in consumption and income. He found that in five quarters the changes in consumption and income were in opposite directions. In 10 of the cases in which consumption and income did change in the same direction, the change in consumption *exceeded* the change in income. In only 7 of the 22 quarters were the movements in consumption and income consistent with a short-run MPC ($\Delta C/\Delta Y_D$) that was positive and less than 1.[4] This erratic short-run behavior of consumption indicated that either the relationship of consumption to current income in the short run was not as mechanical as predicted by the absolute income hypothesis or that other variables were influencing consumption behavior.

We can summarize the early evidence about the consumption function as follows. Evidence from short-run annual time series data and family budget studies seemed to support the Keynesian hypothesis about consumption—the absolute income hypothesis—as represented by equation (21.1). Time series data for a longer time period (e.g., 1869–1938) suggest that the consumption–income relationship is proportional, rather than nonproportional as given by (21.1). There is, therefore, a need to reconcile long-run evidence on the consumption function with the short-run time series evidence and cross-sectional evidence from family budget studies. Finally, erratic quarter-to-quarter movements of consumption relative to income cast doubt on the closeness of the consumption–income relationship in the short run. Resolving these puzzles posed by the early empirical evidence on consumer behavior has been the task of the modern theory of the consumption function.

To see how post-Keynesian consumption theories have tried to reconcile the disparate implications from different data sources, we consider one theory, the *life cycle hypothesis*, in detail. We then compare the conclusions of this theory with another explanation of the same phenomena, Milton Friedman's *permanent income hypothesis*.

## The Life Cycle Hypothesis of Consumption

**life cycle hypothesis** asserts that saving and consumption decisions of households reflect a plan for an optimal consumption pattern over their lifetime, subject to the constraint of their resources

The **life cycle hypothesis** was developed by Franco Modigliani, Albert Ando, and Richard Brumberg.[5] As stated by Modigliani:

> The point of departure of the life cycle model is the hypothesis that consumption and saving decisions of households at each point of time reflect a more or less conscious attempt at achieving the preferred distribution of consumption over the life cycle, subject to the constraint imposed by the resources accruing to the household over its lifetime.[6]

[4]See Ackley, *Macroeconomic Theory*, pp. 253–54.

[5]Two early papers on the life cycle hypothesis are Franco Modigliani and Richard Brumberg, "Utility Analysis and the Consumption Function: An Interpretation of Cross Section Data," in K. Kurihara, ed., *Post-Keynesian Economics* (New Brunswick, N.J.: Rutgers University Press, 1954), pp. 388–436; and Albert Ando and Franco Modigliani, "The Life Cycle Hypothesis of Saving: Aggregate Implications and Tests," *American Economic Review*, 53 (March 1963), pp. 55–84. For an evaluation of the performance of the life cycle hypothesis by one of its originators, see Franco Modigliani, "Life Cycle, Individual Thrift and the Wealth of Nations," *American Economic Review*, 76 (June 1986), pp. 297–313.

[6]Franco Modigliani, "The Life Cycle Hypothesis of Saving, the Demand for Wealth and the Supply of Capital," *Social Research*, 33 (June 1966), pp. 160–217, 162.

An individual or household's consumption depends not just on current income but also, and more importantly, on long-term expected income. Individuals are assumed to plan their expenditures based on expected earnings over their lifetime.

To see the implications of this theory, we first look at a simplified example. Consider a worker who has a life expectancy of $T$ years and plans to remain in the labor force for $N$ years. Our representative consumer might, for example, be 30 with a life expectancy of 50 (additional) years, plan to retire after 40 years, and therefore have expected years in retirement equal to $(T - N)$, or 10. To keep the example simple, we make the following assumptions about the individual's plans. We assume the individual desires a constant consumption flow throughout life. Further, we assume that this person intends to consume the total amount of lifetime earnings plus current assets and that he plans no bequests. Finally, we assume that interest paid on assets is zero; current saving results in dollar-for-dollar future consumption.

