CHAPTER 17 Consumption

Questions for Review

1. First, Keynes conjectured that the marginal propensity to consume—the amount consumed out of an additional dollar of income—is between zero and one. This means that if an individual's income increases by a dollar, both consumption and saving increase.

   Second, Keynes conjectured that the ratio of consumption to income—called the *average propensity to consume*—falls as income rises. This implies that the rich save a higher proportion of their income than do the poor.

   Third, Keynes conjectured that income is the primary determinant of consumption. In particular, he believed that the interest rate does not have an important effect on consumption.

   A consumption function that satisfies these three conjectures is

   $$C = \overline{C} + cY.$$

   $\overline{C}$ is a constant level of "autonomous consumption," and Y is disposable income; c is the marginal propensity to consume, and is between zero and one.

2. The evidence that was consistent with Keynes's conjectures came from studies of household data and short time-series. There were two observations from household data. First, households with higher income consumed more and saved more, implying that the marginal propensity to consume is between zero and one. Second, higher-income households saved a larger fraction of their income than lower-income households, implying that the average propensity to consume falls with income.

   There were three additional observations from short time-series. First, in years when aggregate income was low, both consumption and saving were low, implying that the marginal propensity to consume is between zero and one. Second, in years with low income, the ratio of consumption to income was high, implying that the average propensity to consume falls as income rises. Third, the correlation between income and consumption seemed so strong that no variables other than income seemed important in explaining consumption.

   The first piece of evidence against Keynes's three conjectures came from the failure of "secular stagnation" to occur after World War II. Based on the Keynesian consumption function, some economists expected that as income increased over time, the saving rate would also increase; they feared that there might not be enough profitable investment projects to absorb this saving, and the economy might enter a long depression of indefinite duration. This did not happen.

   The second piece of evidence against Keynes's conjectures came from studies of long time-series of consumption and income. Simon Kuznets found that the ratio of consumption to income was stable from decade to decade; that is, the average propensity to consume did not seem to be falling over time as income increased.

3. Both the life-cycle and permanent-income hypotheses emphasize that an individual's time horizon is longer than a single year. Thus, consumption is not simply a function of current income.

   The life-cycle hypothesis stresses that income varies over a person's life; saving allows consumers to move income from those times in life when income is high to those times when it is low. The life-cycle hypothesis predicts that consumption should depend on both wealth and income, since these determine a person's lifetime resources. Hence, we expect the consumption function to look like

   $$C = \alpha W + \beta Y.$$

In the short run, with wealth fixed, we get a "conventional" Keynesian consumption function. In the long run, wealth increases, so the short-run consumption function shifts upward, as shown in Figure 17–1.

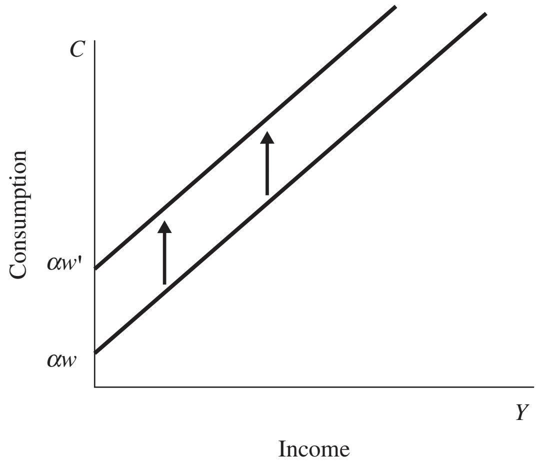

Figure 17–1

The permanent-income hypothesis also implies that people try to smooth consumption, though its emphasis is slightly different. Rather than focusing on the pattern of income over a lifetime, the permanent-income hypothesis emphasizes that people experience random and temporary changes in their income from year to year. The permanent-income hypothesis views current income as the sum of permanent income Y^p and transitory income Y^t. Milton Friedman hypothesized that consumption should depend primarily on permanent income:

$$C = \alpha Y^p.$$

The permanent-income hypothesis explains the consumption puzzle by suggesting that the standard Keynesian consumption function uses the wrong variable for income. For example, if a household has high transitory income, it will not have higher consumption; hence, if much of the variability in income is transitory, a researcher would find that high-income households had, on average, a lower average propensity to consume. This is also true in short time-series if much of the year-to-year variation in income is transitory. In long time-series, however, variations in income are largely permanent; therefore, consumers do not save any increases in income, but consume them instead.

