ECONOMIC PAPERS

COMMISSION OF THE EUROPEAN COMMUNITIES • DIRECTORATE-GENERAL FOR ECONOMIC AND FINANCIAL AFFAIRS

No. 30 February 1984

The integration of EEC qualitative consumer survey results in econometric modelling : an application to the consumption function.

Peter Praet*

Internal Paper

"Economic Papers" are written by the Staff of the Directorate-General for Economic and Financial Affairs, or by experts working in association with them. The "Papers" are intended to increase awareness of the technical work being done by the staff and to seek comments and suggestions for further analyses. They may not be quoted without authorisation. Views expressed represent exclusively the positions of the author and do not necessarily correspond with those of the Commission of the European Communities. Comments and enquiries should be addressed to

The Directorate-General for Economic and Financial Affairs,
Commission of the European Communities,
200, rue de la Loi
1049 Brussels, Belgium

ECONOMIC PAPERS

No. 30 February 1984

The integration of EEC qualitative consumer survey results in econometric modelling : an application to the consumption function.

Peter Praet*

Internal Paper

* Professor, Institute of European Studies, Université Libre de Bruxelles.

The author wishes to acknowledge helpful comments by M. Biart, T.P. de Hora, A. Dramais (European Commission) and J. Mercenier (University of Brussels) and efficient computer assistance from Y. Dabin and B. Mariash (IBM-Diegem).

II/73/84-EN This paper only exists in English.

ABSTRACT

This paper investigates the forecasting performances of alternative models of private consumption using the results of EEC consumer surveys. The main findings of the study are:

- in absolute as well as in comparison with standard economic models consumption functions incorporating opinion variables perform surprisingly well, in spite of important measurement problems (missing data, qualitative character of responses, strong collinearity among responses);
- consumers'opinions predict changes in consumption only for the very short term (between zero and three quarters), notwithstanding the fact that survey questions refer to yearly periods;
- econometric models based on selected opinions perform better than models using the European Commission Consumer Confidence Index (CCI);
- econometric models explaining consumption by both opinions and economic variables (so-called "mixed-models") prove superior to models limited only to opinion variables. This is partly due to the fact that opinion series are relatively smooth compared to actual changes in consumption. The addition of an economic variable corrects one of the weakenesses of opinion-based models.

Contents

List of tables and graphs

I. INTRODUCTION

This research is part of a more ambitious project within the European Commission, DGII, aiming to test wether forecasting can be improved by incorporating the qualitative information of the Community's surveys among businessmen and consumers into macroeconomic modelling. The present paper is limited to the estimation and the comparison of alternative (quarterly) models of private consumption using the results of the consumers' survey for the main EC countries: France, Germany, Italy and the UK. Similar comparisons have been performed by Robinson et al. (1981) for the business survey.

The rationale of incorporating survey results into forecasting equations can be questioned, since in order to forecast the dependent variables the opinion variables will have to be generated (predicted) for the forecasting periods. Predicting people's opinions to predict their actual behavior looks obviously weird. However, if the forecasting horizon is smaller than the time-horizon considered by survey respondents then survey models, which are based on direct and recent information, should present a marked advantage over economic models. In the EEC consumers' surveys, questions are asked on opinions for the past, the present and the next twelve months. For a forecasting horizon of, say zero to four quarters survey models are certainly worth testing. Opinion generated predictions could then be confronted in the early periods of a forecasting exercise to the corresponding "economic" forecasts. Such interaction between alternative models is regularly performed when economic model predictions are revised in view of any objective or subjective additional information.

A second reproach often leveled against the use of opinion variables (as against time-series analysis) in econometric modelling is that such models are not based on an economic theory. This would weaken their usefulness in terms of policy-making since that would imply knowledge of the process of formation of expectations and ability to act accordingly, two hazardous conditions. Nevertheless, the potential role of opinion models in providing early signals to policy-makers has to be stressed.

While we believe that survey models are important in short-term forecasting and, so far, have not been sufficiently developed, it remains that their main function should be to complement rather than "replace" economic models. It is under this perspective that the present work has to be considered.

In section II are estimated the standard economic models that will be used as yardsticks to compare forecasting performances. In these models, the dependent variable is a function of economic variables only. Section III examines the results of the consumer surveys and analyses the problems related to their integration into quantitative models. Section IV proceeds with the estimation of survey and mixed models, i.e. models in which all or part of the dependent variables are consumers' opinions. Alternative models are compared in section V.

II. A STANDARD ECONOMIC MODEL FOR PRIVATE CONSUMPTION

Table 1 gives some basic statistics on the annual growth of real disposable income,private consumption and on the average propensity to consume for the period 1973-4 to 1982-3 (1) and for a more recent period 1979-2 to 1982-3. The table reveals some essential features of the consumption behavior:

- the average propensity to consume has followed a slightly growing trend in France and in Germany; the increase has been more marked in Italy. With the exception of the UK, the average propensity to consume has been higher in the recent period 1979-2 to 1982-3 (2);
- ranges of fluctuations of income, consumption and consumption-income ratios have been important in Italy and in the UK. By contrast, in France fluctuations have been rather -and somewhat surprisingly- small.

One of the main difficulties in modelling the short-run dynamic interaction between income and consumption stems from this variability of the propensity to consume in the short-term. Let us also recall that while consumption flows are relatively well known on a quarterly basis, statistics of disposable income are much more subjected to measurement errors. Moreover, the National Accounts definition of income is particularly inappropriate during inflation and inflationary expectations since it is a non-wealth based concept (3). These characteristics explain in part the development of a vast theoretical and empirical literature on the consumption function. Given such variety, the selection of a consumption function to be used as a yardstick to compare prediction performances is somewhat arbitrar. As a standard economic model, we chose the one extensively discussed by Davidson et al. (1978) for the UK and estimated with good results for the four main EC countries by Lohan (1980):

---

(1) Period for which subsequent regressions have been performed.
(2) More recent data for the UK show however a marked increase in the propensity to consume.
(3) Consequently, the inflation-premium incorporated in interest payments increases the National Accounts disposable income (but not a Haig (1921) or Simons (1938) income concept).

Table 1. Basic statistics on real growth of disposable income (YD), private consumption (C) and on the propensity to consume (%) (a).

	1973-4 to 1982-3						1979-2 to 1982-3		
	Min.	Max.	Max.-Min.	Mean($\bar{x}$)	SD(b)	SD/$\bar{x}$(c)	Mean($\bar{x}$)	SD(b)	SD/$\bar{x}$(c)
FRANCE									
Real disposable income	-0.5	6.1	6.6	3.2	1.8	0.56	2.1	1.8	0.89
Real consumption	0.5	6.3	5.8	3.4	1.5	0.44	2.4	1.0	0.40
Propensity to consume	80.7	86.0	5.3	83.4	1.2	0.01	84.4	0.7	0.01
GERMANY									
Real disposable income	-2.8	6.1	8.9	1.8	2.2	1.22	0.6	2.0	3.17
Real consumption	-3.0	5.3	8.3	1.9	2.3	1.21	0.3	2.3	9.32
Propensity to consume	83.1	90.7	7.6	86.8	2.3	0.03	87.3	2.4	0.03
ITALY									
Real disposable income	-8.3	10.1	18.4	1.3	4.5	3.46	1.4	3.6	2.56
Real consumption	-4.2	6.6	10.8	1.9	3.0	1.58	2.6	2.8	1.05
Propensity to consume	78.8	89.6	10.8	83.8	2.5	0.03	85.3	1.8	0.02
UNITED KINGDOM									
Real disposable income	-4.9	9.2	14.1	1.0	4.2	4.20	0.6	3.9	6.91
Real consumption	-3.4	7.7	11.1	1.0	2.8	2.80	1.3	2.7	2.04
Propensity to consume	82.7	94.1	11.4	87.2	3.0	0.03	86.0	2.7	0.03

(a) Growth rates calculated as annual logarithm differences.
(b) Standard deviation.
(c) Coefficient of variation.

$$\Delta_4 C = \alpha\Delta_4 YD + \beta\Delta_1\Delta_4 YD + \gamma(C/YD)-4 + \delta\Delta 4P + \varepsilon\Delta_1\Delta_4 P$$

where: C = total private consumption at constant prices
YD= real disposable income
P = implicit deflator of private consumption

All variables are expressed in log terms, $\Delta_4 Z$ is the four period or annual difference of variable Z, $\Delta_1\Delta_4 Z$ refers to the acceleration of growth rates over one quarter ($= \Delta_4 Z - \Delta_4 Z{-}1$).

