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Irish Consumer Expectations and the Adaptive Expectations Model

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I INTRODUCTION

DYNAMIC economic models frequently require some hypothesis about expectations of future values of economic variables. Price expectations have received particular attention but expectations also arise in other contexts. The adaptive expectations model is that most commonly used. The approach, devised by Nerlove (1958) assumes that expectations are modified in proportion to the discrepency between an observed value and the previous forecast. If P^e_t and P_t denote estimated and observed values of an economic variable for period t, the model is:

$$P^e_t = P^e_{t-1} + b(P_{t-1} - P^e_{t-1}), \qquad (1)$$

where the coefficient b lies between zero and unity. In many applications P^e_t is an expected price level (perhaps measured in logarithms) or an expected change in level as in, for example, the model of inflation developed by Laidler (1973). Modifications of the adaptive expectations equation and other forecasting models have been proposed in the literature and some empirical comparisons have been made, for example, by Turnovsky (1970). The purpose of this paper is to examine the compatibility of the adaptive expectations model with data obtained from the Irish rounds of the EEC Harmonised Consumer Survey and to suggest an appropriate modification to the model.

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II THE EEC HARMONISED CONSUMER SURVEY

The Harmonised Consumer Survey is conducted in all EEC Member States and is designed to assess consumer attitudes to economic trends and intentions in regard to purchase of consumer durables. It commenced in Ireland in May 1974 and is conducted three times yearly using independently chosen random samples of households that are interviewed by trained enumerators. The target sample size per round was 5,000 households until 1976 when it was reduced to 2,500. However, the attained sample size was sometimes less, due to non response.

Two pairs of questions concerned with perceived and expected changes in economic variables are of interest. The first pair seek the consumer's opinion of how prices have changed in the twelve months prior to interview and his expectations of price changes in the twelve months following interview. The second pair seek information on changes, observed and expected, in the general economic situation. All questions are qualitative with five categories of reply provided (six if a no information/non response category is included). For prices the categories are: prices have fallen (or will fall) slightly, have stayed the same, are a little higher, are moderately higher and are much higher. For the general economic situation the categories are: improved distinctly, improved slightly, stayed the same, deteriorated slightly and deteriorated distinctly. The data from the Survey, then take the form of frequency distributions into these categories.

Unfortunately, the wording of the question on expected prices was altered in the 1976 rounds of the Survey making comparisons from 1975 to 1976 of doubtful validity. In examining the model therefore, price expectation data for 1974 and 1975 are employed, while for general economic situation 1976 data are also used.

III TESTING THE MODEL

Equation (1) is visualised as holding on average over all consumers though it could be taken as applying to individuals if stochastic elements are included. The stochastic elements lead to frequency distributions of perceived and expected price changes. Since the Consumer Survey questions did not try to quantify variable changes, the actual values of ΔP and ΔP^e are unavailable. However the model can still be tested.

If, in equation (1), $P_{t-1} > P^e_{t-1}$ then $P^e_t > P^e_{t-1}$. In consequence, a categorised frequency distribution of expected variable changes at year t would show a shift of frequencies towards the higher variable change categories

when compared with the distribution for year t-1. So, if the model is correct and the array of frequencies for P_{t-1} indicate a higher variable level than do the frequencies for P^e_{t-1}, there should be corresponding differences in the frequency arrays for P^e_t and P^e_{t-1}. If the differences are opposite in direction the model can be rejected, provided of course, that differences in frequency arrays are statistically significant. Since the samples for successive rounds were independently selected, differences in frequency arrays can be tested using chi-squared tests.

This examination of the adaptive expectations model compares the respondents' expectations with their perceptions of past changes. Other empirical studies have compared expectations with objective measures of change, for example, with changes in a Consumer Price Index. The present procedure may be more plausible since it is improbable that respondents, other than professional economists, visualise past changes in terms of a complex index. Comparisons with a quantitative measure of past change also demand a quantitative estimate of expectation, which must either be obtained from quantitative survey data as in Turnovsky's (1970) case or be inferred from qualitative data, by making additional assumptions, as in the case of Carlson and Parkin (1975).