4. Fisher's model of consumption looks at how a consumer who lives two periods will make consumption choices in order to be as well off as possible. Figure 17–2(A) shows the effect of an increase in second-period income if the consumer does not face a binding borrowing constraint. The budget constraint shifts outward, and the consumer increases consumption in both the first and the second period. In Figure 17-2(A), Y_1 is the first period income and Y_2 is second period income. In choosing to consume at point A or B, the consumer is consuming more than their income in period 1 and less than their income in period 2.

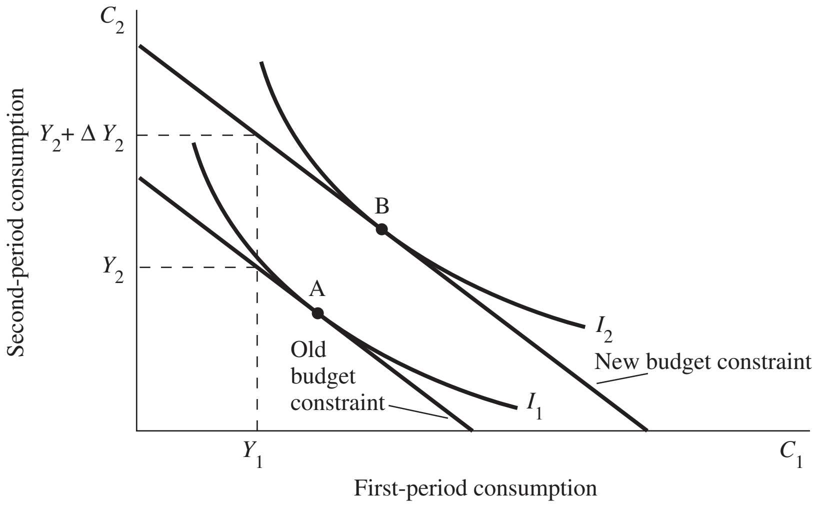

Figure 17–2A

Figure 17–2(B) shows what happens if there is a binding borrowing constraint. The consumer would like to borrow to increase first-period consumption but cannot. If income increases in the second period, the consumer is unable to increase first-period

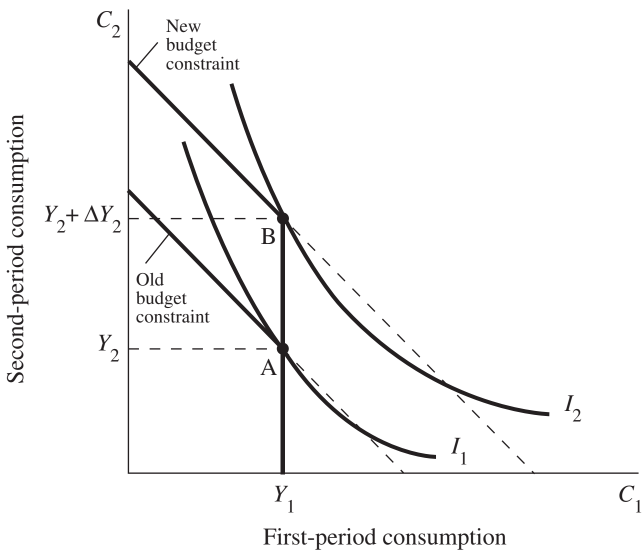

Figure 17–2B

consumption. Therefore, the consumer continues to consume his or her entire income in each period. That is, for those consumers who would like to borrow but cannot, consumption depends only on current income.

5. The permanent-income hypothesis implies that consumers try to smooth consumption over time, so that current consumption is based on current expectations about lifetime income. It follows that changes in consumption reflect "surprises" about lifetime income. If consumers have rational expectations, then these surprises are unpredictable. Hence, consumption changes are also unpredictable.
6. Section 17.6 included several examples of time-inconsistent behavior, in which consumers alter their decisions simply because time passes. For example, a person may legitimately want to lose weight, but decide to eat a large dinner today and eat a small dinner tomorrow and thereafter. But the next day, they may once again make the same choice—eating a large dinner that day while promising to eat less on following days.

Problems and Applications

1. Figure 17–3 shows the effect of an increase in the interest rate on a consumer who borrows in the first period. The increase in the real interest rate causes the budget line to rotate around the point (Y_1, Y_2), becoming steeper.