The model uses differenciated variables and also takes into account the level of variables in short-term consumption behavior (C/YD). Since variables are expressed in annual differences, non deseazonalized data have been used (4). This model presents the advantage of simplicity while relying on a plausible short-term consumption behavior. Accordingly, "consumers plan to spend in each quarter of a year the same as they spent in that quarter of the previous year modified by a proportion of their annual change in income, and by whether that change is itself increasing or decreasing; these together determine a "short-term" consumption decision which is altered by the feedback from the previous consumption income ratio insuring coherence with the long-run "target" outcome: C = k.YD" (5) (Davidson et al., p. 684). The inflation rate and its rate of change can be interpreted in various -and sometimes opposing- ways, leaving the signs of the coefficients of price variables a priori undetermined . Consumers can increase their savings in inflationary periods in order to keep the real value of their liquid assets constant, or because high and variable inflation rates create uncertainty about the future. Inflationary expectations can also have the effect of stimulating purchases of real assets, in particular of durables (6). Inflationary expectations are not explicit in the model: it is assumed that actual inflation and its acceleration are proxies for expectations. An alternative model using an expected inflation variable constructed by Papadia and Basano (1981) was also tested (7). Since the objective is to compare economic models with survey models, we have not introduced dummy variables in either models.

---

(4) Except for Italy. Davidson et al. report that equations using seazonal adjusted data induce only negligible changes in the estimates of such models (p.672).
(5) Long run stability of the avarage propensity to consume.
(6) The impact of inflation and inflationary expectations on consumption-savings flows has been the subject of a number of research (see among other Juster and Wachtel (1972), Wachtel (1977), Howard (1978)).
(7) This is a "quasi-pure" economic model since the expected inflation variable makes use of the results of the consumers' survey.

The regression results are given in table 2. Sources of the data are the INSEE for France, the DIW for Germany, the ISCO for Italy and the CSO for the UK. Variables are expressed in percentages.

Given the highly uncertain period which characrerizes the sample, the model performs reasonably well. The Durbin-Watson statistics are in the inconclusive region for three countries, there is a positive autocorrelation of the first order in the Italian model (8). This could result from the fact that the assumption of a long term unitary elasticity of demand implied in the model may not be appropriate in explaining total private consumption. Davidson et al. use this specification to estimate consumption of non durables only. Under the ordinary-least-squares (OLS) estimates we present the regression results using the Cockrane-Orcutt correction for first-order autoregressive error processes which is a good proxy for a broader dynamic structure. The sum of the squared residuals is significantly reduced in Germany and in Italy. The condition index, which identifies the magnitude of the dependencies among the independent variables, is relatively low (9). The standard-errors of the coefficients are small with the exception of acceleration variables (particularly the rate of change of the inflation rate for France and for the UK). Note that -as in Lohan's earlier estimates (10)- the rate of inflation exercises a negative effect on consumption. This is not the case (except for Italy) for the signs of the rate of change of inflation which differ from Lohan's previous estimates. In Italy, short-run anticipatory buyings are important when the inflation rate is accelerating. Rough stability tests have been performed by estimating the equations for a number of subperiods. It came out that the standard-errors of the coefficients of the acceleration variables strongly increase in some periods. As presented in Appendix 2, similar models with a survey-based proxy for inflationary expectations are not superior.

III. THE RESULTS OF THE EC SURVEY AMONG CONSUMERS.

This section describes and discusses the main characteristics of the EC survey among consumers.

---

(8) Serial correlation affects the value and the standard errors of the parameters.
(9) Weak dependencies are associated with condition indexes around 5 or 10, whereas moderate to strong relations are associated with condition indexes of 30 to 100 (see Belsey, Kuh and Welsch (1980)).
(10) Which covered the early sixties to the end of the seventies.

Table 2. Regression results of standard economic models (a).

	Δ_4YD	$\Delta_1\Delta_4$YD	(C/YD)-4	Δ_4P	$\Delta_1\Delta_4$P	$\bar{R}^2$	DW	SSR	COND.	RHO
FRANCE (OLS)	0.328 (4.27)	-0.184 (-1.65)	-0.310 (-8.64)	-0.324(b) (-5.74)	-0.432(b) (-2.86)	0.96	1.44	16.45	12.1	—
FRANCE (AUTO) (c)	0.472 (3.99)	-0.196 (-1.99)	-0.380 (-6.53)	-0.494(b) (-5.17)	-1.820(b) (-0.11)	0.64	2.37	13.82	6.5	0.70
GERMANY (OLS)	0.756 (6.77)	-0.481 (-3.78)	-0.222 (-3.65)	-0.563 (-3.74)	-0.683 (-1.41)	0.84	1.23	43.16	9.3	—
GERMANY (AUTO) (c)	0.721 (5.34)	-0.467 (-4.35)	-0.176 (-2.69)	-0.432 (-2.50)	-0.789 (-1.72)	0.58	1.89	36.04	6.2	0.45
ITALY (OLS)	0.518 (7.24)	-0.116 (-1.71)	-0.211 (-3.14)	-0.168 (-2.26)	0.561 (4.06)	0.81	1.09	75.92	9.5	—
ITALY (AUTO) (c)	0.449 (5.89)	-0.089 (-1.67)	-0.236 (-3.48)	-0.193 (-2.45)	0.386 (3.24)	0.59	2.05	55.83	5.2	0.58
UK (OLS)	0.529 (7.27)	-0.064 (-0.42)	-0.188 (-3.42)	-0.151 (-2.56)	0.153 (-0.70)	0.77	1.77	57.53	5.4	—
UK (AUTO) (c)	0.621 (5.69)	-0.347 (-2.62)	-0.168 (-2.58)	-0.158 (-2.19)	-0.282 (-1.24)	0.55	1.90	53.38	3.8	0.47

(a) Sample period: 1973-4 to 1982-3 for France, Germany and Italy; 1975-3 to 1982-3 for the UK.
DW = Durbin-Watson statistic; SSR = sum of the squared residuals; COND = condition index identifying dependencies among independent variables; RHO is the coefficient of the correction for first-order autocorrelation; t-ratios are in brackets.

(b) Lagged two periods.

(c) Cockrane-Orcutt correction for first-order autocorrelation. $\bar{R}^2$ calculated on variables corrected for autoregressive process.

— 7 —

1. The measurement of perceptions.

Economists have approached the question of measurement of psychological variables in two main directions: the first is indirect and consists in making assumptions on the formation of expectations (rationality, error-learning process, ...) or on the role of expectations in the determination of the values taken by economic measurable variables (ex. the so-called Fisher interest-rate identity); the second is direct measurement. Direct methods consist in asking directly to a sample of economic agents their opinion on the evolution of an economic variable. Objections which are made against the use of direct information are of the same type as those relating to other opinion surveys: notably the fact that the interviewees do not necessarily act as they say they would, sampling errors, nature of the questions asked and -last but not least- the cost of polling. The main advantages of surveys are that they do not rely upon simplistic or/and untestable theories, that they make possible the detection of the impact of specific events on expectations. Direct and indirect methods are in fact complementary and their mutual confrontation should be fruitful. The measurement of consumers opinions present specific problems: on the whole one would expect them to be less reliable than businessmen opinions. One characteristic of consumers opinions is that they evolve relatively smoothly compared to the evolution of corresponding observed variables.

