of this chapter is to introduce three basic macroeconomic relationships that will help us organize our thinking about macroeconomic theories and controversies:

1. the focus is on the income-consumption and income-saving relationships.
2. the relationship between the interest rate and investment is examined.
3. the multiplier concept is developed, relating changes in spending to changes in output.

- All of this is done outside the formal framework of the Aggregate Expenditures model, which is developed in Chapter 28.
Objectives

• Describe the income-consumption and income-saving relationships.

• Recognize, construct, and explain the consumption and saving schedules.

• Identify the determinants of the location of the consumption and saving schedules.

• Calculate and differentiate between the average and marginal propensities to consume (and save).

• Describe the relationship between the interest rate, expected rate of return, and investment.

• Identify the determinants of investment and construct an investment demand curve.

• Identify the factors that may cause a shift in the investment-demand curve.

• Describe the reasons for the instability in investment spending.

• Provide an intuitive explanation of the multiplier effect.

• Calculate the multiplier and changes in real GDP given information about changes in spending and the marginal propensities.

• Discuss why the actual multiplier may differ from the theoretical examples.

• Define and identify terms and concepts at the end of the chapter.
What Are the Basic Macro Relationships?

• Previously we identified macroeconomic issues of growth, business cycles, recession, and inflation. Here we begin to develop tools to explain these events.

• This chapter focuses on the three basic macroeconomic relationships.
  – Income and consumption, and income and saving.
  – The interest rate and investment.
  – Changes in spending and changes in output.

• Learning objectives
  – How changes in income affect consumption and saving.
  – About factors other than income that can affect consumption.
  – How changes in real interest rates affect investment.
  – About factors other than the real interest rate that can affect investment.
  – Why changes in investment increase or decrease real GDP by a multiple amount.
The Income-Consumption and Income-Saving Relationships

- **Disposable income** is the most important determinant of consumer spending.

- What is not spent is called **saving**.

  \[ S = DI - C \]

- Figure 27.1 or PPT 27-4 represent graphically the recent historical relationship between disposable income (DI), consumption (C), and saving (S) in the United States.
  - A 45-degree line represents all points where consumer spending is equal to disposable income; other points represent actual C, DI relationships for each year from 1983-2005.
  - If the actual graph of the relationship between consumption and income is below the 45-degree line, then the (vertical) difference represents the amount of income that is saved.
  - In 1992 consumption was $4385 billion and disposable income was $4751 billion.
    * Hence, saving was $366 billion.
    * Notice that in 2005, consumption ($9072.1 billion) exceeded disposable income ($9038.6 billion)
    * Thus, personal saving was a negative $33.5 billion!
• Some conclusions can be drawn:
  
  – Households consume a large portion of their disposable income.
  
  – Both consumption and saving are directly related to the level of income.
The consumption schedule:

- A hypothetical consumption schedule (Table 27.1, Graph 27.2a, and PPT 27-7) shows that households spend a larger proportion of a small income than of a large income.

- A hypothetical saving schedule (Table 27.1, column 3) is illustrated in Graph 27.2b.

- Note that “dissaving” occurs at low levels of disposable income, where consumption exceeds income and households must borrow or use up some of their wealth.
Average and marginal propensities to consume and save

- Define **average propensity to consume (APC)** as the fraction or % of income consumed. See Column 4 in Table 27.1.

\[
APC = \frac{\text{consumption}}{\text{income}}
\]

- Define **average propensity to save (APS)** as a the fraction or % of income saved. See Column 5 in Table 27.1.

\[
APS = \frac{\text{saving}}{\text{income}}
\]

- e.g., at $470 billion of income, consumption is $450 while saving is $20. thus,

\[
APC = \frac{450}{470} = 96\% \quad \text{APS} = \frac{20}{470} = 4\%
\]

- Global Perspective 27.1 and PPT 27-9 show the APCs for several nations in 2006.

  – Note the high APCs for the U.S., Canada, and the United Kingdom.

- **Marginal propensity to consume (MPC)** is the fraction or proportion of any change in income that is consumed. See Column 6 in Table 27.1.

\[
MPC = \frac{\text{change in consumption}}{\text{change in income}}
\]
• **Marginal propensity to save (MPS)** is the fraction or proportion of any change in income that is saved. See Column 7 in Table 27.1.

\[
MPS = \frac{\text{change in saving}}{\text{change in income}}
\]

– e.g., at $470 billion of income, and household rises by $20 billion to $490 billion, households will consume \( \text{MPC} = \frac{15}{20} = .75 \) and \( \text{MPS} = \frac{5}{20} = .25 \).

• Note that \( \text{APC} + \text{APS} = 1 \) and \( \text{MPC} + \text{MPS} = 1 \).

• Note that Figure 27.3 illustrates that MPC is the slope of the consumption schedule, and MPS is the slope of the saving schedule.
Nonincome determinants of consumption and saving

- Nonincome determinants of consumption and saving can cause people to spend or save more or less at various income levels, although the level of income is the basic determinant.

