[Notes/Highlighting]

National Income and Price Determination

FROM BOOM TO BUST

Ft. Myers, Florida, was a boom town in 2003, 2004, and most of 2005. Jobs were plentiful: by 2005 the unemployment rate was less than 3%. The shopping malls were humming, and new stores were opening everywhere.

But then the boom went bust. Jobs became scarce, and by 2009 the unemployment rate had reached 14%. Stores had few customers, and many were closing. One new business was flourishing, however. Marc Joseph, a real estate agent, began offering "foreclosure tours": visits to homes that had been seized by banks after the owners were unable to make mortgage payments.

What happened? Ft. Myers boomed from 2003 to 2005 because of a surge in home construction, fueled in part by speculators who bought houses not to live in, but because they believed they could resell those houses at much higher prices. Home construction gave jobs to construction workers, electricians, real estate agents, and others. And these workers, in turn, spent money locally, creating jobs for sales workers, waiters, gardeners, pool cleaners, and more. These workers also spent money locally, creating further expansion, and so on.

The boom turned into a bust when home construction came to a virtual halt. It turned out that speculation had been feeding on itself: people were buying houses as investments, then selling them to other people who were also buying houses as investments, and the prices had risen to levels far beyond what people who actually wanted to live in houses were willing to pay.

The abrupt collapse of the housing market pulled the local economy down with it, as the process that had created the earlier boom operated in reverse.

The boom and bust in Ft. Myers illustrates, on a small scale, the way booms and busts often happen for the economy as a whole. The business cycle is often driven by ups or downs in investment spending—either residential investment spending (that is, spending on home construction) or nonresidential investment spending (such as spending on construction of office buildings, factories, and shopping malls). Changes in investment spending, in turn, indirectly lead to changes in consumer spending, which magnify—or *multiply*—the effect of the investment spending changes on the economy as a whole.


Courtesy of the Dallas Morning News

In this section we'll study how this process works on a grand scale. As a first step, we introduce *multiplier* analysis and show how it helps us understand the business cycle. In **Module 17** we explain *aggregate demand* and its two most important components, consumer spending and investment spending. **Module 18** introduces *aggregate supply*, the other half of the model used to analyze economic fluctuations. We will then be ready to explore how aggregate supply and aggregate demand determine the levels of prices and real output in an economy. Finally, we will use the aggregate demand-aggregate supply model to visualize the state of the economy and examine the effects of economic policy.

SECTION INTRODUCTION

Module 16

Income and Expenditure

What you will learn in this Module:

- The nature of the multiplier, which shows how initial changes in spending lead to further changes
- The meaning of the aggregate consumption function, which shows how current disposable income affects consumer spending
- How expected future income and aggregate wealth affect consumer spending
- The determinants of investment spending
- Why investment spending is considered a leading indicator of the future state of the economy

The Multiplier: An Informal Introduction

The story of the boom and bust in Ft. Myers involves a sort of chain reaction in which an initial rise or fall in spending leads to changes in income, which lead to further changes in spending, and so on. Let's examine that chain reaction more closely, this time thinking through the effects of changes in spending in the economy as a whole.

For the sake of this analysis, we'll make four simplifying assumptions that we will have to reconsider in later modules.

1. We assume that *producers are willing to supply additional output at a fixed price*. That is, if consumers or businesses buying investment goods decide to spend an additional $1 billion, that will translate into the production of $1 billion worth of additional goods and services without driving up the overall level of prices. As a result, *changes in overall spending translate into changes in aggregate output*, as measured by real GDP. As we'll learn in this section, this assumption isn't too unrealistic in the short run, but it needs to be changed when we think about the long-run effects of changes in demand.

2. We take the interest rate as given.

3. We assume that there is no government spending and no taxes.

4. We assume that exports and imports are zero.

Given these simplifying assumptions, consider what happens if there is a change in investment spending. Specifically, imagine that for some reason home builders decide to spend an extra $100 billion on home construction over the next year.

The direct effect of this increase in investment spending will be to increase income and the value of aggregate output by the same amount. That's because each dollar spent on home construction translates into a dollar's worth of income for construction workers, suppliers of building materials, electricians, and so on. If the process stopped there, the increase in housing investment spending would raise overall income by exactly $100 billion.

But the process doesn't stop there. The increase in aggregate output leads to an increase in disposable income that flows to households in the form of profits and wages. The increase in households' disposable income leads to a rise in consumer spending, which, in turn, induces firms to increase output yet again. This generates another rise in disposable income, which leads to another round of consumer spending increases, and so on. So there are multiple rounds of increases in aggregate output.

How large is the total effect on aggregate output if we sum the effect from all these rounds of spending increases? To answer this question, we need to introduce the concept of the **marginal propensity to consume**, or ***MPC***: the increase in consumer spending when disposable income rises by $1. When consumer spending changes because of a rise or fall in disposable income, *MPC* is the change in consumer spending divided by the change in disposable income:

$$\textbf{(16-1)}\quad MPC = \frac{\Delta \text{ Consumer spending}}{\Delta \text{ Disposable income}}$$

where the symbol Δ (delta) means "change in." For example, if consumer spending goes up by $6 billion when disposable income goes up by $10 billion, *MPC* is $6 billion/$10 billion = 0.6.

Many businesses, such as those that support home improvement and interior design, benefit during housing booms. Juice Images/Alamy

Because consumers normally spend part but not all of an additional dollar of disposable income, *MPC* is a number between 0 and 1. The additional disposable income that consumers don't spend is saved; the **marginal propensity to save**, or ***MPS***, is the fraction of an additional dollar of disposable income that is saved. *MPS* is equal to 1 − *MPC*.

With the assumption of no taxes and no international trade, each $1 increase in spending raises both real GDP and disposable income by $1. So the $100 billion increase in investment spending initially raises real GDP by $100 billion. The corresponding $100 billion increase in disposable income leads to a second-round increase in consumer spending, which raises real GDP by a further *MPC* × $100 billion. It is followed by a third-round increase in consumer spending of *MPC* × *MPC* × $100 billion, and so on. After an infinite number of rounds, the total effect on real GDP is:

The **marginal propensity to consume**, or ***MPC***, is the increase in consumer spending when disposable income rises by $1.

