2. This is true in principle. However, Federal accounting rules do not result in an exact correspondence between nominal deficits in the National Income and Product Accounts (or, for that matter, nominal deficits in any budget concept) and changes in the nominal debt: For this reason, changes in the real debt in column (4) of Table 1 will not be equal to the real deficit in column (2).

3. The author will send the derivation of Equations (1) to anyone requesting it.

4. For example, see Barth, Iden, and Russell (1986), Durby (1984), Sargent and Wallace (1981). The relevant real interest rate here is the after-tax real interest rate, but, since a formulation that explicitly recognizes this will not be needed to make the limited point of this section, I have omitted it in the interest of simplicity.

REFERENCES

**INTRODUCTION**

In two recent publications, Robert Frank explored how patterns of spending behavior are affected when demonstration effects apply with greater force to some goods than to others [5,6]. Following Fred Hirsch [6] Frank uses the term “nonpositional good” to refer to those things whose value is not significantly affected by interpersonal comparisons. Many things fall into the nonpositional category simply because they are not easily observed by other people. An example is savings.

Treating savings as a nonpositional good leads Frank to the prediction that when individuals make their consumption decisions noncooperatively (i.e., they make the assumption that their spending behavior does not perceptibly alter the spending behavior of others) budget shares for savings should be an increasing function of a household’s rank in the income hierarchy of the population of which it is a member. Since the level of income and income rank within any group are highly correlated, savings rates should also rise with the level of income, even after controlling for transitory earnings. This prediction contradicts the strict permanent income and life cycle hypotheses of saving, which maintain that budget shares for savings should be constant across income levels after controlling for life cycle and transitory earnings effects [5,11]. It also appears, on the basis of Frank’s survey of existing empirical evidence, that savings rates do rise with permanent income.

However, the findings on the relationship between savings and permanent income appear to be richer than Frank portrays. There is another study (Bhalla, 1980) which suggests a distinctive nonlinear relationship between savings and permanent income on the basis of longitudinal data from rural India [1]. The general functional form Bhalla proposes as the new savings function is shown in Figure 1. This savings function displays a marginal propensity to save out of permanent income (MPS) that initially increases with income, reaches a maximum, then declines slightly, and finally settles down to a constant at high income levels. The average propensity to save out of permanent income (APS), which is essentially zero at the lowest income level, increases with income at a decreasing rate before finally approaching an asymptotic value. Bhalla, however, failed to ask the more interesting question: Is there any reason to expect a savings function with these particular nonlinearities? The purpose of this note is to demonstrate that Bhalla’s findings can be explained with an expanded version of Frank’s nonpositional goods model.

**A Simple Relative Income Model**

Frank begins with a simple device to duplicate the constant savings rate result associated with the strict permanent income and life cycle models. He assumes that, during their working
years, households act as if they were faced with a maximization problem of the form

$$\text{Maximize } u(c, s) \quad \text{subject to} \quad c + s - y,$$

where

- \(c\) = planned consumption,
- \(s\) = planned savings,
- \(y\) = permanent income,
- \(u\) = a utility function homothetic in \(c\) and \(s\).

For example, if a household were to act as if maximizing \(U = cv^{1/4}\) subject to (2), this would lead to the relationships \(c = .4y\) and \(s = .2y\) this period.

To include concern for relative standing in the decision-making process, Frank suggests an otherwise identical maximization problem in which the utility index is expanded to allow for the effect of rank in the current consumption hierarchy. Specifically, assume a set of households

![Graph](image)

**Figure 1.** The New Savings Function Proposed by Bhalla (Journal of Political Economy, August, 1980). Regions OA = Subsistence, AB = Middle Income, and BC = Rich Households.
To find the density function of \( c \), differentiate \( R(c) \). Assuming the relationship between \( c \) and \( y \) is positive, it follows that

\[
\begin{align*}
f(c) &= d R(c)/dc \\
&= (dG(y)/dy) dy/dc \\
&= g(y) dy/dc \\
&= g(x^{-1}(c)) d x^{-1}(c)/dc,
\end{align*}
\]

where \( g(y) \) denotes the income density function. The consumption density given by equation (7) can then be substituted into the first-order conditions. The \( R(c) \) term in the first-order conditions can be replaced by \( G(y) \) because of the assumption of identical preferences. Making the appropriate substitutions, the system of equations consisting of (2), (6), and (7) reduces to the following equilibrium relationship:

\[
dc/dy = ((a+b) y (y - c^2))/(G(y) (b,c + a) - a)).
\]