- **Wealth**:
  - An increase in wealth shifts the consumption schedule up and saving schedule down.
    * In recent years major fluctuations in stock market values have increased the importance of this wealth effect.
    * A “reverse wealth effect” occurred in 2000 and 2001, when stock prices fell dramatically.

- **Expectations**:
  - Changes in expected future prices or wealth can affect consumption spending today.

- **Real interest rates**:
  - Declining interest rates increase the incentive to borrow and consume, and reduce the incentive to save.
    * Because many household expenditures are not interest sensitive - the light bill, groceries, etc. - the effect of interest rate changes on spending are modest.
  - Household borrowing:
    * Lower levels of borrowing shift the consumption schedule up and saving schedule down.
Other important considerations

- Macroeconomic models focus on real domestic output (real GDP) more than on disposable income.
  - Figure 27.4 reflects this change in the labeling of the horizontal axis.

- Changes along schedules:
  - Movement from one point to another on a given schedule is called a change in the amount consumed;
  - a shift in the schedule is called a change in consumption schedule, and is caused by nonincome determinants of consumption.
  - e.g. from $a$ to $b$ on $C_0$ in figure 27.4a is a change in the amount consumed and is solely caused by a change in real GDP.
  - an upward or downward shift of the entire schedule, e.g., a shift from $C_0$ to $C_1$ or $C_2$ in figure 27.4a is a shift of consumption schedule and is caused by changes in any one or more of the nonincome determinants of consumption discussed above.

- Schedule shifts:
  - Consumption and saving schedules will always shift in opposite directions unless a shift is caused by a tax change.
  - if the consumption schedule shifts upward from $C_0$ to $C_1$, in figure 27.4a, the saving schedule shifts downward from $S_0$ to $S_1$, in figure 27.4b.
– Even when they spend more by borrowing, they are, in effect, reducing their current saving by the amount borrowed (*negative saving*).

• **Taxation:**
  – Lower taxes will shift both consumption and saving schedules up since taxation affects both spending and saving, and
  – vice versa for higher taxes.

• **Stability:**
  – Economists believe that consumption and saving schedules are generally stable unless deliberately shifted by government action (like major tax increases or decreases).
  – Their stability may be because consumption-saving decisions are strongly influenced by long-term considerations such as saving to meet emergencies or saving for retirement.
  – It may also be because changes in the nonincome determinants frequently work in opposite directions and therefore may be self-canceling.
The Interest Rate – Investment Relationship

- **Investment** consists of spending on new plants, capital equipment, machinery, inventories, construction, etc.
  
  - The investment decision weighs marginal benefits and marginal costs.
  
  * it is a marginal-benefit-marginal-cost decision.

  - The expected rate of return is the marginal benefit and the interest rate - the cost of borrowing funds - represents the marginal cost.

    * the marginal benefit from investment is the expected rate of return business hope to realize.

    * the marginal cost is the interest rate that must be paid for borrowed funds.

- **Expected rate of return** is found by comparing the expected economic profit (total revenue minus total cost) to cost of investment to get *expected* rate of return.

  - For example, project gets $100 expected profit on a $1000 investment → 10% expected rate of return.

  - Thus, the business would not want to pay more than 10% interest rate on investment.

  - Note that the expected rate of return is not a guaranteed rate of return. Investment carries risk.
• **The real interest rate**, \( i \) (nominal rate corrected for expected inflation), determines the cost of investment.

  – The interest rate represents either the cost of borrowed funds or the opportunity cost of investing your own funds, which is income forgone.

  – If real interest rate exceeds the expected rate of return, the investment should not be made.

• The real interest rate, rather than the nominal rate, is crucial in making investment decisions.

• What is inflation occurring?

  – e.g., suppose a $1000 investment is expected to yield a real (inflation-adjusted) rate of return of 10 percent and the nominal interest rate is 15%.
    
    * Is the investment profitable?

  – However, if there is ongoing inflation of 10% per year, is the investment profitable?

    * While the nominal interest rate is 15%, the real rate is only 5% (15% - 5%).

    * By comparing 5% real interest rate with the 10% expected real rate of return, the investment is still profitable.
Investment demand Curve

- Investment demand schedule, or curve, shows an inverse relationship between the interest rate and amount of investment.

- As long as expected return exceeds interest rate, the investment is expected to be profitable.
  
  – Table 27.2 and PPT 27-14 show that, e.g., $10 billion of investment opportunities that will yield an expected rate of return of 12% or more.
  
  – The $10 billion include the $5 billion of investment expected to yield a return of 14% or more plus the $5 billion expected to yield between 12-14%.

- Graph 27.5 and PPT 27-17 show the relationship when the investment rule is followed.
  
  – Fewer projects are expected to provide high return, so less will be invested if interest rates are high.
  
  – it shows an inverse relationship between the real interest rate and the quantity of investment demanded.

  – Graph 27.5 and PPT 27-17 show that $10 billion of investment spending will be undertaken at a 12%, meaning that $10 billion of investment projects have an expected rate of return of 12% or more.
Shifts of Investment Demand Curve

- Shifts in investment demand (Figure 27.6) occur when any determinant apart from the interest rate changes.
  * Greater expected returns create more investment demand; shift curve to right. The reverse causes a leftward shift.