The **marginal propensity to save**, or ***MPS***, is the increase in household savings when disposable income rises by $1.

$$
\begin{array}{lcl}
\text{Increase in investment spending} & = & \$100 \text{ billion} \\
+\text{ Second-round increase in consumer spending} & = & MPC \times \$100 \text{ billion} \\
+\text{ Third-round increase in consumer spending} & = & MPC^2 \times \$100 \text{ billion} \\
+\text{ Fourth-round increase in consumer spending} & = & MPC^3 \times \$100 \text{ billion} \\
\vdots & & \vdots \\
\hline
\end{array}
$$

$$\text{Total increase in real GDP} = (1 + MPC + MPC^2 + MPC^3 + \ldots) \times \$100 \text{ billion}$$

So the $100 billion increase in investment spending sets off a chain reaction in the economy. The net result of this chain reaction is that a $100 billion increase in investment spending leads to a change in real GDP that is a *multiple* of the size of that initial change in spending.

How large is this multiple? It's a mathematical fact that an infinite series of the form $1 + x + x^2 + x^3 + \ldots$, where x is between 0 and 1, is equal to $1/(1 - x)$. So the total effect of a $100 billion increase in investment spending, I, taking into account all the subsequent increases in consumer spending (and assuming no taxes and no international trade), is given by:

$$\textbf{(16-2)} \quad \text{Total increase in real GDP from \$100 billion rise in } I = \frac{1}{(1 - MPC)} \times \$100 \text{ billion}$$

Let's consider a numerical example in which $MPC = 0.6$: each $1 in additional disposable income causes a $0.60 rise in consumer spending. In that case, a $100 billion increase in investment spending raises real GDP by $100 billion in the first round. The second-round increase in consumer spending raises real GDP by another 0.6 × $100 billion, or $60 billion. The third-round increase in consumer spending raises real GDP by another 0.6 × $60 billion, or $36 billion. This process goes on and on until the amount of spending in another round would be virtually zero. In the end, real GDP rises by $250 billion as a consequence of the initial $100 billion rise in investment spending:

$$\frac{1}{(1 - 0.6)} \times \$100 \text{ billion} = 2.5 \times \$100 \text{ billion} = \$250 \text{ billion}$$

Notice that even though there can be a nearly endless number of rounds of expansion of real GDP, the total rise in real GDP is limited to $250 billion. The reason is that at each stage some of the rise in disposable income "leaks out" because it is saved, leaving less and less to be spent in the next round. How much of an additional dollar of disposable income is saved depends on *MPS*, the marginal propensity to save.

We've described the effects of a change in investment spending, but the same analysis can be applied to any other change in spending. The important thing is to distinguish between the initial change in aggregate spending, before real GDP rises, and the additional change in aggregate spending caused by the change in real GDP as the chain reaction unfolds. For example, suppose that a boom in housing prices makes consumers feel richer and that, as a result, they become willing to spend more at any given level of disposable income. This will lead to an initial rise in consumer spending, before real GDP rises. But it will also lead to second and later rounds of higher consumer spending as real GDP and disposable income rise.

An initial rise or fall in aggregate spending at a given level of real GDP is called an **autonomous change in aggregate spending**. It's autonomous—which means "self-governing"—because it's the cause, not the result, of the chain reaction we've just described. Formally, the **multiplier** is the ratio of the total change in real GDP caused by an autonomous change in aggregate spending to the size of that autonomous change. If we let ΔAAS stand for the autonomous change in aggregate spending and ΔY stand for the total change in real GDP, then the multiplier is equal to $\Delta Y/\Delta AAS$. We've already seen how to find the value of the multiplier. Assuming no taxes and no trade, the total change in real GDP caused by an autonomous change in aggregate spending is:

$$\textbf{(16-3)} \quad \Delta Y = \frac{1}{(1 - MPC)} \times \Delta AAS$$

So the multiplier is:

$$\textbf{(16-4)} \quad \text{Multiplier} = \frac{\Delta Y}{\Delta AAS} = \frac{1}{(1 - MPC)}$$

Notice that the size of the multiplier depends on *MPC*. If the marginal propensity to consume is high, so is the multiplier. This is true because the size of *MPC* determines how large each round of expansion is compared with the previous round. To put it another way, the higher *MPC* is, the less disposable income "leaks out" into savings at each round of expansion.

In later modules we'll use the concept of the multiplier to analyze the effects of fiscal and monetary policies. We'll also see that the formula for the multiplier changes when we introduce various complications, including taxes and foreign trade. First, however, we need to look more deeply at what determines consumer spending.

An **autonomous change in aggregate spending** is an initial rise or fall in aggregate spending that is the cause, not the result, of a series of income and spending changes.

The **multiplier** is the ratio of the total change in real GDP caused by an autonomous change in aggregate spending to the size of that autonomous change.

fyi

The Multiplier and the Great Depression

The concept of the multiplier was originally devised by economists trying to understand the greatest economic disaster in history, the collapse of output and employment from 1929 to 1933, which began the Great Depression. Most economists believe that the slump from 1929 to 1933 was driven by a collapse in investment spending. But as the economy shrank, consumer spending also fell sharply, multiplying the effect on real GDP.

The table shows what happened to investment spending, consumer spending, and GDP during those four terrible years. All data are in 2005 dollars. What we see is that investment spending imploded, falling by more than 80%. But consumer spending also fell drastically and actually accounted for more of the fall in real GDP. (The total fall in real GDP was larger than the combined fall in consumer and investment spending, mainly because of technical accounting issues.)

Investment Spending, Consumer Spending, and Real GDP in the Great Depression (billions of 2005 dollars)

	1929	1933	Change
Investment spending	\$101.7	\$18.9	−\$82.8
Consumer spending	736.6	601.1	−135.5
Real GDP	977.0	716.4	−260.6

Source: Bureau of Economic Analysis.

The numbers in the table suggest that at the time of the Great Depression, the multiplier was around 3. Most current estimates put the size of the multiplier considerably lower—but there's a reason for that change. In 1929, government in the United States was very small by modern standards: taxes were low and major government programs like Social Security and Medicare had not yet come into being. In the modern U.S. economy, taxes are much higher, and so is government spending. Why does this matter? Because taxes and some government programs act as automatic stabilizers, reducing the size of the multiplier. For example, when incomes are relatively high, tax payments are relatively high as well, thus moderating increases in expenditures. And when incomes are relatively low, the unemployment insurance program pays more money out to individuals, thus boosting expenditures higher than they would otherwise be.

