

## Inflation and Consumption in Ireland

PATRICK HONOHAN  
*Central Bank of Ireland*

---

In inflationary times, consumers have limited, mainly out-of-date, information on the general level of prices. Consequently, when the general rate of inflation accelerates unexpectedly, consumers tend to mistakenly regard the higher prices for certain goods that they observe as higher relative prices for these goods — that is, relative to the goods for which they only have out-of-date price information. Accordingly, they buy less of the apparently more expensive goods. This, in a nutshell, is the theory advanced by Deaton (1977) to explain the high levels of saving observed in the United Kingdom and the United States in recent years. In this note, Deaton's aggregate consumption function is applied to Irish data covering the period 1948–1976 with a good deal of success. It is suggested that this theory represents an advance on consumption theories previously applied to Irish data.

The theoretical underpinning of Deaton's model is quite elaborate and it will not be reproduced here. We will simply outline the assumptions leading to his estimated equation as follows:

- (i) *actual* consumption falls short of planned consumption by some function of the amount of unexpected inflation so that the *actual* savings ratio exceeds the planned ratio by a related function of the amount of unexpected inflation, increased by the amount of unexpected real income growth:
- (ii) the *planned* savings ratio is formed by a partial adjustment to the *long-run equilibrium* ratio which, for simplicity, is assumed to be constant (the partial adjustment mechanism leads to the inclusion of the lagged savings ratio in the estimating equation); and

(iii) the *unexpected* inflation and real income growth rates are functions of recently experienced rates.

A linear approximation yields the following estimating equation suggested by Deaton:

$$\Delta (s/y) = a_0 + a_1g + a_2p + a_3L(s/y) \quad (1)$$

where  $s/y$  is the savings ratio,  $\Delta$  and  $L$  denote first difference and lag operator, respectively, and  $g$  and  $p$  are the rates of real disposable income growth and inflation, respectively. Applying this equation to Irish data over the period 1948–76<sup>1</sup> yields the following results (t-statistics in parentheses), illustrated in Figure 1:

$$\Delta (s/y) = 0.015 + 0.393g + 0.401p - 0.451 L(s/y) \quad R^2 = 0.68 \quad DW = 2.63$$

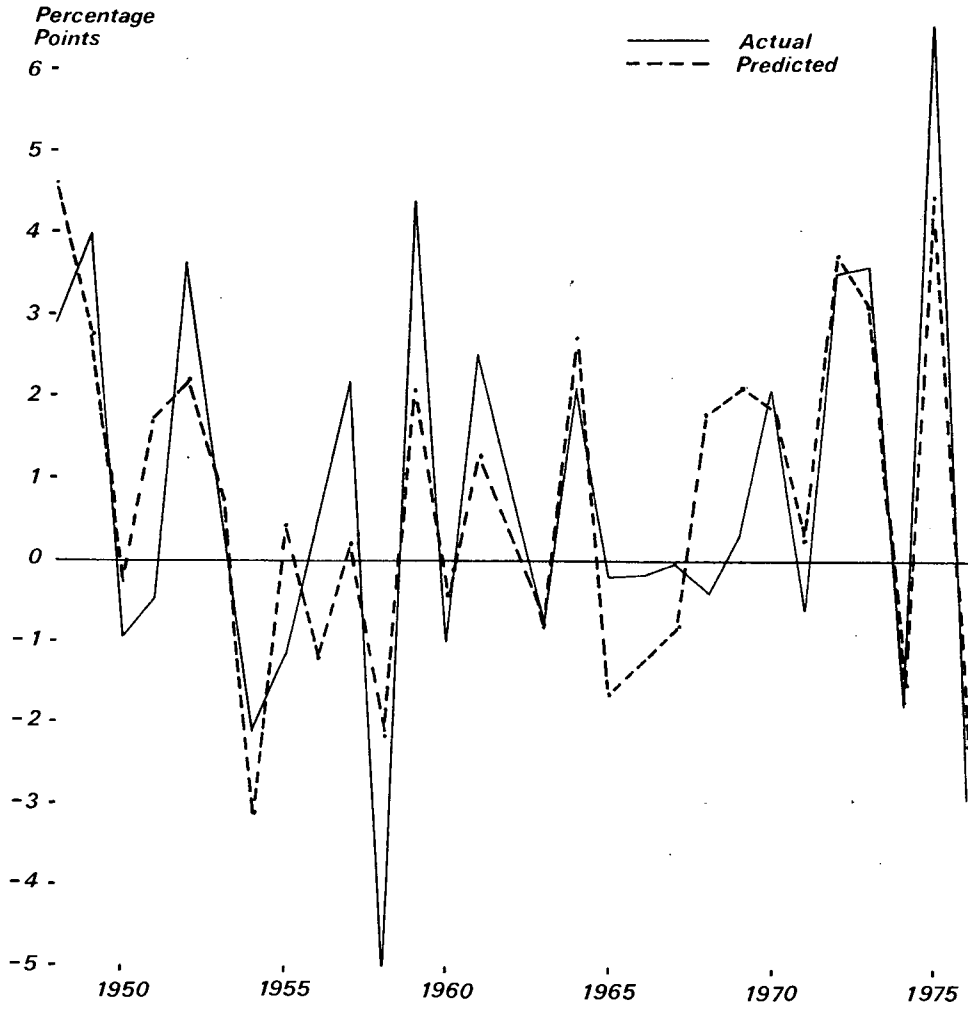
(1.94) (4.91) (4.56) (4.60)

The equation is as good a fit as those reported by Deaton for the United Kingdom and the United States. The coefficients have the correct signs and roughly comparable magnitudes to those found by Deaton; interpreted as the weight of recent growth and inflation rates in the formation of expectations of current values of these rates, the coefficients on  $g$  and  $p$  seem reasonable. The coefficient of the lagged savings ratio is to be interpreted as the partial adjustment coefficient in the context of Deaton's model and it implies that about a half of any deviation of the planned savings ratio from its long-term level is made up within one year.