The Community's survey of consumer opinion was started in 1972 on a thrice-yearly basis. Since october 1980 for the UK, june 1981 for Germany and january 1982 for Italy, monthly data are now available (11). The survey is of a qualitative nature since questions only relate to directions of changes and not to numbers. However, contrary to the business survey where (typically) only three answers are possible (positive change, negative change, and no change), questions of the consumer survey provide a greater number of possible responses. Table 3 lists (summarized) the twelve main questions that are asked and the possible responses. The table shows some diversity in the questions:

- three questions relate to the past (SFAD,SEAD,PRAD), three questions to the present (ACHT,EPAR,SFAC) and six questions to the next 12 months (SFAP,SEAP, PRAP,CHOM,AEQD,EPAP);

(11) For some of the twelve questions, monthly data are available for earlier periods.

Table 3. List of questions and possible responses of the Community consumer survey.

Questions	Name of variable	Possible responses (a)
Financial situation of your household now compared to 12 months ago	SFAD	a lot better (+1), a little better (+1/2)
Financial situation of your household, prospects over the next 12 months	SFAP	the same (0), a little worse (-1/2)
General economic situation in the country now compared to 12 months ago	SEAD	a lot worse (-1), don't know
General economic situation in the country, prospects over the next 12 months	SEAP	
Price levels now compared to 12 months ago	PRAD	much higher (+1), moderately higher (+1/2), a little higher (0), about the same (-1/2), lower (-1), don't know.
Price trends over the next 12 months	PRAP	more rapid increase (+1), same increase (+1/2), slower increase (0), stability (-1/2), fall slightly (-1), don't know.
Unemployment level in the country over the next 12 months	CHOM	increase sharply (+1), increase slightly (+1/2), remain the same (0), fall slightly (-1/2), fall sharply (-1), don't know.
Major purchases (furniture, washing machine, TV,...) at present	ACHT	yes, right time (+1), neither right nor wrong time (0), wrong time, should postpone (-1), don't know.
Major purchases next 12 months compared to last 12 months	AEQD	much more (+1), a little more (+1/2), the same (0), a little less (-1/2), much less (-1), don't know.
Savings at present, a reasonable time to save	EPAR	yes, certainly (+1), yes, perhaps (+1/2), probably not (-1/2), certainly not (-1), don't know.
Savings by you or your household over the next 12 months	EPAP	
Financial situation of households at present - financial asset accumulation	SFAC	borrowing (-1), drawing on savings (-1/2), just making ends meet (0), saving a little (+1/2), saving a substantial amount (+1), don't know.

(a) The numbers in parentheses are the weights given by the Commission to each percentage response to obtain the average answer to each question. The "don't know" responses are redistributed between the other answer categories according to the latter's percentage distribution.

- about half of the questions concern micro-economic conditions (SFAD,SFAP, ACHT,AEQD,EPAP,SFAC), while the remaining relate to the more general economic environment (SEAD,SEAP,PRAD,PRAP,CHOM,EPAR);
- questions are formulated to give de-trended(12), deseazonalized(13) responses. Consumers are asked to compare evolutions of variables 12 months ago or ahead. A consequence is that changes in consumption are more appropriate as the dependent variable than the level of consumption (14);
- the number of possible responses amounts to 6 for 9 questions, 5 for 2 questions and 4 for 1 question. The response frequencies of each question are summarized by the Commission to obtain weighted average answers. The weights are fixed arbitrary, the "don't know" responses are redistributed between the other answer categories according to the latter's percentage distribution;
- for most of the period, the surveys have been conducted in the months of January, May and October. The number of observations that was available(15)for this study is 30 for France, 32 for Germany, 31 for Italy and 27 for the UK. In most of the following regressions, the period of estimation has been reduced by one year in order to allow flexibility in the use of lagged values of opinion variables.

Table 4 gives the means and standard deviations of the various responses of the consumer survey and of the Commission Consumer Confidence Index (CCI) which is the arithmetic average of the answers to the four questions on the financial situation of households and general economic situation together with that on the advisability of making major purchases (ACHT). The table shows great inter -as well as intra- country differences. These differences are not easily explainable. For example, the average CCI has been the lowest for Italy (-23), followed by the UK (-13), Germany (-6) and France (-2). These important differences do not correspond to the observed inter-country differences in real disposable income or consumption growth nor to differences in the losses of growth that occured during the seventies. If one concentrates on particular responses, the striking features are:

---

(12) Except if there is an acceleration process.
(13) Except -in principle- for the questions related to the present.
(14) This is one reason why we chose a consumption function expressed in differences.
(15) On a quarterly basis,assuming Q1=Jan.,Q2=May,Q4=Oct. and Qi=quarterly averages of monthly data, when available.

Table 4 . Mean (X) and standard deviation (SD) of survey responses, changes in the real consumption, in the real disposable income and in the consumer price index (a).

	FRANCE			GERMANY			ITALY			UK		
	$\bar{X}$	SD	$\frac{SD}{\bar{X}}$	$\bar{X}$	6D	$\frac{SD}{\bar{X}}$	$\bar{X}$	SD	$\frac{SD}{\bar{X}}$	$\bar{X}$	SD	$\frac{SD}{\bar{X}}$
Financial situation, perceived (SFAD)	- 4.0	3.2	-0.8	- 6.0	6.8	-1.1	-16.7	5.2	-0.3	-24.3	9.0	-0.4
Financial situation, expected (SFAP)	2.6	3.6	1.4	- 3.8	6.1	-1.6	- 8.2	4.0	-0.5	- 9.3	8.2	-0.9
General Eco. situation, perceived (SEAD)	-23.5	11.6	-0.5	-22.5	19.6	-0.9	-56.6	13.3	-0.2	-45.1	22.4	-0.5
General Eco. situation, expected (SEAP)	-20.9	11.7	-0.6	-12.6	14.7	-1.2	-23.1	8.8	-0.4	-13.9	16.2	-1.2
Price trends, perceived (PRAD)	73.4	9.7	0.1	43.3	17.7	0.4	79.0	7.4	0.1	50.2	13.7	0.3
Price trends, expected (PRAP)	38.9	9.9	0.3	41.8	8.5	0.2	49.6	8.4	0.2	35.4	13.4	0.4
Unemployment, expected (CHOM)	33.3	12.6	0.4	16.6	19.0	1.2	46.9	9.9	0.2	36.7	15.6	0.4
Major purchases, present (ACHT)	35.9	6.7	0.2	14.6	16.9	1.2	- 9.3	11.5	-1.2	31.1	10.7	0.3
Major purchases, expected (AEQD)	-13.5	2.8	-0.2	-20.9	4.8	-0.2	- 6.0	9.4	-1.6	-14.9	4.8	-0.3
Savings, present (EPAR)	3.8	7.1	1.9	36.4	11.5	0.3	1.4	9.4	6.7	- 8.3	12.1	-1.5
Savings, expected (EPAP)	-30.8	3.25	-0.1	32.6	17.8	0.6	-36.7	8.4	-0.2	-10.6	7.0	-0.7
Acquisition of financial assets (SFAC)	9.3	1.2	0.1	18.9	3.9	0.2	5.2	4.2	0.8	8.9	2.9	0.3
Confidence index (CCI)	- 2.0	6.3	-3.2	- 6.0	12.2	-2.0	-22.8	7.0	-0.3	-12.5	11.4	-0.9
Real disposable income (Δ_4YD) (%)	3.5	1.9	0.5	1.9	2.1	1.1	1.7	4.5	2.6	1.1	4.3	3.9
Real consumption (Δ_4C) (%)	3.6	1.6	0.4	2.0	2.2	1.1	2.2	3.0	1.5	1.2	2.8	2.3
Consumer price index (Δ_4P) (%)	10.0	2.1	0.2	5.1	1.4	0.3	15.5	3.5	0.2	13.5	4.4	0.3

(a) Changes calculated as differences of logarithms between t and t-4.
Period: 1972-4 to 1982-3 for France, Germany and Italy; 1974-3 to 1982-3 for the UK.

- opinions on the future have generally been more optimistic (less pessimistic) than perceptions of the past. However, this was not the case for opinions on savings and purchases of durables where expectations have been considerably lower than for the questions on present savings(16) or purchases (17);
- the relative variability of opinions (measured by the coefficient of variation) was greater for expectations than for perceptions of the past for questions on the financial and general economic situation. By contrast, series on price and savings expectations are flat;
- opinions on macroeconomic conditions (SEAD,SEAP) are on average more pessimistic than opinions on personal situations.