These assumptions imply that consumption in a given period will be a constant proportion, $1/T$, of expected *lifetime* resources. The individual plans to consume lifetime earnings in $T$ equal installments. The consumption function implied by this simple version of the life cycle hypothesis is

$$C_t = \frac{1}{T}\left[Y_t^1 + (N - 1)\bar{Y}^{1e} + A_t\right] \tag{21.5}$$

$C_t$ is consumption in time period $t$. The term in brackets is expected lifetime resources, which consist of

$Y_t^1$ = the individual's labor income in the current time period ($t$)
$\bar{Y}^{1e}$ = the average annual labor income expected over the future ($N - 1$) years during which the individual plans to work
$A$ = the value of presently held assets

Equation (21.5) indicates that, according to the life cycle hypothesis, consumption depends not only on current income but also on expected future income and current asset holdings (i.e., current wealth). In fact, the life cycle hypothesis suggests that consumption would be quite unresponsive to changes in current income ($Y_t^1$) that did not also change average expected future income. From equation (21.5), for example, we can compute

$$\frac{\Delta C_t}{\Delta Y_t^1} = \frac{1}{T} = \frac{1}{50} = 0.02$$

An increase in income that was expected to persist throughout the work years would mean that $\bar{Y}^{1e}$ also rose and that the effect on consumption would be much greater:

$$\frac{\Delta C_t}{\Delta Y_t^1} + \frac{\Delta C_t}{\Delta \bar{Y}^{1e}} = \frac{1}{T} + \frac{N-1}{T} = \frac{N}{T} = \frac{40}{50} = 0.8$$

A one-time or transient change in income of, say, \$100 will have the same effect as a change in wealth (note that $\Delta C_t / \Delta Y_t^1 = \Delta C_t / \Delta A_t = 1/T$) of the same amount. Lifetime resources will go up by \$100, and this will be spread out in a planned consumption