An especially attractive feature of the equation is its ability to track the unusual movements in the savings ratio over the last five years of the series (i.e., 1972-76). This can be seen from Figure 1. Except for 1975, the change in the savings ratio is tracked to within about 0.5 of one percentage point. In 1975, when the savings ratio rose by an unprecedented 6.5 percentage points or by more than one-third, the equation also did very well, predicting a 4.4 percentage point increase. Out of sample, the model's predictions for 1977 and 1978 are for no change and a fall of 1½ per cent, respectively, using Central Bank estimates of the exogenous variables.

1. The data are drawn from *National Income and Expenditure*, 1969, for 1947-53; from the Central Bank Data Bank, 1977, for 1954-69; and from *National Income and Expenditure*, 1976, for 1970-76. The major revision of the national accounts which appeared for the first time in the last-named reference hardly affects the variables used in this study. The variable (saving out of personal disposable income) has the same definition as  $YD - PC \cdot C$  in the Central Bank Data Bank, 1977, and  $y$  is personal disposable income,  $YD$ . The variables  $g$  (the rate of change of personal disposable income) and  $p$  (the rate of growth of the consumption deflator) are proportionate first differences in  $YD$  and  $PC$ , respectively. Quarterly data for Ireland are not available. In his study, Deaton presented regressions based on quarterly, as well as some based on annual, data.

FIGURE 1: CHANGE IN SAVINGS RATIO 1948-76



An important feature of most consumption functions is the marginal propensity to consume. However, in this model consumption is a highly non-linear function of income and the other explanatory variables. Thus,

$$\delta c/\delta y = 0.985 - \{0.393(1 + 2g) + 0.401p + 0.549L(s/y)\} \quad (2)$$

The impact marginal propensity to consume, evaluated at the mean of the explanatory variables, is 0.49; evaluated at 1976 values of the explanatory variables, it is 0.39. The long-run equilibrium savings ratio is 0.13.

How does the degree of fit of this equation compare with earlier consumption functions for Ireland? The  $R^2$  seems low, but this is due to the equation being estimated in terms of first differences of the savings ratio. Given income and the other explanatory variables, the above equation "explains" over 99 per cent of the variance in real consumption. To judge the merits of the equation, one could refer to the studies of Kelleher (1977) and Bradley, Kelleher and McCarthy (1977). When equation (1) is estimated over the shorter periods used by these authors, there is little to choose between the performance of their equations and the Deaton model, the comparison being made on the basis of a within-sample standard error of predicted real consumption. However, the Deaton equation can cope with the unprecedentedly large rise in the savings ratio in 1975 in sharp contrast to equations relying on a real balance effect (e.g., that used in Bradley, Kelleher and McCarthy). (In making these comparisons, the earlier data of the Central Bank Data Bank, 1977, were used throughout for consistency.) Indeed, when estimated over the period 1954-1974, the Deaton equation forecasts a 3 per cent rise in the savings ratio in 1975.

So far the results cited have been based on precisely the same equation presented by Deaton and so are completely free of data mining. Some other experiments were also carried out. First, correcting the equation for possible first order serial correlation gives the following coefficients (the autocorrelation coefficient is estimated by maximum likelihood search):  $a_0 = 0.0185$ ,  $a_1 = 0.305$ ,  $a_2 = 0.361$ ,  $a_3 = -0.372$  and the autocorrelation coefficient is  $-0.486$ . All coefficients remain highly significant and the Durban-Watson statistic falls to 2.16. Secondly, none of the following variables significantly enhances the Deaton formula — the ratio of agricultural to total disposable income, the growth rate of agricultural income, lagged real liquid assets and a linear time trend — although inclusion of the growth rate of agricultural income sharply reduces the significance of  $g$ . Thirdly, it has been suggested that  $g$  and  $p$  may not "cause"  $s/y$  to move unidirectionally in the sense posited by Sims (1972). A Sims' test has been conducted to check this hypothesis in the case of both  $g$  and  $p$ .  $\Delta s/y$  was regressed on future, current and past values of  $g$  and  $p$ , respectively, to test

for reverse causation. The data were prefiltered by filters of the form  $1 - rL$  where  $r$  is the estimated first order autocorrelation coefficient of the errors from the unfiltered regressions. Application of a filter of this form to first differenced data is quite similar to applying the filter suggested for US data by Sims to undifferenced data. The hypothesis of reverse causation from  $s/y$  to either  $g$  or  $p$  was rejected.

There are deficiencies in the Deaton equation. In particular, the expectations formation mechanism seems naïve. Nevertheless, its ability to predict the 1975 savings ratio surely means that this approach to consumption deserves further study.

#### REFERENCES

- BRADLEY, J., R. KELLEHER and C. McCARTHY, 1977. "The Central Bank Macroeconomic Model; Revised Estimates and the Results of a Validation Exercise", Mimeo.
- DEATON, A., 1977. "Involuntary Saving Through Unanticipated Inflation", *American Economic Review*, Vol. 67, No. 5, pp. 899-910.
- KELLEHER, R., 1977. "The Influence of Liquid Assets and the Sectoral Distribution of Income on Aggregate Consumers' Behaviour in Ireland", *Economic and Social Review*, Vol. 8, No. 3, pp. 189-199.
- SIMS, C. A., 1972. "Money, Income and Causality", *American Economic Review*, Vol. 62, No. 4, pp. 540-552.