2. Problems related to the integration of survey data into econometric modelling.

The integration of the EC consumer survey data as explanatory variables for private consumption poses four main problems: errors of measurement (and notably, missing data problems), transformation of qualitative data into quantitative series, linear or near linear relationships among opinions (problem of collinearity), overlapping of expectation periods (autocorrelation problem). These problems have been approached in this paper in a very pragmatic way, but clearly further research would be needed on each of these problems.

a) By their very nature, opinion variables are subjected to measurement errors. In the case of the EC consumer surveys, special problems arise due to the fact that for most of the sample period the survey was conducted only in three non-equidistant months while the dependent variable refers to the twelve months of the year, summarized into four quarters. Two main alternatives have been explored:
   - the first consists in performing regressions on the original sample (i.e. with missing data). Since monthly data for economic variables are not available,

(16) Note that the questions on savings, present and future, are not identical.
(17) Except in Italy.

survey responses for January, May and October are assumed to be representative of the first, second and fourth quarters respectively. The main drawback of this method is that it is not convenient in models with lags (18).

- A second alternative consists in interpolating the data. In a first variant, the third quarter (Q3) is calculated as a simple arithmetic average of the second and fourth quarters (Q3 = (Q2+Q4)/2), the other quarters being assimilated (as above) to the monthly figures. A second variant is an interpolation for all the quarters, the weights being inversely proportional to the time-span between the figure to be calculated and the available data (19). The drawbacks of interpolation are twofold: the error terms of equations and the explanatory opinion variables will not be independent so that one expects the OLS estimates to be biased and inconsistent; second the smoothing process of linear interpolation do average the true disturbances over successive time periods. As a consequence, the successive values of the error term are interrelated and should exhibit a moving average pattern. These problems should however not be too worrisome, given the fact that the true pattern of consumers opinions for the missing months is probably smooth in reality. Tables 5 and 6 compare estimates of changes in real consumption growth regressed against the Consumer Confidence Index (CCI) using different samples (original data, first and second interpolation methods). The tables exhibit only small differences in the regression coefficients and statistical tests (20). Subsequent regressions have been performed using the second interpolation method (21).

---

(18) While survey question refer to expectations for the next 12 months, at this stage, it is not clear if consumers really envisage a 12-month horizon.

(19) This gives: $Q1_t = 0.75\ Jan_t + 0.25\ May_t$; $Q2_t = 0.08\ Jan_t + 0.85\ May_t + 0.07\ Oct_t$;

$Q3_t = 0.40\ May_t + 0.60\ Oct_t$; $Q4_t = 0.67\ Oct_t + 0.33\ Jan_{t+1}$.

(20) The only marked difference is the magnitude of the Durbin Watson statistic which is significantly lower in non interpolated data. The DW statistic for regressions performed on the original sample is difficult to interpret since it measures correlations between the residuals of the fourth and second quarters, the second and the first quarter, etc...

(21) A third alternative -not explored in this research- would be to endogenize expectations. The procedure would consist in explaining the January, May and October perceptions from the values of past observed values and other variables, then in predicting expectations for the missing months. Since for some countries one has now monthly survey data, this method could be tested. The drawback with this last procedure is that while it is time-consuming there is no guarantee over its return.

Table 5. Original and interpolated survey data (a): comparison of regression results.

(dependent variable = changes in real consumption, in %)

	N° of obs.	Constant	CCI	$\bar{R}^2$	DW
France					
Original survey data	27	0.042 (19.38)	0.285 (7.34)	0.67	0.54
First interpolation method	36	0.042 (23.53)	0.272 (8.38)	0.66	1.32
Second interpolation method	36	0.043 (21.64)	0.276 (7.59)	0.62	1.22
Germany					
Original survey data	29	0.029 (11.03)	0.168 (9.33)	0.75	1.29
First interpolation method	36	0.029 (12.62)	0.161 (9.57)	0.72	1.67
Second interpolation method	36	0.029 (13.49)	0.165 (10.35)	0.75	1.72
Italy					
Original survey data	28	0.056 (2.89)	0.159 (2.00)	0.10	0.44
First interpolation method	36	0.054 (3.12)	0.148 (2.12)	0.09	0.62
Second interpolation method	36	0.052 (2.78)	0.138 (1.83)	0.06	0.56
United Kingdom					
Original survey data	23	0.031 (4.64)	0.160 (3.87)	0.39	0.86
First interpolation method	29	0.032 (5.78)	0.167 (4.82)	0.44	1.30
Second interpolation method	29	0.032 (5.43)	0.166 (4.42)	0.40	1.21

(a) In the original sample, the third quarter is missing up to a certain period; in the first interpolation, the third quarter is an interpolation of the second and fourth quarter; the second interpolation is a general interpolation of the data (see text).

Period: 1973-4 to 1982-3 for France, Germany and Italy; 1975-3 to 1982-3 for the UK.

Table 6. Comparisons between first and second interpolation methods, using the CCI as independent variable.

(dependent variable = changes in real consumption)

	LAGS	0	-1	-2	-3	-4
France						
First interpolation	$\bar{R}^2$	0.66	0.59	0.36	0.18	0.02
	DW	1.32	1.46	1.08	0.73	0.69
Second interpolation	$\bar{R}^2$	0.62	0.65	0.42	0.22	0.06
	DW	1.22	1.35	1.10	0.78	0.70
Germany						
First interpolation	$\bar{R}^2$	0.72	0.59	0.47	0.31	0.12
	DW	1.67	1.34	1.04	0.65	0.60
Second interpolation	$\bar{R}^2$	0.75	0.64	0.50	0.34	0.15
	DW	1.72	1.33	1.05	0.67	0.57
Italy						
First interpolation	$\bar{R}^2$	0.09	0.28	0.34	0.30	0.18
	DW	0.62	0.62	0.80	0.76	0.67
Second interpolation	$\bar{R}^2$	0.08	0.25	0.37	0.35	0.25
	DW	0.57	0.58	0.69	0.76	0.67
United Kingdom						
First interpolation	$\bar{R}^2$	0.44	0.60	0.73	0.40	0.17
	DW	1.30	2.28	1.77	1.46	1.09
Second interpolation	$\bar{R}^2$	0.40	0.62	0.73	0.48	0.23
	DW	1.21	2.00	1.90	1.48	1.13

Sample period: 1973-4 to 1982-3 for France, Germany and Italy; 1975-3 to 1982-3 for the UK.

b) A second problem of the consumer survey results from its qualitative character. Qualitative series can be transformed into quantitative series through statistical techniques. A simple way is to construct a weighted average of the frequencies associated to the responses to a particular question. This is how the European Commission summarizes the survey results (see Table 3) (22). Table 7 shows that it is generally preferable to use the whole set of information available for a particular question.

A more sophisticated approach is based on the assumption that survey respondents have a common subjective probability distribution over the evolution of opinion variables. This approach also assumes that there are threshold values from which interviewees will react. In Knöbl (1974), Carlson and Parkin (1975) there is a constant arbitrary scaling factor which is assumed to be constant over time; in Papadia and Basano (1981) (who measure inflationary expectations) this role is played by the perceived value of actual inflation. A drawback of the latter method is that no use is made of consumers opinions over the actual inflation. Another drawback is that it needs information on actual variables (such as the actual inflation rate). This is not always possible for the EC consumer survey (for example, what is the corresponding economic variable for households' opinions over their financial situation?). After statistical transformations, the Papadia and Basano method leads to a weighted average of the frequencies associated to the responses times the perceived inflation rate. In subsequent regressions (section C), an expected inflation à la Papadia-Basano using for the perceived inflation actual inflation lagged by one quarter proved satisfactory.

Contrary to the preceeding methods, a third approach uses the relationship between actual variables and respondents perceptions of the past as a yardstick for quantification of respondents' expectations about the future. (see Pesaran and Gulamany (1982)). The idea of using respondents perceptions

---

(22) The weights have been recently changed by the Commission: for example, the former weight vector for price expectations was (3,2,1,0,-1,0) compared to the present vector (1,0.5,0,-0.5,-1). The major difference is that the "don't know" responses are now redistributed between the other answer categories. Regressions performed on opinions weighted according to both schemes have shown only small differences. This does, of course, not mean that no valuable information is contained in the "don't know" responses.