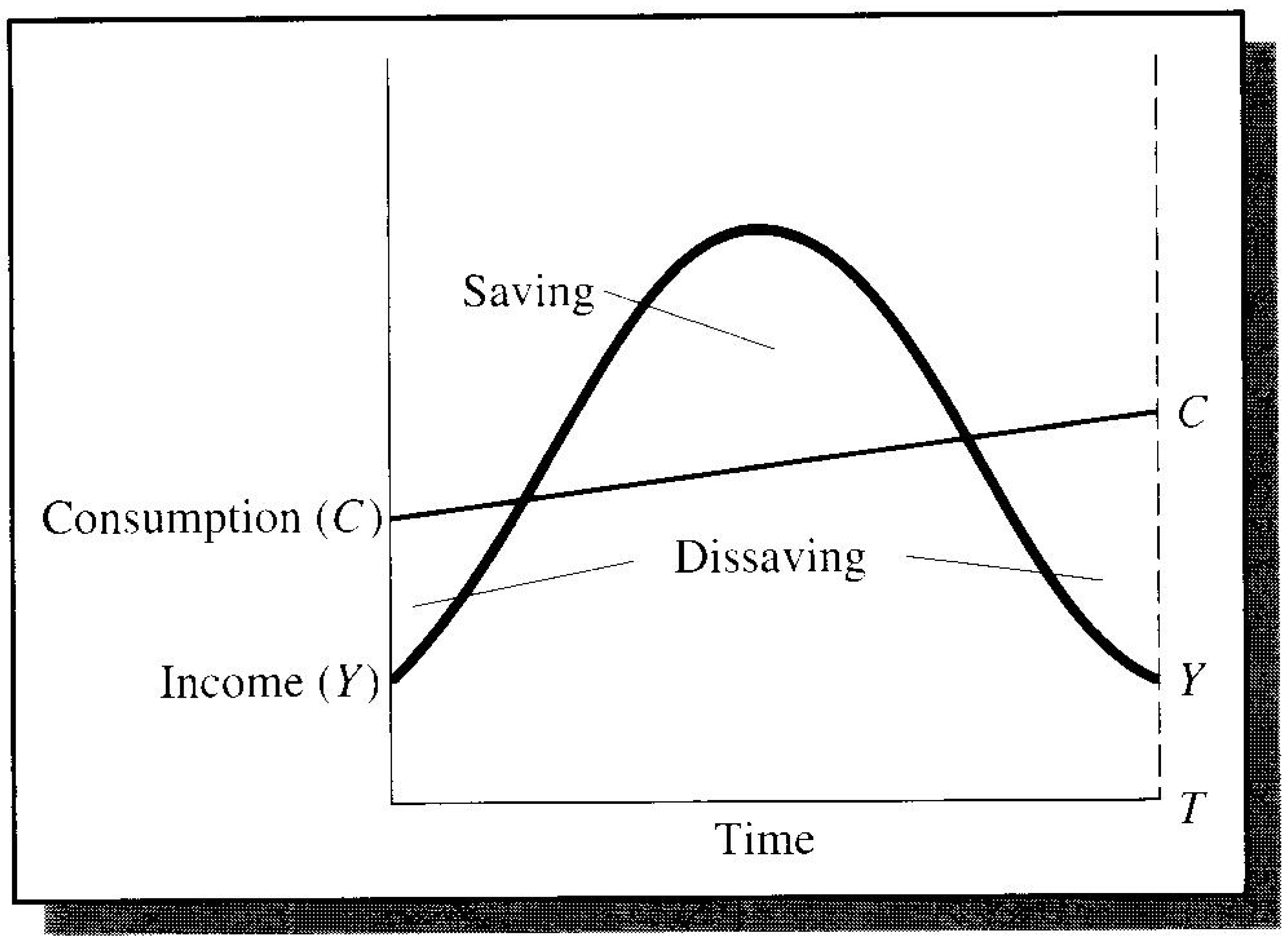



**Figure 21.3** Income and Consumption over the Life Cycle

Consumption rises gradually over the life cycle. Income rises sharply over the early working years, peaks, and then declines, especially with retirement. This pattern of consumption and income results in dissaving in the early working years and the late stage of the life cycle, with positive saving over the high-income middle years of the life cycle.

flow of $100/T = 100/50 = 2$ per period in our example of an individual who expects to live for 50 additional years. A permanent increase in income of \$100 will lead to an increase in consumption of \$80 in each of the remaining periods, including the 10 planned periods of retirement. The increase of \$80 in each of these 10 retirement years, a total of \$800, is financed by a saving of \$20 (100 − 80) in each of the 40 remaining working years.

The life cycle hypothesis accounts for the dependence of consumption and saving on the individual's position in the life cycle. Young workers entering the labor force have relatively low incomes and low (possibly negative) saving rates. As income rises in middle-age years, so does the saving rate. Retirement brings a fall in income and a period of *dissaving* (negative saving rates). This time profile of consumption and saving is depicted in Figure 21.3. Here the desired pattern of consumption rises mildly with time instead of maintaining the constant desired consumption pattern assumed in our individual example. The pattern of income rises more sharply, though, and the typical individual smooths out consumption flow by a short period of early dissaving, a period of positive saving, and then a longer period of dissaving in retirement.

The general form of the aggregate consumption function implied by the life cycle hypothesis is

$$C_t = b_1 Y_t^1 + b_2 \bar{Y}^{1e} + b_3 A_t \tag{21.6}$$

where the variables $C_t$, $Y_t^1$, $\bar{Y}^{1e}$, and $A_t$ are as defined for equation (21.5) but should now be interpreted as economy-wide averages. If the previous simplifying assumptions of no bequests, zero interest on saving, and a uniform consumption pattern over time are relaxed, the parameters $b_1$, $b_2$, and $b_3$ will no longer be simple functions of $N$ and $T$ as were the coefficients in equation (21.5). Still, in the aggregate consumption function (21.6), as in the case of equation (21.5), consumption depends not just on current labor income ($Y_t^1$) but also on average future expected labor income ($\overline{Y}^{1e}$) and wealth ($A_t$). It will also be true in the aggregate, as in the simplified individual example, that the response to a *transient* or one-time increase in labor income (an increase in $Y_t^1$) will be quite small, much less than the response to a permanent income change (an increase in $Y_t^1$ and $\overline{Y}^{1e}$).