This first-order differential equation has no closed form solution, but can be solved, subject to an initial constraint, using numerical methods. The constraint is that the average propensity to consume for the person with the lowest income level is one. To see why this is the proper constraint, note that in the Cobb-Douglas case, the first-order condition can be written as

\[
s/y = 1/(1 + n/a) + (a F_{R}(a)/a).
\]

\( F_{R}(c) = R(c)/R(c) \), and represents the elasticity of \( R(c) \) with respect to \( c \). At the minimum consumption level, \( R(c) \) must equal zero. Therefore, provided \( c \) and \( f(c) \) are greater than zero, \( F_{R}(c) \) approaches infinity and \( s/y \) approaches zero as \( c \) gets small. This significant departure from the constant APS prediction of the permanent income model occurs even though the incentive to save at low income levels is high given the Cobb-Douglas utility function. The prospect of significant advancement in the consumption hierarchy provides an even more powerful incentive for those with low incomes to increase consumption. The extent to which this latter effect can influence the relationship between savings and permanent income over the entire range of income values is documented in the next section.

**Predictions of the Relative Income Model**

The solution to equation (8) is simply the consumption function from which the savings function follows easily. By solving equation (8), a more precise idea is possible about the movement of \( s \) with changes in \( y \) for specific income distributions and utility function parameters. This section seeks to generate examples of results that are consistent with the relative income approach.

Since only the relative magnitudes of the utility function parameters are important, \( a_{0} \) was normalized to one. The value of \( a_{1} \) then determines the asymptotic level of the APS. For these examples, \( a_{1} \) was set equal to 0.25 which implies an asymptotic savings rate of 0.2. The value of \( a \), represents the importance of the rank term in the utility function and so was allowed to vary over a wide range. The two income distributions used were both bell-shaped and skewed to the right since this is presumably how the distribution of permanent income looks for most large groups. Distribution 1 is actually the distribution of measured incomes in the United States as reported by the 1972 Consumer Expenditure Survey. Distribution 2 was constructed to be more compressed towards the low end of the income scale than distribution 1. The functional form used to approximate these distributions was the Weibull distribution. 2

Predicted savings functions for both income distributions are shown in Figure 2, assuming \( a_{1} = 1.0 \). Each savings function displays an APS that increases from zero at a decreasing rate. Both also show an increasing MPS. Density 2, however, displays more similarity to Bhalla's result because the MPS rises more quickly and then eventually declines slightly as \( y \) gets very large. Given that Bhalla's data consisted of a sample from rural India, where the income distribution is presumably compressed towards the low end, it is important to note that density 2, which was constructed in just this way, showed the greatest similarity to his results.

Figure 2 also shows the effect on the savings schedule for density 2 of a reduction in the value of \( a_{1} \) from 1.0 to 0.5 when \( a_{1} \) is reduced, the MPS is initially higher and then rises at a slower rate. The MPS does again settle down at high income levels, but a smaller decline in the MPS is required to achieve the asymptotic value. Figure 2 shows, therefore, that higher values of \( a_{1} \) help to increase the similarity between the predicted savings function and Bhalla's. The finding that similarity increases as \( a_{1} \) increases supports the hypothesis that it is concern about relative standing that generated the nonlinearity in the savings function estimated by Bhalla because the parameter \( a_{1} \) represents the importance of the relative standing term in the utility function.

It may, of course, be possible to explain Bhalla's result in other ways. For example, by manipulating the form of the utility function used in the standard intertemporal model of consumer behavior, it should be possible to generate a savings function with the appropriate nonlinearities. Elsewhere [8], however, I tested the relative income model against such a competing model by comparing their ability to explain differences in savings rates across different income distributions. The results support the relative income model.
FOOTNOTES

1. The view that income rank has a significant effect on household savings rates was first proposed by James Duesenberry in 1949 [2], and more recently again by Franco Modigliani [10] and Paul Meenik and Martin David [9]. A recent survey of the evidence to this view can be found in [7].