Table 7. Changes in real consumption regressed against the frequencies of detailed survey responses. (R-squared)

	FRANCE	GERMANY	ITALY	UK
Financial situation, present (SFAD):				
- "a lot better"	-0.01	-0.02	0.13	0.58
- "a little better"	0.39	0.30	0.18	0.60
- "the same"	0.23	0.81	0.04	0.31
- "a little worse"	0.45	0.72	0.11	0.46
- "a lot worse"	0.50	0.67	0.05	0.62
- index	0.56	0.61	0.12	0.63
Price trends, next 12 months (PRAP)(a):				
- "more rapid increase"	0.44	0.55	0.19	0.43
- "same increase"	0.23	0.08	0.04	0.08
- "slower increase"	0.53	0.26	0.27	0.26
- "stability"	0.34	0.38	0.19	0.03
- "fall slightly"	0.26	-0.01	0.12	-0.02
- index	0.56	0.56	0.19	0.50

(a) Lags: -4 for France, -3 for Germany, 0 for Italy, -2 for the UK.
Highest R-squared underlined.

of the past is also behind the method developed by Dramais and Waelbroeck-Rocha (1981) for the Community Business survey. The authors use this information to correct the survey results: the rationale is that there are systematic bias in responses. For example, near turning points, businessmen production expectations have a high probability of being false. The correction consists in weighting the survey responses by their probability to be true. These probabilities are computed from objective indicators and from information contained in the business survey itself.

Lack of correspondance between actual and opinion variables did not encourage us in this direction. As subsequent regression results show, the use of the Commission weighting scheme gave relatively good fits. It remains however that the problem of quantification of survey data needs further research.

c) In specifying survey-based consumption functions one may wish to include several explanatory opinion variables (inflationary expectations, unemployment expectations, savings attitudes, ...) . The problem is that there are linear (or near linear) relationships among the survey responses, a characteristic that violates a crucial condition for the application of least squares. Since collinear variables do not provide information that is very different from that already inherent in the others, it becomes difficult to infere the separate influence of such explanatory variables on the dependent variable (see Belsley et al. (1980)). The matrixes of correlation of survey responses (Table 8 (23)) show the important correlations between consumers' opinions. Among the 66 correlations between pairs of opinion variables, about 50% are greater than 0.5 in three countries (80% in Germany). Weaker correlations (<0.2) represent 20 to 30% of the total in three countries (2% in Germany). More specifically, it appears that:

---

(23) In this table we also report the correlations with real consumption growth and real income growth.

Table 8 . Matrix of correlation coefficients of survey responses, changes in real consumption and disposable income.

1. FRANCE (1972-4 to 1982-3)

	SFAD	SFAP	SEAD	SEAP	PRAD	PRAP	CHOM	ACHT	AEQD	EPAR	EPAP	SFAC	CCI	Δ_4C	Δ_4YD
SFAD	1.000														
SFAP	0.903	1.000													
SEAD	0.968	0.875	1.000												
SEAP	0.834	0.962	0.857	1.000											
PRAD	-0.225	-0.296	-0.217	-0.351	1.000										
PRAP	-0.140	-0.451	-0.150	-0.507	0.001	1.000									
CHOM	-0.713	-0.826	-0.751	-0.858	0.340	0.316	1.000								
ACHT	0.431	0.161	0.419	0.025	0.375	0.486	-0.196	1.000							
AEQD	0.363	0.440	0.489	0.550	-0.295	-0.105	-0.546	0.008	1.000						
EPAR	0.840	0.772	0.761	0.702	-0.404	-0.218	-0.458	0.121	0.073	1.000					
EPAP	0.572	0.620	0.468	0.584	-0.725	-0.132	-0.543	-0.192	0.161	0.709	1.000				
SFAC	0.852	0.790	0.775	0.698	-0.297	-0.286	-0.494	0.216	0.098	0.911	0.604	1.000			
CCI	0.970	0.927	0.982	0.894	-0.189	-0.208	-0.810	0.441	0.477	0.746	0.481	0.773	1.000		
Δ_4C	0.746	0.652	0.753	0.618	-0.154	0.017	-0.693	0.521	0.449	0.458	0.363	0.582	0.774	1.000	
Δ_4YD	0.693	0.747	0.737	0.787	-0.308	-0.291	-0.546	0.001	0.675	0.549	0.356	0.601	0.726	0.529	1.000

2. GERMANY (1972-4 to 1982-3)

	SFAD	SFAP	SEAD	SEAP	PRAD	PRAP	CHOM	ACHT	AEQD	EPAR	EPAP	SFAC	CCI	Δ_4C	Δ_4YD
SFAD	1.000														
SFAP	0.968	1.000													
SEAD	0.918	0.942	1.000												
SEAP	0.797	0.905	0.851	1.000											
PRAD	-0.472	-0.499	-0.506	-0.463	1.000										
PRAP	-0.219	-0.380	-0.246	-0.581	0.576	1.000									
CHOM	-0.749	-0.853	-0.801	-0.958	0.382	0.515	1.000								
ACHT	0.840	0.877	0.792	0.896	-0.292	-0.416	-0.848	1.000							
AEQD	0.880	0.832	0.829	0.637	-0.658	-0.178	-0.582	0.642	1.000						
EPAR	0.519	0.576	0.455	0.644	-0.517	-0.571	-0.711	0.515	0.387	1.000					
EPAP	0.804	0.821	0.703	0.806	-0.383	-0.478	-0.805	0.874	0.588	0.783	1.000				
SFAC	0.952	0.929	0.895	0.804	-0.539	-0.285	-0.757	0.862	0.858	0.571	0.841	1.000			
CCI	0.933	0.977	0.948	0.948	-0.460	-0.400	-0.898	0.935	0.783	0.563	0.839	0.924	1.000		
Δ_4C	0.781	0.826	0.749	0.849	-0.380	-0.418	-0.829	0.899	0.644	0.543	0.813	0.818	0.869	1.000	
Δ_4YD	0.724	0.713	0.557	0.651	-0.360	-0.375	-0.618	0.723	0.640	0.560	0.725	0.743	0.692	0.668	1.000

3. ITALY (1972-4 to 1982-3)

	SFAD	SFAP	SEAD	SEAP	PRAD	PRAP	CHOM	ACHT	AEQD	EPAR	EPAP	SFAC	CCI	Δ_4C	Δ_4YD
SFAD	1.000														
SFAP	0.844	1.000													
SEAD	0.878	0.872	1.000												
SEAP	0.554	0.826	0.822	1.000											
PRAD	-0.521	-0.375	-0.623	-0.446	1.000										
PRAP	0.329	-0.171	-0.021	-0.509	-0.073	1.000									
CHOM	-0.497	-0.644	-0.637	-0.745	0.071	0.205	1.000								
ACHT	0.716	0.341	0.395	-0.017	-0.347	0.790	-0.163	1.000							
AEQD	-0.526	-0.173	-0.249	0.143	0.401	-0.699	-0.199	-0.792	1.000						
EPAR	0.425	0.612	0.706	0.754	-0.398	-0.376	-0.417	-0.122	0.059	1.000					
EPAP	0.855	0.617	0.662	0.300	-0.579	0.493	-0.132	0.776	-0.802	0.373	1.000				
SFAC	0.606	0.240	0.395	0.007	-0.717	0.611	0.156	0.760	-0.842	0.028	0.842	1.000			
CCI	0.959	0.893	0.949	0.735	-0.585	0.158	-0.631	0.626	-0.422	0.551	0.785	0.524	1.000		
Δ_4C	0.427	0.288	0.322	0.143	0.056	0.367	-0.510	0.386	-0.014	-0.024	0.145	0.021	0.384	1.000	
Δ_4YD	0.367	0.353	0.347	0.308	-0.101	0.091	-0.535	0.245	0.104	0.085	0.111	0.002	0.386	0.678	1.000

Table 8. Matrix of correlation coefficients of survey responses, changes in real consumption and disposable income.

