Since the permanent income hypothesis was posed by Friedman [1957] and by Modigliani and Brumberg [1954] stating that consumption is a function of the flow of income ("permanent income") that, if sustained across one's life time would just compensate expected earnings and wealth, the question of the sensitivity of consumption to current income has focussed the attention of three decades of econometricians. Yet, until the end of the seventies the analysts always came up against the problem that permanent income is unobservable. Then Hall [1978] showed that by incorporating rational expectations a household maximizing expected intertemporal utility subject to the budget constraint behaves such that the marginal utility of current consumption next year is expected to be proportional to the marginal utility this year (see also Sargent's [1978] contribution). He also found empirical evidence (on macro data) which suggested that lagged real disposable income and other variables dated \( t - 1 \) or earlier had little explanatory power on present (aggregate) consumption so long as lagged consumption was a regressor.

Hall's paper has been the starting point for a long series of empirical papers trying to test this assumption. Most of them are based on aggregate data. This includes work by Flavin [1981], Hansen and Singleton [1983], and Mankiw et al. [1985] among others. However, aggregate evidence does not seem powerful enough for econometricians to obtain a unique solution. For example, applying the same aggregate data, Flavin [1981] disputes Hall's and Sargent's conclusion that the life-cycle/permanent income hypothesis is largely supported by aggregate time series. Also, important literature has been published in order to explain the difference between Hall's and Flavin's results (see e.g., Mankiw and Shapiro [1985], Goodfriend [1986], Deaton [1987], Stock and West [1987], etc.).

No aggregate conclusion has really been decisive. This partly explains why researchers have tried to use panel data as much as possible. Yet the availability of panel data on consumption is rare and thus, so are the empirical studies about the behaviour of consumers based on data for individual households. So far only a few studies of this kind have been published which almost allows...
one to include an extensive treatment of each of them. However, we certainly
would not be exhaustive if we forget the approximatively equivalent number
of empirical studies based on a pseudo panel of cohort averages computed on
time series of cross section surveys.

This chapter is divided into six parts. The first one deals with the basic
rational expectation–life cycle model as it has been, for example, developed in
Hall [1978]. Two applications of this model will be considered. The first one
assumes constant interest rates and a complicated structure of income while
the second one assumes just the opposite, varying interest rates and a simpler
income structure. The next section studies a very important generalization
of the basic model, that is the allowance of liquidity constraints. Three con-
tributions are examined. The first two assume liquidity constraints that take
the form of credit upper bounds, one in a perfect foresight context, the other
one in a rational expectation context. The third one considers continuous
credit constraints by allowing interest rates to be functions of assets. The
fourth section deals with durability. A straightforward generalization is first
considered in which the consumption flow of the basic model is replaced by
an autoregressive linear function of past durables expenditures. The role of
adjustment costs will be more extensively studied in the second and third
applications surveyed. In the fifth section the problem of intratemporal allo-
cation is taken into account. In the last section some concluding remarks are
made.

18.1 The Basic Life–cycle Consumption Model

The textbook's consumer (see e.g., Hall [1978]) maximizes expected intertem-
poral utility:

$$E_t \sum_{\tau=0}^{H-t} \rho^\tau U_\tau(c_{t+\tau}),$$  \hspace{1cm} (18-1)

subject to the $H - t + 1$ budget constraints:

$$c_{t+\tau} + a_{t+\tau} = y_{t+\tau} + (1 + r_{t+\tau})a_{t+\tau-1}, \quad \tau = 0, \ldots, H - t, \quad a_H = 0, \hspace{1cm} (18-2)$$

where $E_t$ stands for mathematical expectation conditional on all available
information at time $t$, $\rho$ is the rate of subjective time preference, $H$ is length
of economic life, $c_t$ is consumption, $y_t$ is income, $r_t$ is real rate of interest, $a_t$
is non–human wealth (assets) and $U_t(.)$ is the within–period utility function.

The first order conditions (called Euler conditions) of the problem are:

$$E_t \rho^\tau(1 + r_{t+\tau}) U_{t+\tau}'(c_{t+\tau}) = U_t'(c_t), \quad \tau = 1, \ldots, H - t,$$ \hspace{1cm} (18-3)

where $U_t'(.)$ is marginal utility. That is, the error in forecasting the product of
the marginal rate of substitution and the rate of return must be uncorrelated
with all information available to the household at time $t$. As a consequence,
“no information available in period $t$, apart from the level of consumption,