2. Undoubtedly, a more sophisticated inquiry would treat permanent income as endogenous. As Frank points out in his discussion of consumption as a signal of ability, relative standing may play an important part in determining the outcome of a number of competitions that have a bearing on a household’s permanent income. A similar point is made by Hirsch [6]. Relative standing concerns may also influence permanent income by affecting the labor supply decision. Such a treatment of permanent income, however, is well beyond the scope of this paper.

3. If households have complete information about the consumption of their peers and rational expectations as assumed earlier, there still exists an underlying force that can upset the “equilibrium” just described. Namely, once each household has fixed its optimum consumption level, the household that started out with zero rank still has zero rank, and could easily revert back to the consumption level associated with independent preferences with no loss of rank. The person with the next highest consumption would then be free to follow and so on. As Robert Frank pointed out to me, this unravelling problem can be eliminated by modifying the objective function to be $U(c, s, R(c, e) - c)$, where $e$ is the consumption level of the next highest household. If the consumption classification is continuous and everyone is concerned about maintaining relative standing, $e - c$ should be approximately zero for everyone. However, if the lowest ranked household decided to cut back its consumption, this term would become positive. Assuming that the partial derivative of $U$ with respect to the fourth argument is negative and large enough, the move would result in a set reduction in utility.

4. If the initial condition has the minimum consumption level equal to the minimum income level, equation (4) at first suggests $dc/dy$ is indeterminate at that point. However, after applying L’Hospital’s Rule and taking the limit as $(c, y)$ approaches $(c_0, y_0)$ along the equilibrium path $y(x)$, $dc/dy$ approaches $a_1(x_0, y_0)$, provided $g(x)$ is greater than zero. This value of $dc/dy$ can then be used as the starting point in the numerical algorithm used to solve equation (3).

5. The income distribution data and the estimated parameters for each distribution are discussed in an appendix to this paper available from the author.

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Rational Behavior with Deficient Foresight

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INTRODUCTION

Although there has recently been a revival of some broadly “keynesian” ideas and concepts in macroeconomics, under the label of “New Keynesianism” (Colander, 1988), the so-called rational expectations hypothesis (REH) remains a major element in these theories. By now, it is widely accepted by both: “New Keynesian” and “New Classical” economists that the REH has entirely supplanted the adaptive expectations hypothesis (AEH), of (e.g.) Cagan (1956) and Nerlove (1958), even though the latter was the mainstay of most orthodox models for some two decades.

However, the recent developments still do not squarely address some of the important issues involving uncertainty and expectations formulation which were originally raised by Keynes (CW VII, CW XIV, pp. 109–23), and have subsequently been taken up by economists such as Shaackle (1949, 1967, 1973, 1974, 1972), Davidson (1972), and Loasby (1976). Unlike the AEH, the REH alternative view has not been entirely eliminated from the literature, although clearly it has not had a comparable degree of influence on the majority of the profession as the REH. The alternative approach, which stresses fundamental uncertainty in Keynes’ or Knight’s (1921) sense (as opposed to mathematical risk), does not have as neat an identifying label as the REH or AEH. However, Coddington (1982, 1983), in a highly critical discussion, has recently used the term “Deficient Foresight” (DF) to refer to the associated set of concepts and ideas, and although this term may be misleading in a number of respects, it will be convenient to adopt it as a shorthand here.

If, as plausibly claimed by Lawson (1985, p. 909), fundamental uncertainty is a “pervasive fact of life,” the dismissal of the DF approach by a majority of economists requires some explanation. One possibility may be that it is widely believed that the use of DF concepts entails modelling the behaviour of economic agents as being “irrational” in some sense. After all, the success of arguments in this vein led to a fairly rapid demise of adaptive expectations once the REH appeared on the scene, and it may be felt that similar considerations suffice to dispose of the DF approach also. Alternatively, there is also, apparently, a view that even if the profession were prepared to grant more theoretical respectability to DF than it allows the AEH, nonetheless the DF approach is outruled on purely technical grounds.

In this paper, however, we argue that, in fact, the DF approach is likely to have more staying power than adaptive expectations. Although proponents of the REH were able to demonstrate that agents in adaptive expectations models are clearly not “rational” in the sense in which this term is widely understood by economists, the same is not true of agents forming expectations under genuine uncertainty in models based on that of Keynes. We also suggest that...