IV PRICE CHANGES

The percentage frequency distributions for price perceptions and expectations are shown in Table 1. As very few respondents perceived a fall in prices

Table 1: *Percentage frequencies of price changes*

	May '74	*Oct. '74*	*Jan. '75*	*May '75*	*Oct. '75*
			Perceived		
Lower/About the same	1·3	0·5	0·5	0·4	6·4
A little higher	4·1	2·4	1·9	2·4	13·2
Moderately higher	5·4	4·1	3·9	4·3	14·6
Much higher	89·1	93·0	93·6	92·9	65·8
Total frequency	5129	4946	4324	4377	4930
			Expected		
Lower/About the same	9·8	6·0	5·0	3·4	10·2
A little higher	14·6	14·3	12·1	9·9	22·5
Moderately higher	21·0	16·9	17·9	16·0	21·1
Much higher	54·6	62·8	65·0	70·6	46·1
Total frequency	4570	4702	4179	4255	4738

this category has been combined with "stayed the same". Comparing the perceived price changes (P_{t-1}) in May 1975 with those expected (P^e_{t-1}) in May 1974 shows an obviously more pessimistic view for P_{t-1}. The corresponding comparison of expected price changes for May 1975 (P^e_t) with those expected for the previous year also shows increased pessimism in the forecasts. So this comparison is compatible with the adaptive expectations model.

The comparisons for October show a different picture, however. The perceived change in 1975 is slightly (though statistically significant, a Chi-Squared test gave $p<0{\cdot}005$) more pessimistic than that expected in 1974 but the expected change in 1975 is more optimistic than in 1974. A Chi-Squared test showed that this change is highly significant and this result conflicts with the adaptive expectations model. The greater optimism in October 1975 can perhaps be explained by the special measures introduced in the Supplementary Budget in June 1975 which included subsidies on food and transport, and the failure of the model might be attributed to a greater immediate effect on expectations than on perceptions.

V CHANGES IN GENERAL ECONOMIC SITUATION

Percentage frequency distributions for perceived and expected changes in general economic situation are shown in Table 2. The categories "improved

Table 2: *Percentage frequencies of changes in general economic situation*

	May '74	*Oct.* '74	*Jan.* '75	*May* '75	*Oct.* '75	*Jan.* '76	*May* '76
				Perceived			
Improved distinctly/ Improved slightly	23·6	7·3	3·3	8·2	19·5	13·2	13·2
Stayed the same	6·8	3.7	3·8	5·8	10·6	8·7	6·9
Deteriorated slightly	24·6	20·3	15·8	18·2	26·4	21·8	21·4
Deteriorated distinctly	45·0	68·6	77·2	67·8	43·4	56·4	58·5
Total frequency	5050	4886	4306	4356	4893	2494	2464
				Expected			
Improved distinctly/ Improved slightly	27·6	19·3	19·5	19·0	27·8	15·1	22·6
Stayed the same	21·6	13·6	12·6	15·9	22·8	19·3	22·8
Deteriorated slightly	25·8	25·6	25·1	21·8	23·8	29·6	25·5
Deteriorated distinctly	25·0	41·5	42·8	43·2	25·6	36·0	29·2
Total frequency	4365	4374	4004	4068	4522	2335	2302

distinctly" and "improved slightly" have been combined due to the low frequency of the former category of reply. It might be argued that "General Economic Situation" is, unlike price, an intrinsically qualitative variable without any underlying quantitative measure. It is worth remembering that the quantitative price variable in the model is a complex weighted index of various price series and one could hypothesise some quantitative measure of general economic situation. In any event some adaptive expectation mechanism could be expected to apply to the frequencies. The value of the variable is that comparisons are possible using 1976 data so complementing the data on price.

As in the case of price, the May 1974 to May 1975 comparison is compatible with the adaptive expectations model, both the perceived and expected arrays of frequencies in May 1975 showing significantly greater pessimism than the expected for May 1974. The October comparison, again as in the case of price, conflicts with the model, the expectations for 1975 being less pessimistic than in 1974 although the perceived values in 1975 were more pessimistic ($p<.001$).