To study actual consumer behavior using equation (21.6), we must make some assumption about the way individuals form expectations concerning lifetime labor income. In a study for the United States, Ando and Modigliani assume that expected average future labor income is just a multiple of current labor income:

$$\overline{Y}^{1e} = \beta Y_t^1 \qquad \beta > 0 \tag{21.7}$$

According to this specification, individuals revise their expectation of future expected labor income $\overline{Y}^{1e}$ by some proportion $\beta$ of a change in current labor income. Substitution of equation (21.7) for $\overline{Y}^{1e}$ in the aggregate consumption function (21.6) yields

$$C_t = (b_1 + b_2\beta)Y_t^1 + b_3A_t \tag{21.8}$$

A representative statistical estimate of the equation based on the work of Ando and Modigliani is

$$C_t = 0.72Y_t^1 + 0.06A_t \tag{21.9}$$

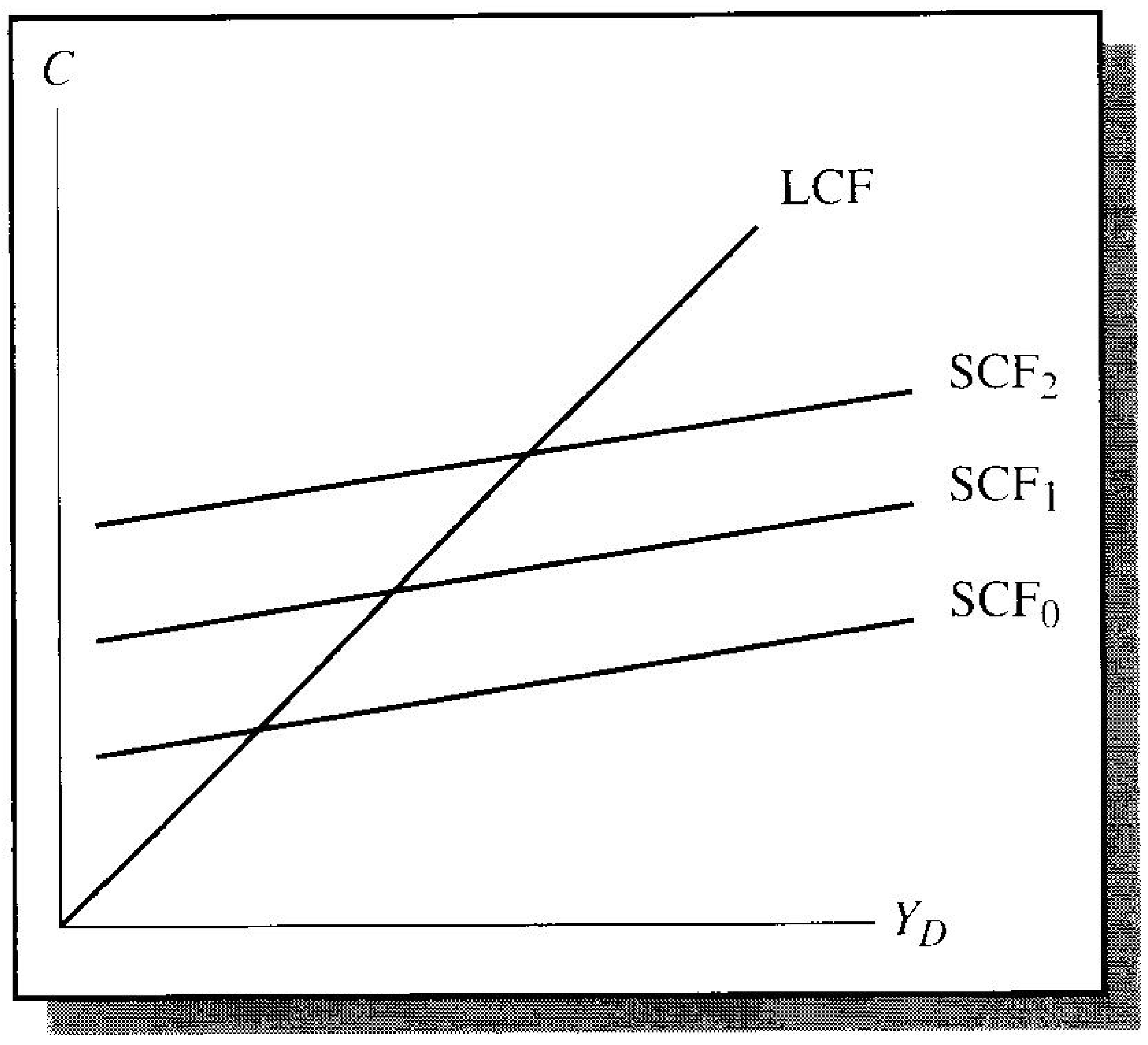
An increase in current labor income of \$100 *with the assumed effect on future labor income* will increase consumption by \$72. An increase in wealth of \$100 will increase consumption by \$6. As noted previously, an increase in income that was known to be temporary and therefore would *not* affect future expected labor income would have the same effect as an increase in wealth. Thus, according to this estimate, the MPC out of such a transient income flow is on the order of 0.06, the MPC out of wealth.

