CONSUMPTION

Consumption commands nearly two-thirds of total output in the United States. Most of what the people of a country produce, they consume. What is left over after two-thirds of output is consumed goes toward investment and government services, and many government services are just publicly provided consumption; the national park system is an example. Though consumption is a large fraction of total output it is not a constant. In this chapter we study the forces that determine the level of and variations in consumption.

Some Measurement Issues

Before we go too far, we need to refine our concept of consumption. In the national income and product accounts (NIPA) consumption spending is the dollar value of spending on consumption services, non-durable goods, and durable goods. A definition more true to the economist's concept of consumption defines consumption as the value of the flow of consumption services. This notion is straightforward if, for example, we are talking about a plane trip. The consumption service is the transportation from one city to another, and the value of the service is just the price of the ticket. Once you get off the plane the service is provided, and we can close the book on this transaction. In this case, the NIPA and the flow of services definitions yield the same answer.

Things are different when you purchase a new TV set, car, or some other durable good. Suppose you buy a new TV for $400. In the NIPA this counts for $400 worth of consumption. But, do you consume the TV once you bring it home? The answer is no. You expect the TV to yield you entertainment services not only on the first night you bring it home, but for years to come. If the TV never wore out or became obsolete, you could consume entertainment services
forever, but this is not likely with a TV or with any other durable good for that matter. Next year's model will probably be better in some dimension, and parts in the set wear out. So, what is the value of the services from the TV over the year? Suppose on the anniversary of your purchase you could sell your TV for $300. The wear and tear on your set, and the quality improvements on new sets have lowered its value by $100 over the year. This depreciation results from the years worth of services rendered by your set. The value of the TV isn't lost, it was consumed, and, we hope, enjoyed.

Does this mean that if there is no depreciation, the consumption of durables is free? The answer to this question is a resounding no. If you paid $400 for your set, then that is $400 that you did not put into your savings account. If the interest rate is 5%, this means that you gave up $20 (= (.05)•($400)) in interest income in order to own your set. To get an estimate of the value of the consumption services yielded by the TV set, you must add the foregone interest income to the depreciation. This would make the value of the service flow from the set $120.

It is hard to estimate the correct depreciation and the interest cost needed to measure the service flow from durables. Nevertheless researchers have given us some rough measures. In Figure 8.1 real consumption calculated on a NIPA basis is plotted against real consumption calculated using an estimate of the service flow from consumer durables. The plot clearly shows that the one concept of consumption tracks the other very closely. This means that looking at the traditional measure of consumption will not usually lead one far astray.

---

Nevertheless, it is important to have the correct concept of consumption in mind when you think about the issues in this chapter.

**Guiding Facts about Consumption**

In Figure 8.2 real per capita consumption, calculated on a national income accounts basis, is plotted against real per capita income. It is clear that over the long haul consumption trends upward along with real income. The rising consumption over time reflects improving living standards.

The story is much the same in the short run. Figure 8.3 is a scatter diagram of the growth in real consumption against the growth in income. The diagram shows a clear, positive relationship between the two. From Figure 8.3 we conclude that consumption is strongly procyclical.

Figure 8.2 reveals another important feature of consumption. Consumption is smoother than real income. The fluctuations in consumption do not tend to be as large as those in real income. Figure 8.4 plots changes in consumption against changes in income, and though this picture is noisy, you can still see that the amplitude of the fluctuations in income is larger than those for consumption.
As you think about the behavior of consumption, and later about fluctuations in economic activity, you need to keep in mind these guiding facts about consumption:

1) in the long run consumption and income move together

2) consumption is procyclical

3) consumption is smoother than income

Basic Determinants of Consumption
a. the stream of income

We begin with basic and add some complications later on. So let's first think about an individual trying to figure out how much to spend on consumption. The first thing that will constrain her choice is her income. The lower her income, the lower will be her consumption. This much seems pretty safe, but it is too early to stop. Our consumer may have little income today, but may be expecting more, and perhaps high, income in the near future; and they may base some of their consumption on this expectation. Students are usually in this position.

But how can someone consume income that they haven't yet earned? The answer is to borrow. Suppose your parents tell you they are sending some money to you, but it won't arrive for a week. If you have a credit card or a handy friend with cash, you can increase your spending immediately in anticipation of paying your friend or credit card balance with the money that is in the mail. A similar thing happens when a student takes out a loan. The loan not only finances the investment in so-called human capital, but it also permits a higher, though not high, standard of living. Students take out such loans with the anticipation of paying them off with future income. Similarly, young households usually buy their first home, car, refrigerator, and so forth on credit. The payments are often burdensome at first. It is, at least in part, the anticipation of higher income in the future that motivates the size and quality of the home, car or durable good. In general, households can consume future income today by borrowing.