4. United Kingdom (1974-3 to 1982-3)

	SFAD	SFAP	SEAD	SEAP	PRAD	PRAP	CHOM	ACHT	AEQD	EPAR	EPAP	SFAC	CCI	$\Delta_4 C$	$\Delta_4 YD$
SFAD	1.000														
SFAP	0.688	1.000													
SEAD	0.669	0.904	1.000												
SEAP	0.163	0.795	0.740	1.000											
PRAD	-0.457	-0.512	-0.577	-0.322	1.000										
PRAP	-0.266	-0.731	-0.646	-0.738	0.644	1.000									
CHOM	-0.224	-0.752	-0.696	-0.893	0.245	0.549	1.000								
ACHT	0.518	0.547	0.637	0.367	-0.247	-0.154	-0.437	1.000							
AEQD	0.818	0.653	0.682	0.255	-0.229	-0.131	-0.374	0.824	1.000						
EPAR	0.058	-0.049	0.097	-0.185	-0.535	-0.099	0.295	0.236	0.120	1.000					
EPAP	0.707	0.499	0.364	0.173	0.134	0.048	-0.274	0.244	0.592	-0.478	1.000				
SFAC	0.475	0.004	-0.168	-0.395	-0.141	0.153	0.364	-0.233	0.076	0.016	0.505	1.000			
CCI	0.673	0.950	0.973	0.796	-0.518	-0.649	-0.764	0.714	0.729	0.032	0.427	-0.149	1.000		
$\Delta_4 C$	0.746	0.547	0.617	0.179	-0.445	-0.141	-0.271	0.640	0.757	0.169	0.397	0.071	0.619	1.000	
$\Delta_4 YD$	0.821	0.477	0.561	0.027	-0.275	-0.073	-0.135	0.603	0.803	0.027	0.537	0.202	0.548	0.802	1.000

(a) SFAD= Financial situation, perceived
SFAP= Financial situation, expected
SEAD= General eco. situation, perceived
SEAP= General eco. situation, expected
PRAD= Price trends, perceived
PRAP= Price trends, expected
CHOM= Unemployment, expected
ACHT= Major purchases, present
AEQD= Major purchases, expected
EPAR= Savings, present
EPAP= Savings, expected
SFAC= Acquisition of financial assets

- responses to micro -and macro- questions are highly correlated (see in particular the opinions on the financial situation, the general economic situation, inflation, important purchases and savings). Note however that perceptions of actual inflation are not correlated to inflationary expectations in France and in Italy;
- the signs of the correlations are most often as one would expect, with some exceptions however (for example, in Italy, important purchase opinions are inversely correlated);
- there is a great diversity between the countries: for example, the correlation between major purchases, present and expected is negligible in France, negative in Italy (-0.79) and positive in Germany (+0.64) and in the UK (+0.82).

These results confirm earlier work undertaken by Van der Linden (1977).

The principal components technique allows to summarize the information given by a set of variables in a smaller number of uncorrelated variables which describe the major part of the variance of the original set. When applied to the 12 opinion variables, it appears that the first two components explain as much as between 66% (in the UK) and 83% (in Germany) of the total variation in the survey data (table 9) implying that two underlying dimensions determine to a great extent consumer's opinions. The table also gives the results of principal components analysis performed on the five variables composing the CCI. It results that the first two components explain between 87% (in the UK) and 97% (in France) of the total variance.

The loadings(24) of the first principal components (bottom of the table) show that in the four countries the loadings on the personal financial and general economic variables are among the highest. It is interesting to notice that, when applied to the five CCI variables, the loadings of the first principal component are relatively close to unity(25) which roughly confirms the unitary weights taken by the Commission to construct its confidence index. The principal components analysis also reveals for Italy a negative sign for the loading on price expectations (contrary to the other countries).

---

(24) The loadings are the weights which transform the original variables into the new orthogonal variables.

(25) The loadings are the lowest for the questions on important purchases (ACHT) in France and in Italy.

Table 9. Principal components analysis on survey responses.

1. % of total variance explained by principal components.

a) all opinion variables (12)

	FRANCE		GERMANY		ITALY		UK	
		cumul.		cumul.		cumul.		cumul.
PC1	56.0	56.0	71.3	71.3	49.7	49.7	46.3	46.3
PC2	15.7	71.6	11.6	82.9	30.9	80.6	16.9	66.2
PC3	11.3	82.9	8.2	91.1	9.2	89.8	15.9	82.1
PC4	9.9	92.8	4.1	95.2	4.1	93.9	10.9	93.0
PC5	3.2	96.2	2.3	97.6	2.7	96.6	2.2	95.2

b) variables of CCI (5)

	FRANCE		GERMANY		ITALY		UK	
		cumul.		cumul.		cumul.		cumul.
PC1	75.9	75.9	90.3	90.3	72.2	72.2	69.4	69.4
PC2	20.9	96.8	5.6	95.9	22.9	95.1	17.8	87.2
PC3	2.0	98.8	2.9	98.8	2.6	97.7	10.4	97.6
PC4	1.1	99.9	1.1	99.9	2.1	99.8	1.9	99.5
PC5	0.1	100.0	0.1	100.0	0.2	100.0	0.5	100.0

2. Loadings of first principal component.

	SFAD	SFAP	SEAD	SEAP	FRAD	FRAP	CHOM	ACHT	AEQD	EPAR	EPAP	SFAC
FRANCE	-0.94	-0.97	-0.92	-0.94	0.44	0.34	0.82	-0.17	-0.46	-0.85	-0.71	-0.85
GERMANY	-0.93	-0.97	-0.91	-0.94	0.59	0.50	0.90	-0.90	-0.81	-0.70	-0.89	-0.94
ITALY	-0.95	-0.80	-0.89	-0.60	0.69	-0.30	0.44	-0.71	0.61	-0.52	-0.91	-0.72
UK	-0.73	-0.97	-0.95	-0.77	0.55	0.67	0.76	-0.69	-0.75	-0.02	-0.47	0.06
FRANCE	-0.98	-0.96	-0.97	-0.92	—	—	—	-0.36	—	—	—	—
GERMANY	-0.95	-0.99	-0.95	-0.94	—	—	—	-0.93	—	—	—	—
ITALY	-0.94	-0.95	-0.96	-0.80	—	—	—	-0.52	—	—	—	—
UK	-0.73	-0.96	-0.96	-0.75	—	—	—	-0.73	—	—	—	—

A negative sign corresponds to the variables which have a favorable effect on consumption. This tends to confirm the economic model finding that accelerations of inflation (which are used as proxies for inflationary expectations) have had a positive effect on private consumption in Italy.

In view of the strong linear relations among consumers' opinions, one alternative is to select empirically the opinion variables which will give the best statistical fits (including the tests on collinearity); another alternative is to summarize all (or part) of the survey information into one or more (orthogonal) variables. The Commission confidence index belongs to the second alternative. Ward (1980) has explored a great number of alternative forms of index construction without clear-cut results(26). It has also been proposed to take the first principal component loadings to construct a confidence index (see Moutet and Vangrevelinghe (1969), Heald (1971), Van der Linden (1977)). However, regressions performed on such constructed indexes did not prove better than the Commission CCI (see appendix 3).

d) The next problem has to do with the time horizon of opinions. Survey questions and economic data (consumption, disposable income) cover a different time span: perceptions refer to a 12 month horizon while economic data are on a quarterly basis. The overlapping of time horizon potentially creates problems of autocorrelation of errors. In reality, the time-horizon of survey respondents is probably vague, consumers expressing more their "short-term" views than refering to a precise horizon.

Table 10 presents the OLS results of changes in real consumption regressed against the various survey responses using increasing lags, from 0 to 4 quarters. For each survey response, one can identify an "optimum" lag which corresponds to the highest R-squared. The "optimum" lag is most often one quarter for France (6 opinions), zero quarter for Germany (9 opinions), three quarters for Italy (4 opinions) and two quarters for the UK (6 opinions):

---

(26) Ward also found that there appeared to be no advantage in using the array of data on the characteristics of respondents as a means of weighting their replies.