- Changes in expected returns result because:
  1. **Acquisition, maintenance, and operating costs**
     * Higher costs lower the expected return.
  2. **Business taxes**
     * Increased taxes lower the expected return.
  3. **Technology**
     * Technological change often involves lower costs, which would increase expected returns
  4. **Stock of capital goods on hand**
     * If there is abundant idle capital on hand because of weak demand or recent investment, new investments would be less profitable.
     * Firm with excess production capacity have little incentive to invest in new capital. Therefore, less investment is forthcoming at each real interest rate, the investment demand curve shifts leftward.
* If executives become more optimistic (pessimistic) about future sales, costs, and profits, the investment demand curve will shift to the right (left).

5. **Expectations**

* Expectations about future economic and political conditions, both in the aggregate and in certain specific markets, can change the view of expected profits.
Instability of Investment

- Investment $I$ is a very unstable type of spending; $I$ is more volatile than GDP.
  - Refer to figure 27.7

- Durable

- Irregularity of Innovation

- Variability of Profits

- Variability of Expectations
The Multiplier Effect

- Assuming that the economy has room to expand – so that increases in spending do not lead to increases in price, then
  - More (less) spending results in a higher (lower) GDP.

- Changes in spending ripple through the economy to generate even larger changes in real GDP. This is called the multiplier effect.

\[
\text{Multiplier} = \frac{\text{change in real GDP}}{\text{Initial change in spending}}
\]

- Thus,

\[
\text{change in real GDP} = \text{Multiplier} \times \text{Initial change in spending}
\]

- **Example:**
  - If investment in an economy rise by $30 billion and GDP increases by $90 billion,

\[
\text{Multiplier} = \frac{\$90 \text{ billion}}{\$30 \text{ billion}} = 3.
\]

- **Three points to remember about the multiplier:**
  - The initial change in spending is usually associated with investment because it is so volatile, but changes in consumption (unrelated to income), net exports, and government purchases also are subject to the multiplier effect.
– The initial change refers to an upshift or downshift in the aggregate expenditures schedule due to a change in one of its components, like investment.

– The multiplier works in both directions (up or down).

* An increase (a decrease) in spending will create a multiple increase (decrease) in GDP.

**The multiplier is based on two facts:**

– The economy has continuous flows of expenditures and income – a ripple effect – in which income received by Grant comes from money spent by Bob. Bob’s income, in turn, came from money spent by Mary, and so forth.

– Any change in income will cause both consumption and saving to vary in the same direction as the initial change in income, and by a fraction of that change.

* The fraction of the change in income that is spent is called the marginal propensity to consume (MPC).

* The fraction of the change in income that is saved is called the marginal propensity to save (MPS).

* This is illustrated in Table 27.3, and Figure 27.8 that is derived from the Table.

**The size of the MPC and the multiplier are directly related; the size of the MPS and the multiplier are inversely related.** See Figure 27.9 for an illustration of this point. In equation
form

\[ \text{Multiplier} = \frac{1}{MPS} \]

or

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

• The significance of the multiplier is that a small change in investment plans or consumption-saving plans can trigger a much larger change in the equilibrium level of GDP.

• The simple multiplier given above can be generalized to include other “\textit{leakages}” from the spending flow besides savings. For example, the actual multiplier is derived by including taxes and imports as well as savings in the equation. In other words, the denominator is the fraction of a change in income not spent on domestic output.
Squaring the Economic Circle

- Humorist Art Buchwald illustrates the concept of the multiplier with this funny essay.

- Hofberger, a Ford salesman in Tomcat, Va., called up Littleton of Littleton Menswear & Haberdashery, and told him that a new Ford had been set aside for Littleton and his wife.

- Littleton said he was sorry, but he couldn’t buy a car because he and Mrs. Littleton were getting a divorce.

- Soon afterward, Bedcheck the painter called Hofberger to ask when to begin painting the Hofbergers’ home. Hofberger said he couldn’t, because Littleton was getting a divorce, not buying a new car, and, therefore, Hofberger could not afford to paint his house.

- When Bedcheck went home that evening, he told his wife to return their new television set to Gladstone’s TV store. When she returned it the next day, Gladstone immediately called his travel agent and canceled his trip. He said he couldn’t go because Bedcheck returned the TV set because
Hofberger didn’t sell a car to Littleton because Littletons are divorcing.

- Sandstorm, the travel agent, tore up Gladstone’s plane tickets, and immediately called his banker, Gripsholm, to tell him that he couldn’t pay back his loan that month.

- When Rudemaker came to the bank to borrow money for a new kitchen for his restaurant, the banker told him that he had no money to lend because Sandstorm had not repaid his loan yet.

- Rudemaker called his contractor, Eagleton, who had to lay off eight men.

- Meanwhile, Ford announced it would give a rebate on its new models. Hofberger called Littleton to tell him that he could probably afford a car even with the divorce. Littleton said that he and his wife had made up and were not divorcing. However, his business was so lousy that he couldn’t afford a car now. His regular customers, Bedcheck, Gladstone, Sandstorm, Gripsholm, Rudemaker, and Eagleton had not been in for over a month!