We conclude that consumption depends on both current and future income. Sometimes this finding is summarized by saying that consumption depends on a consumer's wealth, and the change in consumption brought about by change in the household's income stream is called a wealth effect.

b. the interest rate

The other basic determinant of consumption is the interest rate. The interest rate may be thought of as the reward to savings. It is the payoff or the premium you receive for postponing
consumption. When the interest rate increases, the reward to saving increases, and this motivates households to save more. The increase in savings reduces current consumption. In this way the higher interest rate induces the household to substitute less consumption today for more in the future, and accordingly this effect is called an **intertemporal (across time) substitution effect**. It is important to keep in mind that people are concerned about their reward to saving in terms of bundles of goods so that it is the real interest rate that matters.

A fundamental result of economics is that the higher the relative price of a good, the lower will be the quantity of the good demanded. This is pretty reasonable. The more something costs, the less of it people will want to buy. The relationship between the interest rate and consumption is just a special case of this fundamental result. The relative price, or cost of any good, service, or action is the most favored alternative forgone. It is an unfortunate fact of life that when one path is taken, another is not. Economists call this concept opportunity cost.

Now suppose you increase your current consumption by 1 unit, what opportunity have you forgone? If you had chosen not to consume this unit, you could have saved it, and it is this opportunity that you have foregone. Had the unit been saved, its value would have grown to $1 + r$ units by the next period, and those units could have been consumed then. So, you gave up $1 + r$ units of future consumption when you increased your current consumption by 1 unit. This means that the relative price of current consumption in terms of future consumption is $1 + r$. Most of the time we do not explicitly recognize the "$1"$, and say instead that the real interest rate, $r$, is the relative price of current consumption. We can now extend the fundamental result: an increase in the real interest rate lowers the quantity of current consumption. This confirms our earlier conclusion.

c. the consumption function

The above discussion can be summarized very briefly by saying that consumption depends on current and future income, and the interest rate. An increase in income, current or future, will
An increase in the real interest rate lowers current consumption.

In functional notation we can write

\[ C_t^d = C(r_t, Y_t, Y_{t+1}, \bullet, \bullet, \bullet). \]

The \( \bullet \) indicates income in periods beyond the next, and the "-" and "+" signs remind us that consumption is inversely related to interest rates, but positively related to income. This relationship is called the consumption function.

d. a loose end

The alert reader may be a bit uneasy about the effect of a change in the interest rate, and there is a subtle issue lurking in the underbrush that justifies this uneasiness. Suppose I want to save for a European vacation next year. I have done my homework and calculated the cost to be $2,000. How much of this year's summer income will I have to put away to be able to vacation abroad next year? If the interest rate is 10% or .1, the answer is

\[
\text{required savings} = \frac{2,000}{1.1} = 1,818.19.
\]

(If the reasoning behind this calculation puzzles you, review the concept of present value). Now suppose that the interest rate increases to 15% or .15. The required savings becomes

\[
\text{required savings} = \frac{2,000}{1.15} = 1,739.13.
\]

The interest rate increased, but now I need to save less for my European vacation. I can reduce my saving, increase my current consumption, and still go to Europe next year. This conflicts with the above conclusion that higher interest rates cause lower current consumption. What has happened? Since I am saving, I want to see high interest rates because they make my savings balance grow faster. The increase in the interest rate from 10% to 15% made me better off by allowing me to increase current consumption and still go to Europe. Because the higher
interest rate makes me better off, it has an effect on consumption similar to the effect an increase in the income stream; and we also call it a wealth effect. The substitution effect described above is still at work, but it is now opposed by a wealth effect. In general, you can't tell which effect will dominate, and the response of a saver to a change in the interest rate cannot be predicted.

Higher interest rates evoke a wealth effect on borrowers also. However, the effect is in exactly the opposite direction. When interest rates rise, borrowers are unhappy. They are made worse off since the interest cost on the loans they plan to take out goes up. The wealth effect on borrowers induces lower current consumption on their part. The substitution effect works on borrowers also, but, unlike the case for savers, the wealth and substitution effects work in the same direction so that for borrowers there is no ambiguity. An increase in the real interest rate lowers current consumption.