Consumer Spending

Should you splurge on a restaurant meal or save money by eating at home? Should you buy a new car and, if so, how expensive a model? Should you redo that bathroom or live with it for another year? In the real world, households are constantly confronted with such choices—not just about the consumption mix but also about how much to spend in total. These choices, in turn, have a powerful effect on the economy: consumer spending normally accounts for two-thirds of total spending on final goods and services. But what determines how much consumers spend?

Current Disposable Income and Consumer Spending

[Notes/Highlighting]

The most important factor affecting a family's consumer spending is its current disposable income—income after taxes are paid and government transfers are received. It's obvious from daily life that people with high disposable incomes on average drive more expensive cars, live in more expensive houses, and spend more on meals and clothing than people with lower disposable incomes. And the relationship between current disposable income and spending is clear in the data.

The Bureau of Labor Statistics (BLS) collects annual data on family income and spending. Families are grouped by levels of before-tax income; after-tax income for each group is also reported. Since the income figures include transfers from the government, what the BLS calls a household's after-tax income is equivalent to its current disposable income.

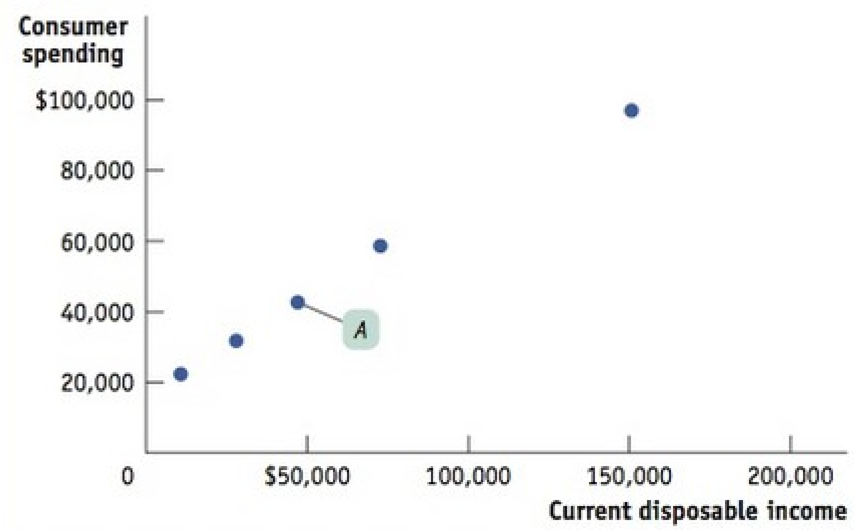
Figure 16.1 is a scatter diagram illustrating the relationship between household current disposable income and household consumer spending for American households by income group in 2008. For example, point *A* shows that in 2008 the middle fifth of the population had an average current disposable income of $46,936 and average spending of $42,659. The pattern of the dots slopes upward from left to right, making it clear that households with higher current disposable income had higher consumer spending.

figure 16.1

Current Disposable Income and Consumer Spending for American Households in 2008

For each income group of households, average current disposable income in 2008 is plotted versus average consumer spending in 2008. For example, the middle income group, with an annual income of $36,271 to $59,086, is represented by point *A*, indicating a household average current disposable income of $46,936 and average household consumer spending of $42,659. The data clearly show a positive relationship between current disposable income and consumer spending: families with higher current disposable income have higher consumer spending.

Source: Bureau of Labor Statistics.



It's very useful to represent the relationship between an individual household's current disposable income and its consumer spending with an equation. The **consumption function** is an equation showing how an individual household's consumer spending varies with the household's current disposable income. The simplest version of a consumption function is a linear equation:

$$\textbf{(16-5)} \quad c = a + MPC \times y_d$$

where lowercase letters indicate variables measured for an individual household.

In this equation, c is individual household consumer spending and y_d is individual household current disposable income. Recall that *MPC*, the

The **consumption function** is an equation showing how an individual household's consumer spending varies with the household's current disposable income.

marginal propensity to consume, is the amount by which consumer spending rises if current disposable income rises by $1. Finally, *a* is a constant term—individual household **autonomous consumer spending**, the amount a household would spend if it had no disposable income. We assume that *a* is greater than zero because a household with no disposable income is able to fund some consumption by borrowing or using its savings. Notice, by the way, that we're using *y* for income. That's standard practice in macroeconomics, even though income isn't actually spelled "yncome." The reason is that *I* is reserved for investment spending.

Autonomous consumer spending is the amount of money a household would spend if it had no disposable income.

Recall that we expressed *MPC* as the ratio of a change in consumer spending to the change in current disposable income. We've rewritten it for an individual household as Equation 16-6:

$$\textbf{(16-6)} \quad MPC = \Delta c / \Delta y_d$$

Multiplying both sides of Equation 16-6 by Δy_d, we get:

$$\textbf{(16-7)} \quad MPC \times \Delta y_d = \Delta c$$

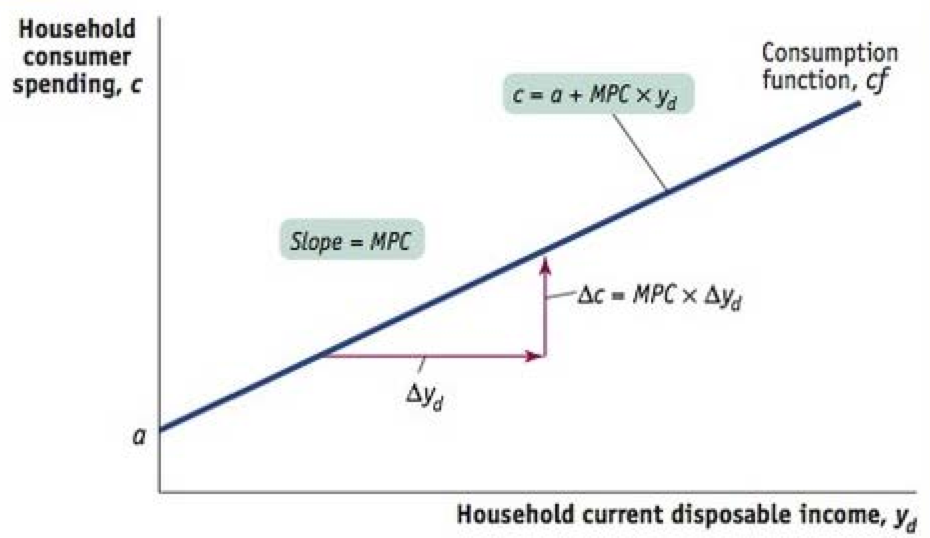
Equation 16-7 tells us that when y_d goes up by $1, *c* goes up by *MPC* × $1.