The January 1975 to January 1976 comparison and the corresponding May comparison both conflict with the model, expectation in 1976 being significantly less pessimistic than in 1975 although the perceived was significantly more pessimistic. Overall then, the adaptive expectations model does not appear to be compatible with the data. The method of testing involved no assumptions other than that the categories had the same meaning in each round of the survey. Even this assumption is not critical, since perceived and expected changes are both compared with expected changes in the previous year so the effects of any changes in the understanding of "a little higher" or "deteriorated slightly" should cancel out.

VI ALTERNATIVE MODELS

Examining the comparisons where the adaptive expectations model was incompatible with the data shows that in all cases reduced pessimism about expectations was associated with an improvement in perceived changes. That is:

$$P^e_t < P^e_{t-1} \text{ when } P_{t-1} < P_{t-2}$$

This suggests an extrapolative type model containing a term in $(P_{t-1}-P_{t-2})$. Extrapolative models have appeared, for example, that of Enthoven and Arrow (1956). However, a model including both extrapolative and adaptive

features seems desirable. Before postulating the form of such a model it is worth examining the fundamental restriction attaching to the model as given by equation (1). It is well known that this may be expressed as a weighted sum of previous perceived prices. Over an infinite time span

$$P^e_t = bP_{t-1} + b(1-b)\,P_{t-2} + b(1-b)^2\,P_{t-3} + \ldots .$$

If all values of the economic variable were equal, for example, if price changes were occurring in equal increments, we could sum the geometric series and have $P^e_t = P_{t-1}$, an obviously desirable property. But suppose price increments were themselves increasing at a steady rate, so that

$$P_{t-1} > P_{t-i}, \text{ for all } i.$$

Then

$$P^e_t < bP_{t-1}[1+(1-b)+(1-b)^2+\ldots.] < P_{t-1}$$

Thus although a constantly increasing series has been observed up to time $(t-1)$ the forecast for time t is below P_{t-1}. This is not a plausible result.

Suppose we demand that the expression for P^e_t be such that $P^e_t = P_{t-1}$ if all P_{t-i} are observed as equal and that $P^e_t = P_{t-1} + (P_{t-1} - P_{t-2})$ if the P_{t-i} are observed to be increasing (or decreasing) at a constant rate. These seem sensible requirements and the series

$$P^e_t = P_{t-1} + b[P_{t-1} - P_{t-2}] + b(1-b)\,[P_{t-2} - P_{t-3}] + b(1-b)^2\,[P_{t-3} - P_{t-4}] + \ldots .$$

satisfies these requirements. This may be rewritten as the recurrence relation,

$$P^e_t = P^e_{t-1} + (P_{t-1} - P_{t-2}) + b(P_{t-1} - P^e_{t-1}) \qquad (2)$$

An interpretation of equations (1) and (2) is that equation (1) moves a forecast for year $(t-1)$ closer to the observed value for year $(t-1)$, while equation (2) extrapolates to year t by adding an observed increment. If there are no trends the equations are equivalent except that equation (2) contains an extra "random" term but if there are trends equation (2) is preferable.

The data in Tables 1 and 2 cannot reject the model represented by equation (2). The cases where the original model was incompatible can be ex-

plained by the second term in equation (2) outweighing the third. The May comparisons for both price and general economic situation are also plausible in terms of the model since the perceived situation deteriorated from 1974 to 1975.

It must be admitted that there is an infinity of other models that would not be incompatible with the data. For example, the second term in (2) could be replaced by $c(P_{t-1}-P_{t-2})$, where $0<c<1$. However, most of these models will not have the "sensible" properties mentioned earlier. In conclusion, it should also be said that the period from May 1974 to May 1976 is somewhat short for evaluating the merits of a forecasting model. A short term trend may mean that equation (2) is superior to equation (1) but in the long term, it may be plausible to treat short term trends as random phenomena.

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