In general, higher real interest rates set off two forces: the intertemporal substitution effect and the wealth effect. The first effect motivates all households to lower current consumption, while the wealth effect encourages consumption for savers, but discourages it for borrowers. Can we say anything about the size of these opposing wealth effects? It is critical to note that borrowing and lending are just two sides of the same transaction and so there must be a dollar borrowed for every dollar lent. This suggest that the opposing effects will be the same size and in the aggregate the wealth effect on borrowers cancels out the wealth effect on savers. Therefore, the "average" household does not experience a wealth effect from a change in the interest rates. Only the substitution effect changes the decision of the average household, and we can conclude that for this group higher interest rates lower consumption. Since we can think of the aggregate as being made up of a large number of average individuals, we can also conclude the higher interest rates lower consumption in the aggregate as well. This is a case where it is easier

<table>
<thead>
<tr>
<th></th>
<th>Intertemporal Substitution Effect</th>
<th>Wealth Effect</th>
<th>Total Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lenders</td>
<td>-</td>
<td>+</td>
<td>?</td>
</tr>
<tr>
<td>Borrowers</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
to predict the outcome in the aggregate than it is to predict the outcome for individuals. Table 8.1 summarizes the various effects.

### The Marginal Propensity to Consume

We have argued that when income goes up, consumption increases also. We now want to know something about the magnitude of the change. An important part of the story here is the nature of the change in income. Households react differently to changes in their income that they perceive to be permanent than they do to those changes that are only temporary. To fix ideas let's first think about a world with only two periods. A temporary change in income is then one that occurs only in the first period. A permanent change occurs when income increases in both periods.

First, consider the reaction of a household to a temporary change in their income. We expect an increase in consumption to follow. However, since they recognize the change as temporary, the household will probably want to save some of the income so that consumption next period can also increase. The increase in both current and future consumption means that the household smoothed out the consumption of the temporary increase in income over the two periods. It is important to note that this smoothing or spreading of consumption occurs through savings. Households save a portion of the temporary change in income to enable higher future consumption.

Does this smoothing argument ring true? Suppose that you win $20,000 in the lottery. The smoothing argument suggests that you will save a good part of it. You may say that that may be true for some, but I would buy a new car, or CD player, or something else I have long wanted. It is now important to recall the discussion of durables at the beginning of the chapter. Since a durable good yields services over a long period of time, durables count as a form of savings.

Let's now look at the effect of an increase in second period income only. When second period income increases, the household will probably not want to wait until next period to increase their consumption. Recall the earlier discussion of the student who expects her income
to increase. As we discussed there, the household can increase current consumption in anticipation of future income by borrowing. The household is again smoothing its consumption from a temporary change in income, but this time it is "smoothing it backward." This backward smoothing causes savings to decline.

We are now ready to look at the effect of a permanent change in income. This amounts to combining the effect of a change in current income only with the effect of a change in future income only. This is easy enough to do. An increase in either first- or second-period income increases current consumption, so a permanent increase in income will also raise current consumption.

What happens to savings? The increase in current income will raise savings, but the increase in second period income will lower it. These two effects will tend to offset each other, and we expect no change in savings from a permanent change in income. Intuitively, a permanent change in income does not affect savings because a permanent change does not require consumption smoothing, either backward or forward. Current consumption can increase by the full amount of the change in current income, and then be maintained at the new level.

This discussion may be summarized in terms of the marginal propensity to consume. The marginal propensity to consume, or the MPC for short, is the change in current consumption that is brought about by a unit change in current income. Symbolically the MPC is written as

$$\text{MPC} = \frac{\Delta C_i}{\Delta Y_t}.$$ 

As we have seen, the value of the marginal propensity to consume depends critically on the nature of the income change. In particular, it depends on whether the change in income is expected to be permanent or just temporary.
To illustrate consider a household whose income is $100, and assume that the household consumes the entire $100 each period. Also assume for simplicity that the interest rate is zero and that the household will live for 10 periods. The consumption path for this household, cp1, is drawn in Figure 8.5.

Suppose there is a one-time increase of $10 in the household's income. Since the interest rate has not changed, we do not expect any intertemporal substitution of consumption from one period to another. Our consumer will therefore spread the $10 windfall over his entire lifetime by consuming an extra dollar in each period. His new consumption path is cp2. In the current period income is up by $10 but consumption is up by only $1. The MPC in this case is 1/10 or 10%.

Now suppose that the increase in income is permanent so that the household can expect an additional $10 in each of the next 10 periods. What is the effect of this permanent increase in income on consumption? Again, we do not expect any intertemporal substitution effects. The household will maintain its flat consumption profile and increase consumption by $10 in each of the next 10 periods. In this case the marginal propensity to consume is one.