Figure 16.2 shows what Equation 16-5 looks like graphically, plotting y_d on the horizontal axis and *c* on the vertical axis. Individual household autonomous consumer spending, *a*, is the value of *c* when y_d is zero—it is the vertical *intercept* of the consumption function, *cf. MPC* is the *slope* of the line, measured by rise over run. If current disposable income rises by Δy_d, household consumer spending, *c*, rises by Δc. Since *MPC* is defined as $\Delta c/\Delta y_d$, the slope of the consumption function is:

figure 16.2

The Consumption Function

The consumption function relates a household's current disposable income to its consumer spending. The vertical intercept, *a*, is individual household autonomous consumer spending: the amount of a household's consumer spending if its current disposable income is zero. The slope of the consumption function line, *cf*, is the marginal propensity to consume, or *MPC*: of every additional $1 of current disposable income, *MPC* × $1 is spent.



$$\textbf{(16-8)} \quad \begin{aligned} &\text{Slope of consumption function} \\ &= \text{Rise over run} \\ &= \Delta c/\Delta y_d \\ &= MPC \end{aligned}$$

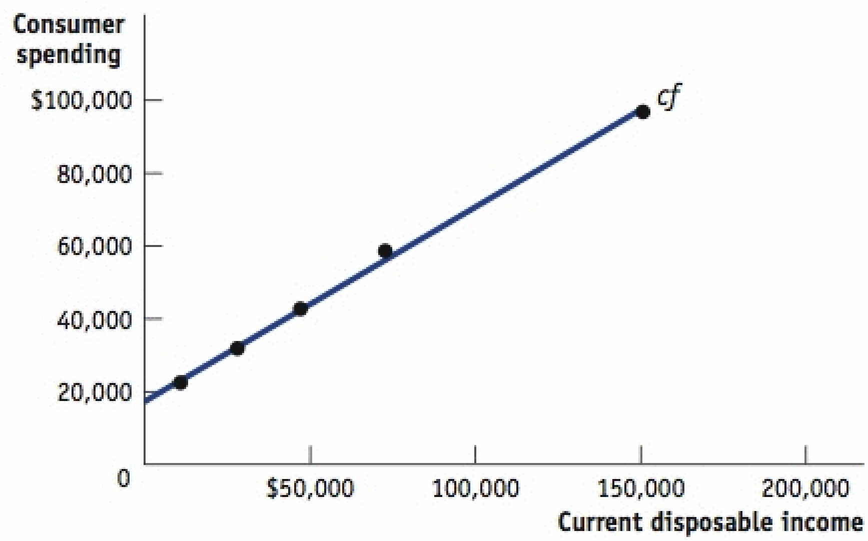
In reality, actual data never fit Equation 16-5 perfectly, but the fit can be pretty good. **Figure 16.3** shows the data from **Figure 16.1** again, together with a line drawn to fit the data as closely as possible. According to the data on households' consumer spending and current disposable income, the best estimate of *a* is $17,484 and of *MPC* is 0.534. So the consumption function fitted to the data is:

figure 16.3

A Consumption Function Fitted to Data

The data from Figure 16.1 are reproduced here, along with a line drawn to fit the data as closely as possible. For American households in 2008, the best estimate of the average household's autonomous consumer spending, *a*, is \$17,484 and the best estimate of *MPC* is 0.534, or approximately 0.53.

Source: Bureau of Labor Statistics.



$$c = \$17,484 + 0.534 \times y_d$$

That is, the data suggest a marginal propensity to consume of approximately 0.53. This implies that the marginal propensity to save (*MPS*)—the amount of an additional \$1 of disposable income that is saved—is approximately 1 − 0.53 = 0.47, and the multiplier is 1/(1 − *MPC*) = 1/*MPS* = approximately 1/0.47 = 2.13.

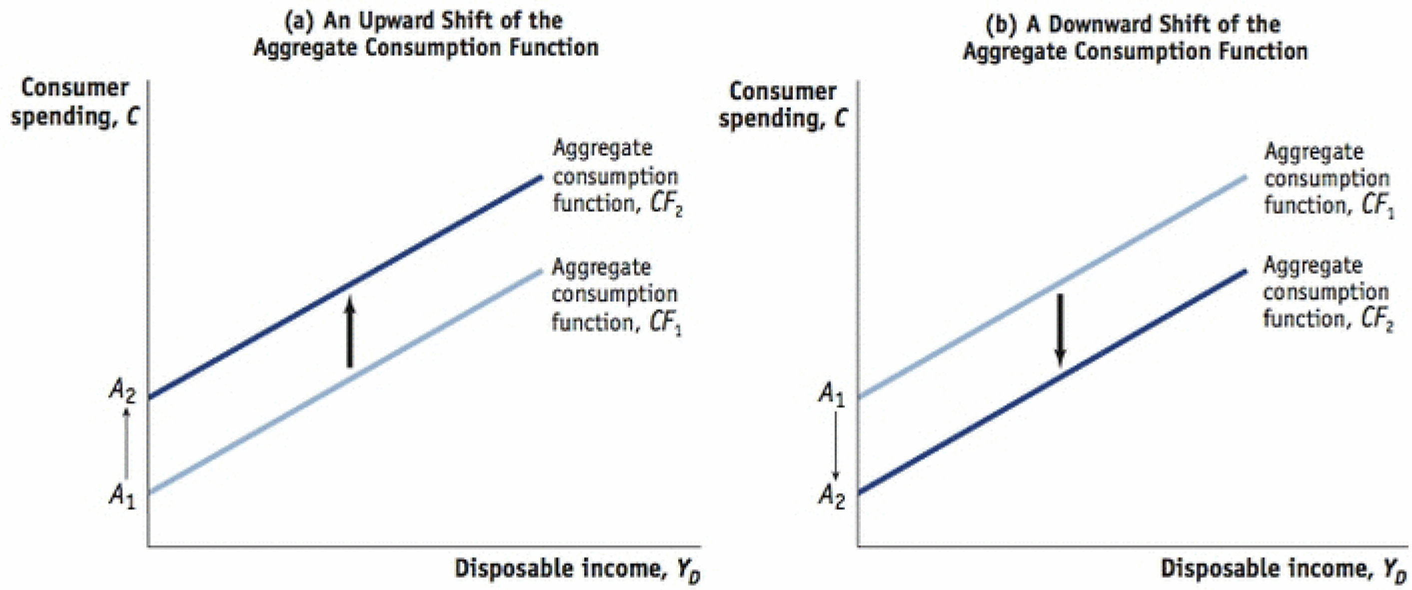
It's important to realize that **Figure 16.3** shows a *microeconomic* relationship between the current disposable income of individual households and their spending on goods and services. However, macroeconomists assume that a similar relationship holds *for the economy as a whole*: that there is a relationship, called the **aggregate consumption function**, between aggregate current disposable income and aggregate consumer spending. We'll assume that it has the same form as the household-level consumption function:

$$\textbf{(16-9)} \quad C = A + MPC \times Y_D$$

Here, C is aggregate consumer spending (called just "consumer spending"); Y_D is aggregate current disposable income (called, for simplicity, just "disposable income"); and A is aggregate autonomous consumer spending, the amount of consumer spending when Y_D equals zero. This is the relationship represented in **Figure 16.4** by *CF*, analogous to *cf* in **Figure 16.3**.