"optimum" lag	number of opinions				
	France	Germany	Italy	United Kingdom	All countries
0	2	9	2	4	17
-1	6	2	1	6	15
-2	3	0	1	0	4
-3	0	1	4	0	5
-4	1	0	2	1	4
undeterminate	0	0	2	1	3
	12	12	12	12	48

It appears that households adjust their consumption according to opinions expressed in very recent periods. For the countries considered altogether, two-third of the "optimum" lags lie between zero and one quarter. In consequence, the overlapping of time horizons should not constitute a major problem in a quarterly model.

The table also reveals no marked differences between questions regarding the future and the questions concerning the past or the present. For the four countries and for the relevant questions, the "optimum" lag of expectations is greater in only six cases (out of twenty) and identical in ten cases.

IV. PURE SURVEY AND MIXED MODELS OF CONSUMPTION.

In this section we first examine the relationship between changes in opinions and consumption before presenting selected OLS estimates of changes in real consumption regressed against survey responses and economic variables.

1. Opinions or changes in opinions ?

Consumption flows can be adjusted on the basis of changes in opinions rather than on opinions themselves. Table 11 reports regression results obtained with annual changes in opinions. Of the 48 R-squared reported in the table, only 4 are greater than the corresponding regressions performed on levels of opinions. Only changes in inflationary expectations and in purchase intentions in Italy and changes in savings intentions in the United Kingdom gave significantly better fits.

Table 10. R-squared (a) and Durbin-Watson statistics for changes in real consumption regressed against lagged survey responses plus a constant (b).

		FRANCE					GERMANY					ITALY					UNITED KINGDOM				
LAGS (quarters) / OPINIONS		0	-1	-2	-3	-4	0	-1	-2	-3	-4	0	-1	-2	-3	-4	0	-1	-2	-3	-4
Financial situation, perceived (SFAD)	R^2	0.56	0.64	0.44	0.22	0.04	0.61	0.47	0.35	0.17	0.01	0.12	0.21	0.25	0.22	0.14	0.63	0.57	0.33	0.05	-0.04
	DW	1.13	1.32	1.01	0.77	0.67	1.15	0.95	0.73	0.52	0.47	0.55	0.57	0.61	0.61	0.59	1.66	1.47	0.91	0.77	0.67
Financial situation, expected (SFAP)	R^2	0.31	0.61	0.53	0.48	0.23	0.70	0.58	0.46	0.31	0.10	0.01	0.18	0.34	0.35	0.27	0.30	0.56	0.71	0.39	0.12
	DW	0.84	1.34	1.82	1.03	0.83	1.57	1.21	1.03	0.63	0.53	0.54	0.57	0.70	0.82	0.65	1.11	1.86	1.75	1.35	0.97
General Eco. situation, perceived (SEAD)	R^2	0.57	0.55	0.40	0.20	0.04	0.54	0.38	0.26	0.13	0.01	0.04	0.26	0.50	0.55	0.44	0.38	0.62	0.74	0.55	0.32
	DW	1.10	1.20	0.89	0.75	0.68	1.01	0.82	0.68	0.50	0.48	0.56	0.59	0.85	0.97	0.83	1.18	1.83	2.00	1.59	1.18
General Eco. situation, expected (SEAP)	R^2	0.25	0.52	0.51	0.48	0.25	0.72	0.65	0.57	0.46	0.28	0.02	0.14	0.37	0.49	0.45	0.01	0.18	0.44	0.41	0.27
	DW	0.76	1.06	1.62	1.03	0.86	1.71	1.44	1.38	0.87	0.72	0.48	0.54	0.78	0.99	0.88	0.69	0.90	1.01	1.30	1.29
Price trends, perceived (PRAD)	R^2	-0.02	0.09	0.19	0.13	0.00	0.40	0.30	0.26	0.19	0.10	0.03	0.03	0.18	0.28	0.27	0.16	0.32	0.39	0.23	0.05
	DW	0.62	0.63	0.64	0.69	0.61	0.69	0.73	0.61	0.52	0.51	0.48	0.47	0.55	0.61	0.67	0.76	0.98	0.93	0.88	0.78
Price trends, expected (PRAP)	R^2	-0.03	-0.01	0.05	0.36	0.56	0.34	0.38	0.45	0.56	0.55	0.19	0.01	-0.02	0.05	0.11	0.03	0.17	0.50	0.42	0.17
	DW	0.61	0.62	0.75	0.93	1.45	0.73	0.95	1.40	1.26	1.39	0.48	0.52	0.47	0.50	0.46	0.69	0.93	1.07	1.29	1.07
Unemployment, expected (CHOM)	R^2	0.38	0.43	0.26	0.15	0.02	0.67	0.60	0.48	0.36	0.19	0.18	0.35	0.32	0.18	0.07	0.06	0.27	0.44	0.38	0.19
	DW	0.89	0.95	1.04	0.73	0.69	1.51	1.19	1.13	0.75	0.62	0.74	0.74	0.78	0.69	0.58	0.74	0.95	1.03	1.13	1.05
Major purchases, present (ACHT)	R^2	0.22	0.05	-0.03	0.09	0.17	0.80	0.77	0.61	0.45	0.29	0.17	0.10	-0.00	0.03	0.01	0.52	0.35	0.30	0.15	0.06
	DW	0.76	0.66	0.62	0.57	0.61	1.99	1.84	1.31	0.90	0.67	0.49	0.51	0.48	0.47	0.45	1.42	1.27	0.99	0.90	0.84
Major purchases, expected (AEQD)	R^2	0.12	0.28	0.25	0.10	0.01	0.43	0.29	0.14	0.03	0.03	0.02	-0.03	-0.03	0.02	0.03	0.62	0.51	0.29	0.09	-0.00
	DW	0.73	0.80	0.86	0.82	0.69	0.83	0.62	0.53	0.45	0.43	0.48	0.47	0.48	0.47	0.47	1.74	1.35	0.98	0.84	0.71
Savings, present (EPAR)	R^2	0.05	0.23	0.38	0.32	0.12	0.46	0.48	0.47	0.43	0.25	0.04	0.02	0.22	0.45	0.54	-0.02	0.03	0.03	0.04	0.03
	DW	0.68	0.74	0.84	0.77	0.70	0.91	1.04	1.01	0.78	0.70	0.45	0.48	0.70	0.91	0.80	0.67	0.68	0.67	0.67	0.67
Savings, expected (EPAP)	R^2	0.02	0.14	0 14	0.11	0.00	0.69	0.71	0.62	0.54	0.39	0.01	-0.00	0.02	0.07	0.12	0.23	0.17	0.04	0.04	0.01
	DW	0.62	0.56	0.75	0.65	0.61	1.37	1.47	1.47	1.04	0.82	0.48	0.49	0.50	0.55	0.55	0.90	0.79	0.69	0.67	0.65
Acquisition of financial assets (SFAC)	R^2	0.21	0.39	0.40	0.30	0.12	0.66	0.54	0.38	0.22	0.05	0.01	-0.01	0.01	-0.01	-0.02		0.03	0.00	0.18	0.47
	DW	0.78	0.86	1.06	0.88	0.70	1.12	1.04	0.83	0.55	0.50	0.48	0.48	0.48	0.49	0.49	0.69	0.66	0.73	0.91	1.15
Confidence index (CCI)	R^2	0.62	0.65	0.42	0.22	0.06	0.75	0.64	0.50	0.34	0.15	0.08	0.25	0.37	0.35	0.25	0.40	0.62	0.73	0.48	0.23
	DW	1.22	1.35	1.10	0.78	0.70	1.72	1.33	1.05	0.67	0.57	0.57	0.58	0.69	0.76	0.67	1.21	2.00	1.90	1.48	1.13

Regressions using (when available) the differences between expectations and the corresponding perceptions of the past or present gave extremely poor fits (27).