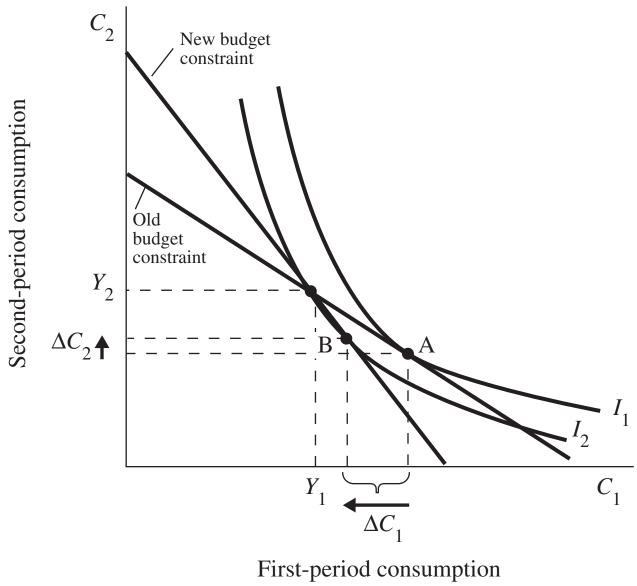

Figure 17–3

We can break the effect on consumption from this change into an income and substitution effect. The income effect is the change in consumption that results from the movement to a different indifference curve. Because the consumer is a borrower, the increase in the interest rate makes the consumer worse off—that is, he or she cannot achieve as high an indifference curve. If consumption in each period is a normal good, this tends to reduce both C_1 and C_2.

The substitution effect is the change in consumption that results from the change in the relative price of consumption in the two periods. The increase in the interest rate makes second-period consumption relatively less expensive; this tends to make the consumer choose more consumption in the second period and less consumption in the first period.

On net, we find that for a borrower, first-period consumption falls unambiguously when the real interest rate rises, since both the income and substitution effects push in the same direction. Second-period consumption might rise or fall, depending on which effect is stronger. In Figure 17–3, we show the case in which the substitution effect is stronger than the income effect, so that C_2 increases.

2. a. We can use Jill's intertemporal budget constraint to solve for the interest rate:

$$C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r}$$
$$\$100 + \frac{\$100}{1+r} = \$0 + \frac{\$210}{1+r}$$
$$r = 10\%.$$

Jill borrowed \$100 for consumption in the first period and in the second period used her \$210 income to pay \$110 on the loan (principal plus interest) and \$100 for consumption.

b. The rise in interest rates leads Jack to consume less today and more tomorrow. This is because of the substitution effect: it costs him more to consume today than tomorrow, because of the higher opportunity cost in terms of forgone interest. This is shown in Figure 17–4.

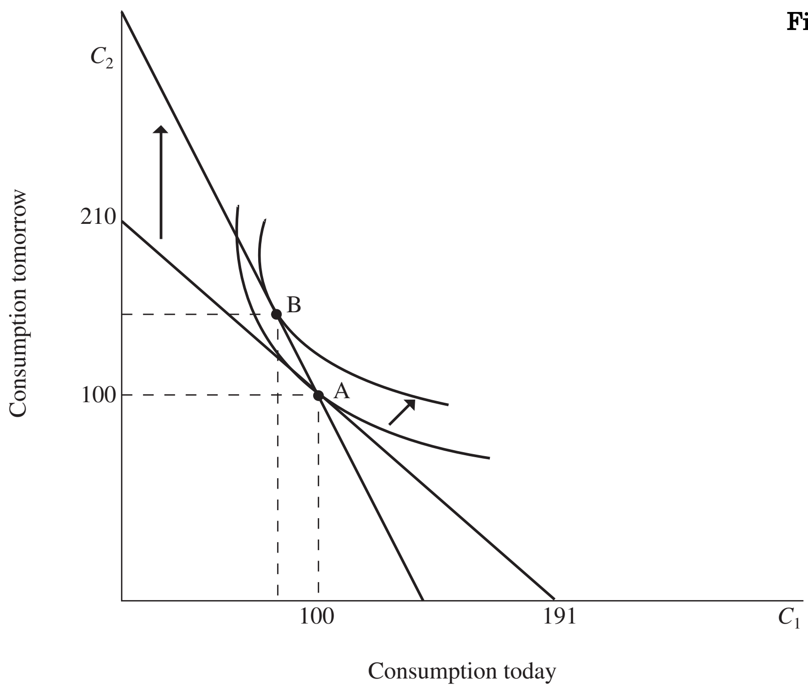

Figure 17–4

By revealed preference we know Jack is better off: at the new interest rate he could still consume \$100 in each period, so the only reason he would change his consumption pattern is if the change makes him better off.