The **aggregate consumption function** is the relationship for the economy as a whole between aggregate current disposable income and aggregate consumer spending.

figure 16.4 Shifts of the Aggregate Consumption Function



Panel (a) illustrates the effect of an increase in expected aggregate future disposable income. Consumers will spend more at every given level of aggregate current disposable income, Y_D. As a result, the initial aggregate consumption function CF_1, with aggregate autonomous consumer spending A_1, shifts up to a new position at CF_2 with aggregate autonomous consumer spending A_2. An increase in aggregate wealth will also shift the aggregate consumption function up. Panel (b), in contrast, illustrates the effect of a reduction in expected aggregate future disposable income. Consumers will spend less at every given level of aggregate current disposable income, Y_D. Consequently, the initial aggregate consumption function CF_1, with aggregate autonomous consumer spending A_1, shifts down to a new position at CF_2 with aggregate autonomous consumer spending A_2. A reduction in aggregate wealth will have the same effect.

Current Disposable Income and Consumer S...

Shifts of the Aggregate Consumption Function

The aggregate consumption function shows the relationship between disposable income and consumer spending for the economy as a whole, other things equal. When things other than disposable income change, the aggregate consumption function shifts. There are two principal causes of shifts of the aggregate consumption function: changes in expected future disposable income and changes in aggregate wealth.

Changes in Expected Future Disposable Income Suppose you land a really good, well-paying job on graduating from college—but the job, and the paychecks, won't start for several months. So your disposable income hasn't risen yet. Even so, it's likely that you will start spending more on final goods and services right away—maybe buying nicer work clothes than you originally planned—because you know that higher income is coming.

Conversely, suppose you have a good job but learn that the company is planning to downsize your division, raising the possibility that you may lose your job and have to take a lower-paying one somewhere else. Even though your disposable income hasn't gone down yet, you might well cut back on spending even while still employed, to save for a rainy day.

Both of these examples show how expectations about future disposable income can affect consumer spending. The two panels of **Figure 16.4**, which plot disposable income against consumer spending, show how changes in expected future disposable income affect the aggregate consumption function. In both panels, CF_1 is the initial aggregate consumption function. Panel (a) shows the effect of good news: information that leads consumers to expect higher disposable income in the future than they did before. Consumers will now spend more at any given level of current disposable income Y_D, corresponding to an increase in A, aggregate autonomous consumer spending, from A_1 to A_2. The effect is to shift the aggregate consumption function up, from CF_1 to CF_2. Panel (b) shows the effect of bad news: information that leads consumers to expect lower disposable income in the future than they did before. Consumers will now spend less at any given level of current disposable income, Y_D, corresponding to a fall in A from A_1 to A_2. The effect is to shift the aggregate consumption function down, from CF_1 to CF_2.

In a famous 1956 book, *A Theory of the Consumption Function*, Milton Friedman showed that taking the effects of expected future income into account explains an otherwise puzzling fact about consumer behavior. If we look at consumer spending during any given year, we find that people with high current income save a larger fraction of their income than those with low current income. (This is obvious from the data in **Figure 16.3**: people in the highest income group spend considerably less than their income; those in the lowest income group spend more than their income.) You might think this implies that the overall savings rate—the percentage of a country's disposable income that is saved—will rise as the economy grows and average current income rises; in fact, however, this hasn't happened.

Friedman pointed out that when we look at individual incomes in a given year, there are systematic differences between current and expected future income that create a positive relationship between current income and the savings rate. On one side, many of the people with low current income are having an unusually bad year. For example, they may be workers who have been laid off but will probably find new jobs eventually. They are people whose expected future income is higher than their current income, so it makes sense for them to have low or even negative savings. On the other side, many of the people with high current income in a given year are having an unusually good year. For example, they may have investments that happened to do extremely well. They are people whose expected future income is lower than their current income, so it makes sense for them to save most of their windfall.

When the economy grows, by contrast, current and expected future incomes rise together. Higher current income tends to lead to higher savings today, but higher expected future income tends to lead to lower savings today. As a result, there's a weaker relationship between current income and the savings rate.

Friedman argued that consumer spending ultimately depends mainly on the income people expect to have over the long term rather than on their current income. This argument is known as the *permanent income hypothesis*.

Mike Kemp/Rubberball/Getty Images

Changes in Aggregate Wealth Imagine two individuals, Maria and Mark, both of whom expect to earn $30,000 this year. Suppose, however, that they have different histories. Maria has been working steadily for the past 10 years, owns her own home, and has $200,000 in the bank. Mark is the same age as Maria, but he has been in and out of work, hasn't managed to buy a house, and has very little in savings. In this case, Maria has something that Mark doesn't have: wealth. Even though they have the same disposable income, other things equal, you'd expect Maria to spend more on consumption than Mark. That is, *wealth* has an effect on consumer spending.

The effect of wealth on spending is emphasized by an influential economic model of how consumers make choices about spending versus saving called the *life-cycle hypothesis*. According to this hypothesis, consumers plan their spending over their lifetime, not just in response to their current disposable income. As a result, people try to *smooth* their consumption over their lifetimes—they save some of their current disposable income during their years of peak earnings (typically occurring during a worker's 40s and 50s) and during their retirement live off the wealth they accumulated while working. We won't go into the details of this hypothesis but will simply point out that it implies an important role for wealth in determining consumer spending. For example, a middle-aged couple who have accumulated a lot of wealth—who have paid off the mortgage on their house and already own plenty of stocks and bonds—will, other things equal, spend more on goods and services than a couple who have the same current disposable income but still need to save for their retirement.