The life cycle hypothesis can explain the puzzles that emerged from the early empirical work on consumption functions. According to the life cycle hypothesis, the relationship between consumption and current income would be nonproportional, as seems to be the case in *short-run* time series estimates [see equation (21.4)]. The intercept of the function measures the effect of wealth [$0.06A_t$ in equation (21.9)]. But the intercept is not constant over time; such short-run consumption functions shift upward as wealth grows. These upward shifts in the short-run consumption function (SCF) are illustrated in Figure 21.4. The shifting short-run consumption functions trace out a long-run consumption function (LCF).

If the ratios of wealth and labor income to disposable personal income are relatively constant over time, the life cycle consumption function [equation (21.9)] is also consistent with the evidence from long-run time series data that the long-run consumption–income relationship (LCF in Figure 21.4) is proportional, with the APC ($C/Y_D$) relatively stable in the neighborhood of 0.9. To see this relationship, first note that the ratio of labor income to disposable personal income has been approximately

**Figure 21.4**
Short-Run and Long-Run Consumption Functions

As wealth increases over time, the nonproportional short-run consumption function (SCF) shifts upward (from $SCF_0$ to $SCF_1$, then to $SCF_2$) to trace out the long-run proportional consumption income relationship (LCF).




0.88—that is, $Y_t^1 = 0.88Y_D$. The ratio of wealth to disposable income is approximately 4.75; $A_t = 4.75Y_D$. Substituting these expressions for $A_t$ and $Y_t^1$ in the estimated aggregate consumption function (21.9) yields

$$\begin{aligned} C_t &= 0.72(0.88Y_D) + 0.06(4.75Y_D) \\ &= 0.63Y_D + 0.29Y_D \\ &= 0.92Y_D \end{aligned}$$

or

$$\frac{C_t}{Y_D} = 0.92$$

which is approximately the average value of the APC over the post-World War II period.

The life cycle hypothesis also explains evidence from cross-sectional family budget studies showing that higher-income families consume a smaller proportion of their income than do lower-income families. A larger proportion of high-income families might be expected to be in their peak earning years—that is, in the "humped" portion of Figure 21.3. In this range, according to the life cycle hypothesis, income should exceed consumption by the greatest amount, and the APC should be the lowest. Conversely, a sample of low-income families would have a high proportion of new entrants to the labor market and retirees, both groups that tend to dissave. These groups with high APCs would push up the APC for the sample of low-income families.

Finally, the life cycle hypothesis explains why quarter-to-quarter movements in consumption do not closely mirror quarter-to-quarter movements in income, the other anomalous finding of early research on the consumption function. The change in income from any given quarter to the next will be partly the result of one-time factors that will not affect individuals' perceptions of lifetime average income. We have seen that transient income changes have little impact on consumer behavior according to the life cycle hypothesis.