Note that C' is greater than C, and T_1' is greater than T_1, as shown. This is because in part (b), the consumer has lower consumption in the first part of life, so there are more resources left when there is no constraint—consumption will be higher. The case where people are borrowing constrained in their early working years is more realistic since it is difficult, if not impossible, to borrow against expected future income.

6. The life-cycle model predicts that an important source of saving is that people save while they work to finance consumption after they retire. That is, the young save, and the old dissave. If the fraction of the population that is elderly will increase over the next 20 years, the life-cycle model predicts that as these elderly retire, they will begin to dissave their accumulated wealth in order to finance their retirement consumption: thus, the national saving rate should fall over the next 20 years.

7. In this chapter, we discussed two explanations for why the elderly do not dissave as rapidly as the life-cycle model predicts. First, because of the possibility of unpredictable and costly events, they may keep some precautionary saving as a buffer in case they live longer than expected or have large medical bills. Second, they may want to leave bequests to their children, relatives, or charities, so again, they do not dissave all of their wealth during retirement.

   If the elderly who do not have children dissave at the same rate as the elderly who do have children, this seems to imply that the reason for low dissaving is the precautionary motive; the bequest motive is presumably stronger for people who have children than for those who don't.

   An alternative interpretation is that perhaps having children does not increase desired saving. For example, having children raises the bequest motive, but it may also lower the precautionary motive: you can rely on your children in case of financial emergency. Perhaps the two effects on saving cancel each other.

8. If you are a fully rational and time-consistent consumer, you would certainly prefer the saving account that lets you take the money out on demand. After all, you get the same return on that account, but in unexpected circumstances (e.g., if you suffer an unexpected, temporary decline in income), you can use the funds in the account to finance your consumption. This is the kind of consumer in the intertemporal models of Irving Fisher, Franco Modigliani, and Milton Friedman.

   By contrast, if you face the "pull of instant gratification," you may prefer the account that requires a 30-day notification before withdrawals. In this way, you precommit yourself to not using the funds to satisfy a desire for instant gratification. This precommitment offers a way to overcome the time-inconsistency problem. That is, some people would like to save more, but at any particular moment, they face such a strong desire for instant gratification that they always choose to consume rather than save. This is the type of consumer in David Laibson's theory.

9. The agent lives for two periods: period 1 and period 2. The agent's utility function is

$$U(C_1, C_2) = \frac{C_1^{1-\sigma}}{1-\sigma} + \beta \frac{C_2^{1-\sigma}}{1-\sigma}$$

where β is time discount factor and σ is coefficient of relative risk aversion. The income of period 1 is Y_1 and the income of period 2 is Y_2. The interest rate is r. Please solve the optimal consumption functions, C_1 and C_2.

Answer: The agent's problem is

$$max_{C_1, C_2} \quad \frac{C_1^{1-\sigma}}{1-\sigma} + \beta \frac{C_2^{1-\sigma}}{1-\sigma}$$

$$s.t. \;\; C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r}$$

From the budget constraint, we have

$$C_2 = (1+r)(Y_1 - C_1) + Y_2$$

Thus the agent's problem is rewritten as

$$max_{C_1} \quad \frac{C_1^{1-\sigma}}{1-\sigma} + \beta \frac{\big((1+r)(Y_1 - C_1) + Y_2\big)^{1-\sigma}}{1-\sigma}$$

We have the first order condition

$$C_1^{-\sigma} = \beta(1+r)\big((1+r)(Y_1 - C_1) + Y_2\big)^{-\sigma} \qquad (1)$$

From equation (1), we can solve

$$C_1 = \frac{(1+r)\left(Y_1 + \frac{Y_2}{1+r}\right)}{(\beta(1+r))^{\frac{1}{\sigma}} + (1+r)}$$

From equation (2), we also have $C_2 = (\beta(1+r))^{\frac{1}{\sigma}} C_1$. Thus we have

$$C_2 = \frac{(\beta(1+r))^{\frac{1}{\sigma}}((1+r)Y_1 + Y_2)}{(\beta(1+r))^{\frac{1}{\sigma}} + (1+r)}$$