Because wealth affects household consumer spending, changes in wealth across the economy can shift the aggregate consumption function. A rise in aggregate wealth—say, because of a booming stock market—increases the vertical intercept *A*, aggregate autonomous consumer spending. This, in turn, shifts the aggregate consumption function up in the same way as does an expected increase in future disposable income. A decline in aggregate wealth—say, because of a fall in housing prices as occurred in 2008—reduces *A* and shifts the aggregate consumption function down.

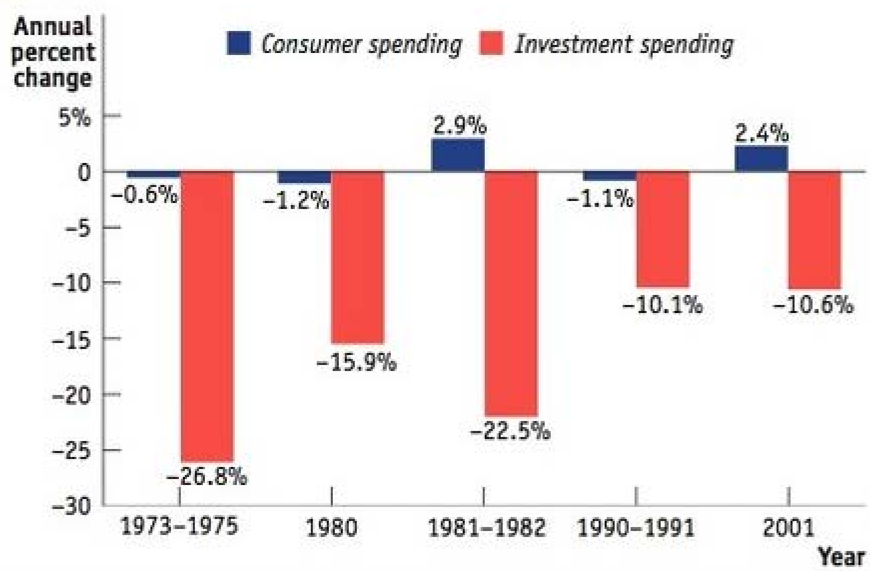
Investment Spending

Although consumer spending is much greater than investment spending, booms and busts in investment spending tend to drive the business cycle. In fact, most recessions originate as a fall in investment spending. **Figure 16.5** illustrates this point; it shows the annual percent change of investment spending and consumer spending in the United States, both measured in 2005 dollars, during five recessions from 1973 to 2001. As you can see, swings in investment spending are much more dramatic than those in consumer spending. In addition, economists believe, due to the multiplier process, that declines in consumer spending are usually the result of a process that begins with a slump in investment spending. Soon we'll examine in more detail how a slump in investment spending generates a fall in consumer spending through the multiplier process.

figure 16.5

Fluctuations in Investment Spending and Consumer Spending

The bars illustrate the annual percent change in investment spending and consumer spending during five recent recessions. As the lengths of the bars show, swings in investment spending were much larger in percentage terms than those in consumer spending. The pattern has led economists to believe that recessions typically originate as a slump in investment spending.



Before we do that, however, let's analyze the factors that determine investment spending, which are somewhat different from those that determine consumer spending. **Planned investment spending** is the investment spending that firms *intend* to undertake during a given period. For reasons explained shortly, the level of investment spending businesses *actually* carry out is sometimes not the same level as was planned. Planned investment spending depends on three principal factors: the interest rate, the expected future level of real GDP, and the current level of production capacity. First, we'll analyze the effect of the interest rate.

Planned investment spending is the investment spending that businesses intend to undertake during a given period.

The Interest Rate and Investment Spending

Interest rates have their clearest effect on one particular form of investment spending: spending on residential construction—that is, on the construction of homes. The reason is straightforward: home builders only build houses they think they can sell, and houses are more affordable—and so more likely to sell—when the interest rate is low. Consider a potential home-buying family that needs to borrow $150,000 to buy a house. At an interest rate of 7.5%, a 30-year home mortgage will mean payments of $1,048 per month. At an interest rate of 5.5%, those payments would be only $851 per month, making houses significantly more affordable. Interest rates actually did drop from roughly 7.5% to 5.5% between the late 1990s and 2003, helping set off a housing boom.

Interest rates also affect other forms of investment spending. Firms with investment spending projects will go ahead with a project only if they expect a rate of return higher than the cost of the funds they would have to borrow to finance that project. If the interest rate rises, fewer projects will pass that test, and as a result investment spending will be lower.

Interest rates have a direct impact on whether or not construction companies decide to invest in the construction of new homes. Photodisc

You might think that the trade-off a firm faces is different if it can fund its investment project with its past profits rather than through borrowing. Past profits used to finance investment spending are called *retained earnings*. But even if a firm pays for investment spending out of retained earnings, the trade-off it must make in deciding whether or not to fund a project remains the same because it must take into account the opportunity cost of its funds. For example, instead of purchasing new equipment, the firm could lend out the funds and earn interest. The forgone interest earned is the opportunity cost of using retained earnings to fund an investment project. So the trade-off the firm faces when comparing a project's rate of return to the market interest rate has not changed when it uses retained earnings rather than borrowed funds. Either way, a rise in the market interest rate makes any given investment project less profitable. Conversely, a fall in the interest rate makes some investment projects that were unprofitable before profitable at the now lower interest rate. So some projects that had been unfunded before will be funded now.

So planned investment spending—spending on investment projects that firms voluntarily decide whether or not to undertake—is negatively related to the interest rate. Other things equal, a higher interest rate leads to a lower level of planned investment spending.

Expected Future Real GDP, Production Capacity, and Investment Spending

[Notes/Highlighting]

Suppose a firm has enough capacity to continue to produce the amount it is currently selling but doesn't expect its sales to grow in the future. Then it will engage in investment spending only to replace existing equipment and structures that wear out or are rendered obsolete by new technologies. But if, instead, the firm expects its sales to grow rapidly in the future, it will find its existing production capacity insufficient for its future production needs. So the firm will undertake investment spending to meet those needs. This implies that, other things equal, firms will undertake more investment spending when they expect their sales to grow.

Now suppose that the firm currently has considerably more capacity than necessary to meet current production needs. Even if it expects sales to grow, it won't have to undertake investment spending for a while—not until the growth in sales catches up with its excess capacity. This illustrates the fact that, other things equal, the current level of productive capacity has a negative effect on investment spending: other things equal, the higher the current capacity, the lower the investment spending.