The important message here is that the MPC out of permanent changes in income is likely to be substantially larger than the MPC out of temporary changes in income, and should be about equal to one. The details of the argument are more complicated if the interest rate is not zero or the consumption path is not flat, but the main result is not changed. Our general conclusions are:

\[ \frac{\Delta C}{\Delta Y} |_{\text{permanent change}} = 1 \]

\[ \frac{\Delta C}{\Delta Y} |_{\text{temporary change}} = \frac{1}{ \text{planning horizon}}. \]

The length of the planning horizon determines the size of the MPC out of temporary changes in income; the longer the planning horizon, the smaller is the MPC since any change in income must be smoothed over a longer period of time. It may seem that the planning horizon should equal the expected lifetime of the household, and in some cases this may be true.
However, it is likely that for many households the planning horizon extends past their own lifetime. This is because most households have children, and parents care about their children's welfare even after they are gone.

Consider two 30-year-old parents with a newborn baby. The parents can expect to live about another 40 years, but their planning horizon may well be the 70 years or so that their child can expect to live. The connection across generations doesn't stop here. Suppose the parents expect their child to have children at 30 also, and they expect their grandchildren to live their three score and ten. If the parents care about their children's children, then this extends the planning horizon to 100 years. Of course, this argument could be applied to great grandchildren, and so on, until we get a planning horizon that is infinitely long.

Parents can provide for their children's future in many ways. While the parents are still alive, they can provide capital to their children by helping pay for their education, making a down payment on their first home, or making loans at low or zero interest. Finally, parents may leave children a bequest to help them.

We conclude that if there are intergenerational links, the planning horizon of a household may be very long. As a result the MPC out of temporary changes in income will be very small. To make our later results sharper (and the graphs easier to draw), we assume that households have infinite horizons, and the MPC out of temporary changes in income is zero. The analysis that we carry out in later chapters is not very sensitive to this simplifying assumption. Instead, our conclusions rely on the qualitative result that the marginal propensity to consume out of temporary changes in income is small, and substantially less than one.

The Consumption Demand Curve

Consumption demand for the average household is plotted against the interest rate in Figure 8.6. The consumption demand curve is downward sloping since an increase in the interest rate reduces current consumption. This is illustrated in Figure 8.6 where an increase in the interest rate from 2% to 4% decreases current consumption from 19,200 to 16,000. Typically, when we talk about a demand curve the price of the good is on the vertical axis and the quantity of the good is on the horizontal axis. We can think of current consumption as the good, but can we think of the interest rate as its relative price? From our earlier discussion we know that the
answer to this question is yes. So, this demand curve is similar to others that you may have encountered.

Along any given consumption demand curve the household's income stream is held constant and so a change in this stream may shift the consumption demand curve. Whether or not, and to what extent, a shift occurs when current income changes depends on whether the change in income is perceived to be permanent or temporary.

Let's first consider a permanent change in current income of 1 unit. For a permanent change in income the MPC is one. This means that current consumption will increase by 1 unit also, and the consumption demand curve shifts out by the same unit. This is shown in Figure 8.7. Now let's consider a temporary increase in income. For a temporary increase in income, the MPC is zero or at least substantially smaller than one. This means that if current consumption changes at all, it is only by a very small amount; and therefore at most the consumption demand curve shifts upward and to the right by a very small amount. If the MPC is zero, then the consumption demand curve does not shift at all. To keep our pictures as simple as possible, we assume that the MPC for temporary changes...
in income is zero and so the consumption demand curve will not shift at all when shocks to income are temporary.

**Extensions**

Borrowing and lending permit households to smooth the consumption of their income. A temporary increase in income encourages savings so that some of the income may be consumed in the future. Households respond to a dip in income by borrowing or drawing down their savings to maintain their standard of living. Smoothing occurs over lifetimes as well. When young, households earn relatively low levels of income since skills are not honed and experience not yet gained. During the middle years earnings peek, and then fall in later years and in retirement. Desired spending patterns do not usually match this earnings profile. Young people have the burden of buying an education, purchasing and furnishing their first home, raising kids, and so forth. Typically young households borrow. The debts of youth are repaid in the high earning years and saving for retirement takes place. In the later years, households dissave to finance their retirement.

This **life cycle pattern of savings** is illustrated in Figure 8.8. In the early years, $t_1$ to $t_2$ the household's spending exceeds its income. The difference is, of course, financed by borrowing. In the middle years income exceeds spending; the difference repays debt and accumulates savings. In the later years, after $t_3$, the accumulated savings provides for retirement. Thus, savings permits the income stream of the household to differ from its consumption stream, and this, in turn, increases the choices available to households making them better off.