If we put together the effects on investment spending of (1) growth in expected future sales and (2) the size of current production capacity, we can see one situation in which firms will most likely undertake high levels of investment spending: when they expect sales to grow rapidly. In that case, even excess production capacity will soon be used up, leading firms to resume investment spending.

What is an indicator of high expected growth in future sales? It's a high expected future growth rate of real GDP. A higher expected future growth rate of real GDP results in a higher level of planned investment spending, but a lower expected future growth rate of real GDP leads to lower planned investment spending.

Inventories and Unplanned Investment Spending

Most firms maintain **inventories**, stocks of goods held to satisfy future sales. Firms hold inventories so they can quickly satisfy buyers—a consumer can purchase an item off the shelf rather than waiting for it to be manufactured. In addition, businesses often hold inventories of their inputs to be sure they have a steady supply of necessary materials and spare parts. At the end of 2009, the overall value of inventories in the U.S. economy was estimated at $1.9 trillion, more than 13% of GDP.

A firm that increases its inventories is engaging in a form of investment spending. Suppose, for example, that the U.S. auto industry produces 800,000 cars per month but sells only 700,000. The remaining 100,000 cars are added to the inventory at auto company warehouses or car dealerships, ready to be sold in the future.

Inventory investment is the value of the change in total inventories held in the economy during a given period. Unlike other forms of investment spending, inventory investment can actually be negative. If, for example, the auto industry reduces its inventory over the course of a month, we say that it has engaged in negative inventory investment.

Getty Images

To understand inventory investment, think about a manager stocking the canned goods section of a supermarket. The manager tries to keep the store fully stocked so that shoppers can almost always find what they're looking for. But the manager does not want the shelves too heavily stocked because shelf space is limited and products can spoil. Similar considerations apply to many firms and typically lead them to manage their inventories carefully. However, sales fluctuate. And because firms cannot always accurately predict sales, they often find themselves holding larger or smaller inventories than they had intended. When a firm's inventories are higher than intended due to an unforeseen decrease in sales, the result is **unplanned inventory investment**. An unexpected increase in sales depletes inventories and causes the value of unplanned inventory investment to be negative.

So in any given period, **actual investment spending** is equal to planned investment spending plus unplanned inventory investment. If we let $I_{Unplanned}$ represent unplanned inventory investment, $I_{Planned}$ represent planned investment spending, and I represent actual investment spending, then the relationship among all three can be represented as:

$$(16\text{-}10) \quad I = I_{Unplanned} + I_{Planned}$$

To see how unplanned inventory investment can occur, let's continue to focus on the auto industry and make the following assumptions. First, let's assume that the industry must determine each month's production volume in advance, before it knows the volume of actual sales. Second, let's assume that it anticipates selling 800,000 cars next month and that it plans neither to add to nor subtract from existing inventories. In that case, it will produce 800,000 cars to match anticipated sales.

Inventories are stocks of goods held to satisfy future sales.

Inventory investment is the value of the change in total inventories held in the economy during a given period.

Positive **unplanned inventory investment** occurs when actual sales are less than businesses expected, leading to unplanned increases in inventories. Sales in excess of expectations result in negative unplanned inventory investment.

Actual investment spending is the sum of planned investment spending and unplanned inventory investment.

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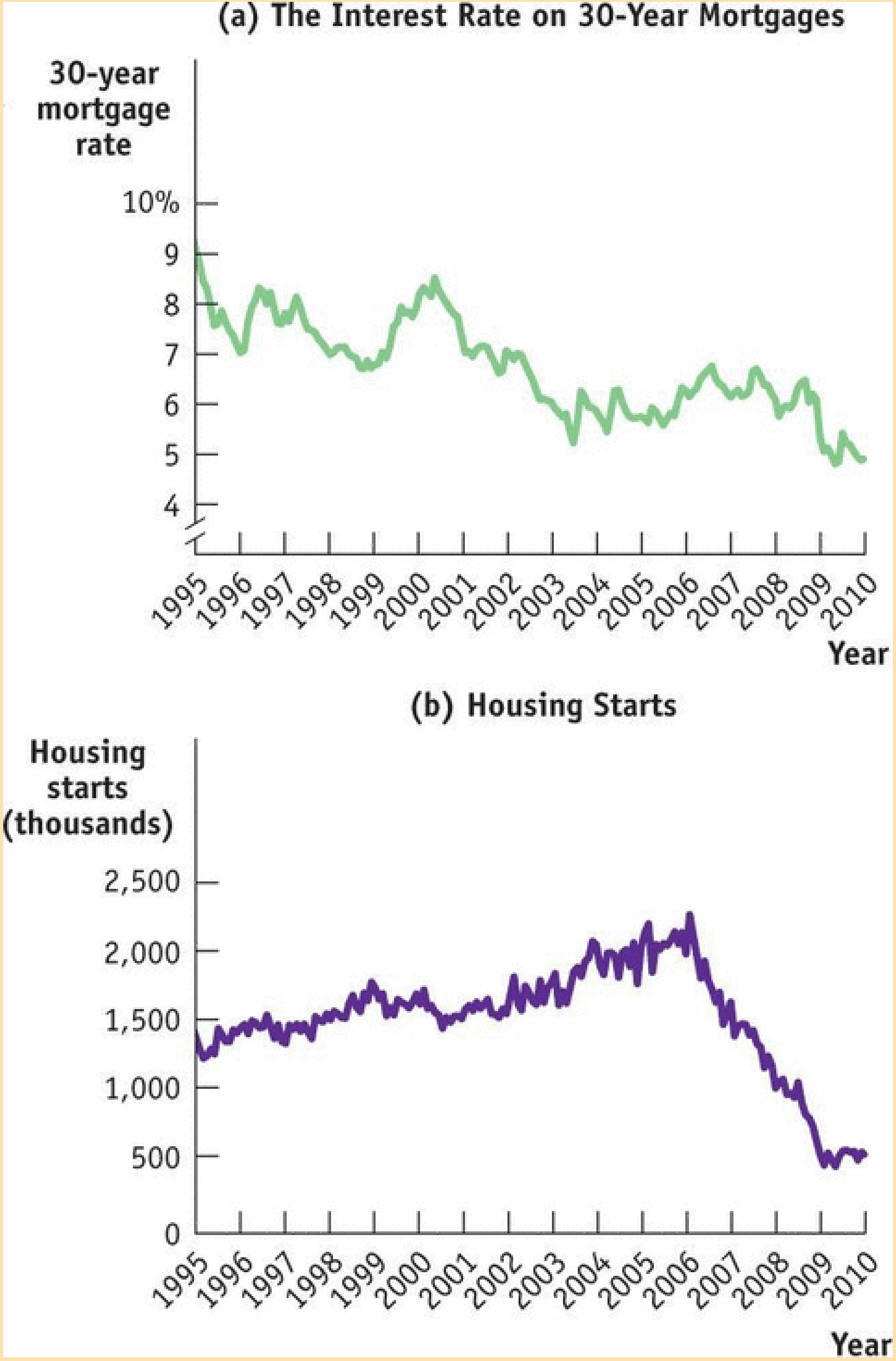
Interest Rates and the U.S. Housing Boom

Interest rates dropped from roughly 7.5% to 5.5% between the late 1990s and 2003, helping set off a housing boom. The housing boom was part of a broader housing boom in the country as a whole. There is little question that this housing boom was caused, in the first instance, by low interest rates.

The figure shows the interest rate on 30-year home mortgages—the traditional way to borrow money for a home purchase—and the number of housing starts, the number of homes for which construction is started per month, from 1995 to the end of 2009 in the United States. Panel (a), which shows the mortgage rate, gives you an idea of how much interest rates fell. In the second half of the 1990s, mortgage rates generally fluctuated between 7% and 8%; by 2003, they were down to between 5% and 6%. These lower rates were largely the result of Federal Reserve policy: the Fed cut rates in response to the 2001 recession and continued cutting them into 2003 out of concern that the economy's recovery was too weak to generate sustained job growth.

The low interest rates led to a large increase in residential investment spending, reflected in a surge of housing starts, shown in panel (b). This rise in investment spending drove an overall economic expansion, both through its direct effects and through the multiplier process.

Unfortunately, the housing boom eventually turned into too much of a good thing. By 2006, it was clear that the U.S. housing market was experiencing a bubble: people were buying housing based on unrealistic expectations about future price increases. When the bubble burst, housing—and the U.S. economy—took a fall.



(Federal Reserve Bank of St. Louis)

Now imagine that next month's actual sales are less than expected, only 700,000 cars. As a result, the value of 100,000 cars will be added to investment spending as unplanned inventory investment.

The auto industry will, of course, eventually adjust to this slowdown in sales and the resulting unplanned inventory investment. It is likely that it will cut next month's production volume in order to reduce inventories. In fact, economists who study macroeconomic variables in an attempt to determine the future path of the economy pay careful attention to changes in inventory levels. Rising inventories typically indicate positive unplanned inventory investment and a slowing economy, as sales are less than had been forecast. Falling inventories typically indicate negative unplanned inventory investment and a growing economy, as sales are greater than forecast. In the next section, we will see how production adjustments in response to fluctuations in sales and inventories ensure that the value of final goods and services actually produced is equal to desired purchases of those final goods and services.

Inventories and Unplanned Investment Spe...

Module 16 AP Review

Check Your Understanding

1. Explain why a decline in investment spending caused by a change in business expectations leads to a fall in consumer spending.

[Answer Field]

Show Answer

2. What is the multiplier if the marginal propensity to consume is 0.5? What is it if *MPC* is 0.8?

[Answer Field]

Show Answer

3. Suppose a crisis in the capital markets makes consumers unable to borrow and unable to save money. What implication does this have for the effects of expected future disposable income on consumer spending?

[Answer Field]

Show Answer

4. For each event, explain whether the initial effect is a change in planned investment spending or a change in unplanned inventory investment, and indicate the direction of the change.

   a. an unexpected increase in consumer spending

   [Answer Field]

   Show Answer

   b. a sharp rise in the cost of business borrowing

   [Answer Field]

   Show Answer

   c. a sharp increase in the economy's growth rate of real GDP

   [Answer Field]

   Show Answer

   d. an unanticipated fall in sales

   [Answer Field]

   Show Answer

Tackle the Test: Free-Response Questions

1. Use the consumption function provided to answer the following questions.
$c = \$15{,}000 + 0.8 \times y_d$

a. What is the value of the marginal propensity to consume?

[Answer Field]

b. If individual household current disposable income is $40,000, individual household consumer spending will equal how much?

[Answer Field]

c. Draw a correctly labeled graph showing this consumption function.

[Answer Field]

d. What is the slope of this consumption function?

[Answer Field]

e. On your graph from part c, show what would happen if expected future income decreased.

[Answer Field]

Answer (7 points)

1 point: 0.8

1 point: $47,000

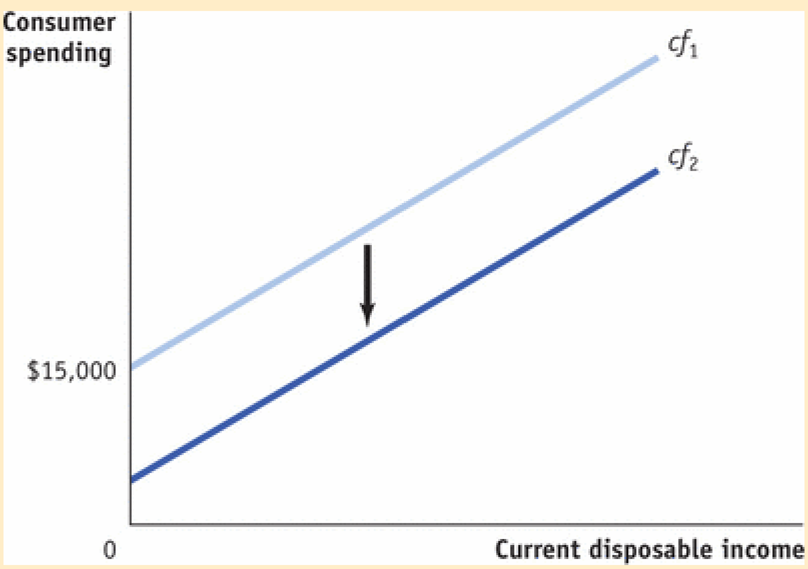
1 point: Vertical axis labeled "Consumer spending" and horizontal axis labeled "Current disposable income"

1 point: Vertical intercept of $15,000

1 point: Upward sloping consumption function

1 point: 0.8

1 point: Consumption function shifts downward



2. List the three most important factors affecting planned investment spending. Explain how each is related to actual investment spending.

[Answer Field]

Show Answer