Another motive for saving is to be ready for the proverbial "rainy day." People lose jobs or
get sick. The car breaks down or the roof caves in. Life is filled with uncertainty and a prudent response is to accumulate savings as a precaution. Savings to fill this need are called precautionary savings.

The ability to borrow played an important role in the above discussion. But, many households may not be able to borrow all they wish. The household may be young and without job security or collateral. Such a household may be seen by banks or other potential lenders as too risky a prospect even if the household were willing to pay a high rate of interest. We call these households liquidity or credit constrained. If a large portion of households are in this fix, it can have important implications for how the economy behaves. For example, a liquidity constrained household may have larger savings because of the need to make large down payments or to buy goods outright. Also, if a household is liquidity constrained, they know that borrowing will be difficult in an emergency so they may have high precautionary savings. In short, a high proportion of liquidity constrained households may generate high savings in an economy.

Liquidity constraints may also affect the size of the marginal propensity to consume. A credit constrained household may be consuming less than they wish. When their current income increases, they may consume most of it even if the change in income is temporary. This may make the MPC out of temporary changes in income quite large, and perhaps near one. When we study the effects of deficit spending, the nature and extent of the effects of deficit spending may depend on the number of credit constrained households, but the details will have to wait.

Summary

This chapter presented the principles of consumption demand. The determinants of consumption for a household are its stream of income and the interest rate. Permanent changes in the stream of income change consumption by the amount of the change in income. On the other hand, a temporary change in income does not result in a one-for-one increase in consumption. Instead, households save a large portion of the temporary increase in income, perhaps in the form of additional durable goods, to smooth their consumption. The interest rate is the price of current consumption in terms of future consumption. Just as in the case for a typical good,
like pretzels, an increase in the price of current consumption causes a decline in the quantity of current consumption demanded. These results are fundamental to much of what follows.

REVIEW QUESTIONS

1) Consider the planned consumption stream below. The household has a planning horizon of 5 years, say a 70-year-old with no children.

<table>
<thead>
<tr>
<th>year</th>
<th>consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>400</td>
</tr>
<tr>
<td>2</td>
<td>400</td>
</tr>
<tr>
<td>3</td>
<td>400</td>
</tr>
<tr>
<td>4</td>
<td>400</td>
</tr>
<tr>
<td>5</td>
<td>400</td>
</tr>
</tbody>
</table>

a) Suppose Social Security payments to this individual increase by 50 units in each year. What do you expect will happen to the consumption and saving of this person?

b) Now, suppose that the increase of 50 units is just a one time deal. What do you expect to happen to consumption and savings in this case? How would your answer change, if you find out the person has just been reunited with his child who was lost during WWII when he was separated from his wife during the Nazi invasion of Russia?

2) Consider the following data:

<table>
<thead>
<tr>
<th>R</th>
<th>Consumption Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>4%</td>
<td>550</td>
</tr>
<tr>
<td>5%</td>
<td>475</td>
</tr>
<tr>
<td>6%</td>
<td>450</td>
</tr>
<tr>
<td>7%</td>
<td>400</td>
</tr>
<tr>
<td>8%</td>
<td>340</td>
</tr>
</tbody>
</table>

Draw the consumption demand curve. Redraw the curve on the assumption that income increases permanently by 400 units. What result are you using to draw this new curve?
3) In the 1970s tax rebates were a popular tool of the government to increase consumption spending during recessions. A tax rebate is a one-time payment by the government to households; it presumably reflects the return of earlier tax payments. Do you think this type of policy was very successful? Explain.

4) "If I won the lottery, I would buy a big house, furnish it, get a big screen TV, and all sorts of other 'toys'. I wouldn't save anything from that first check." Comment.

5) Falling interest rates seem to thrill some politicians. They say, for example, that homeowners can refinance their homes to get lower mortgage payments, and this frees some income that can go to consumption. My aunt is 65 years old and lives off her savings. Do you think she is happy about the fall in interest rates? Explain. How would the "average" household feel about lower rates?

6) Suppose the interest rate increases. Then,
   a) the current consumption of a lender certainly decreases
   b) the current consumption of a borrower certainly increases
   c) the current consumption of a lender may decrease
   d) the current consumption of a borrower may increase

7) Suppose the interest rate decreases. Then,
   a) the wealth effect encourages lower consumption for borrowers
   b) the intertemporal substitution effect encourages lower consumption for borrowers
   c) the wealth of lenders is increased
   d) the intertemporal substitution effect encourages more consumption for lenders

8) Suppose we found out that a very large meteor was speeding toward the earth. On impact life on the planet will cease. The impact is expected in 40 years. What is the effect of this news on the marginal propensity to consume out of temporary changes in income?