2. Regression results of survey and mixed models

Table 12 reports selected regression results for both survey and mixed models. The opinion variables that are retained are the one that gave the "best" statistical tests for the sample period. Particular attention was given to the significance of the coefficients and to the impact of omitted variables on the regression results. The retained variables are the perception of the personal financial situation (SFAD) for France, a sub-CCI composed of the expected financial situation (SFAP), the expected general economic situation (SEAP), and important purchase intentions (ACHT) for Germany, perceptions of the general economic situation (SEAD) and savings intentions (EPAR) for Italy, and a sub-CCI composed of the expected financial situation (SFAP) and the perception of the general economic situation (SEAD) for the United Kingdom. Price expectations constitute a second group of opinion variables. The quantification method proposed by Papadia and Basano (1980) has been applied(28). Annual changes in opinions for inflation expectations (Δ_4PRAP), important purchases (Δ_4ACHT) and savings expectations (Δ_4EPAP) appear in the Italian and British models.

The economic variables are the lagged propensity to consume (four quarter lag),and the annual change in real disposable income. Mixed models basically assume that consumers modify their consumption-income ratio depending of their expectations on the general or personal economic and financial situation and inflationary expectations(29).We have tried to avoid non-lagged economic variables since in forecasting exercises they would have to be predicted. This was not always possible (see the Italian mixed models).

Additional regressions using the Commission confidence index and increasing the lags of the survey variables are also presented for comparison.

Note that the simplicity of the models do not reflect the numerous specifications that have been tested.

---

(27) As one would expect, in view of the strong linear relationships between these variables (see above).

(28) Using the first weighting scheme proposed by the authors. The perceived inflation rate is the actual inflation lagged by one quarter.

(29) Since the dependent variable is an annual rate of growth, the constant term reflects an autonomous trend. In mixed models no intercept appears meaning that the trend in the dependent variable is already captured by the explanatory variables. These models are not deducted from our standard economic model.

Table 11 . R-squared and Durbin-Watson statistics of changes in real consumption regressed against changes (a) in consumers opinions, plus a constant (b).

		France	Germany	Italy	UK
Financial situation, perceived (SFAD)	R^2	0.03	0.41	-0.03	0.34
	DW	0.60	0.82	0.48	0.92
Financial situation, expected (SFAP)	R^2	-0.03	0.30	0.10	-0.02
	DW	0.63	0.71	0.50	0.66
General Eco. situation, perceived (SEAD)	R^2	0.04	0.30	0.14	-0.04
	DW	0.59	0.63	0.52	0.67
General Eco. situation, expected (SEAP)	R^2	-0.02	0.12	0.28	0.07
	DW	0.64	0.50	0.60	0.88
Price trends, perceived (PRAD)	R^2	-0.03	0.02	0.17	-0.02
	DW	0.61	0.44	0.62	0.66
Price trends, expected (PRAP)	R^2	0.33	0.02	<u>0.47</u>	0.01
	DW	0.90	0.50	0.72	0.75
Unemployment, expected (CHOM)	R^2	0.03	0.13	-0.02	-0.01
	DW	0.60	0.51	0.48	0.74
Major purchases, present (ACHT)	R^2	0.37	0.35	<u>0.33</u>	0.08
	DW	0.84	0.70	0.51	0.66
Major purchases, expected (AEQD)	R^2	-0.00	<u>0.50</u>	0.00	0.32
	DW	0.61	1.16	0.46	0.98
Savings, present (EPAR)	R^2	-0.02	-0.015	0.48	0.05
	DW	0.62	0.43	0.61	0.73
Savings, expected (EPAP)	R^2	-0.03	0.17	0.04	<u>0.38</u>
	DW	0.62	0.56	0.53	1.03
Acquisition of financial assets (SFAC)	R^2	-0.02	0.44	-0.03	0.43
	DW	0.62	0.76	0.47	1.25

(a) Changes of opinions between t-4 and t.

(b) R-squared underlined if greater than the corresponding R-squared obtained from regressions performed on absolute opinions (reported in table 10).

The regression results look satisfactory for three countries (France, Germany and the United Kingdom). For Italy, while the explanatory variables are more numerous, the statistical tests are not good (in particular look the Durbin-Watson statistic)(30). However, considering the multiple measurement problems discussed above, the general impression is positive. The graphical presentations (see below) show that the main trends are well predicted by these -simple- models(see also table 13).

Mixed models perform better than pure survey models, except in the UK: R-squared of .9 for mixed models against .7 for France , .9 against .8 for Germany, .9 against .7 in Italy. The introduction of real disposable income among the explanatory variables improves the fit only in Italy.

Models using the CCI are generally inferior to the models based on selected opinions. The performance differences are however relatively small.A correction for autocorrelation to the Italian models leads to a sharp fall of the R-squared of the equations including a CCI variable (from .60 to .38 for equation 5, .66 to .24 for equation 9). The equations including particular responses do not deteriorate as much (in particular, the R-squared of the survey model (eq.2) falls from .75 to .63). The mixed models with real disposable income growth give the best results with R-squared of the order of .78 after correction for autocorrelation- see bottom of the table for Italy.

Estimated models using greater lags are tolerable for France (where lags on opinions can be increased from one to two quarters without too great losses) and for Germany (where lags on opinions can be increased from zero to one quarter). In Italy and in the UK, the performances deteriorate too much when lags are increased. Also, models using polynomial distributed lags (Almon lags technique) did not improve the fits.

Contrary to the economic model, the coefficient on expected inflation is not significant for Germany. For France, the lag of expected inflation is four quarters and the sign is positive, implying that households postpone today's purchases when inflationary expectations are high and catch up latter on. In Italy, positive changes in inflation expectations lead to anticipatory buyings

---

(30)The Italian model can be improved when the opinion variables EPAR and SEAD are regrouped.For example:

$$\Delta_4 C = \underset{(4.19)}{0.063}\ (EPAR_{-4} + SEAD_{-3}) + \underset{(1.22)}{0.057}\ \Delta_4 PRAP + \underset{(2.60)}{0.091}\ \Delta_4 ACHT - \underset{(-5.65)}{0.284}\ (C/YD)_{-4}$$

with R^2=0.77 ; D.W.= 1.40 ; SSR= 96.14

This model was not retained since the constraint on the coefficients of EPAR and SEAD is difficult to justify.

Table 12. Regression results of survey and mixed models (a).

A. FRANCE

	Constant	Opinion variables			Economic variables		Statistical Tests			
		SFAD-1	CCI-1	Δ_4Pe-4	(C/YD)-4	Δ_4YD	$\bar{R}^2$	DW	SSR	COND
EQ1	3.770 (6.14)	0.736 (9.43)		0.325 (3.65)			0.74	1.97	19.91	12.9
EQ2	2.090 (2.93)		0.320 (8.90)	0.252 (2.85)			0.71	1.72	21.65	12.1
EQ3		0.648 (8.72)		0.308 (3.92)	-0.193 (-7.28)		0.96	1.85	16.38	12.3
EQ4			0.287 (7.86)	0.216 (2.80)	-0.127 (-3.85)		0.96	1.69	18.83	11.2
EQ5		0.608 (7.36)		0.273 (3.23)	-0.186 (-6.81)	0.081 (1.08)	0.96	1.82	15.80	14.4
EQ6			0.283 (6.36)	0.209 (2.38)	-0.127 (-3.79)	0.015 (0.17)	0.96	1.67	18.81	13.4
Selected regressions using greater lags for opinion variables.										
		SFAD-2	CCI-2							
EQ3 bis		0.609 (5.72)		0.425 (3.28)	-0.122 (-2.88)		0.94	1.60	22.17	15.8
EQ4 bis			0.244 (4.59)	0.274 (2.14)	-0.087 (-1.59)		0.93	1.48	33.03	13.8
		SFAD-3	CCI-3							
EQ3 ter		0.329 (2.17)		0.190 (0.93)	-0.165 (-2.40)		0.90	0.81	43.37	18.9
EQ4 ter			0.136 (1.91)	0.108 (0.57)	-0.148 (-1.80)		0.89	0.80	48.73	16.6

B. GERMANY

	Constant	Opinion variables		Economic variables		Statistical tests			
		(SEAP+SFAP +ACHT)	CCI	(C/YD)-4	Δ_4YD	$\bar{R}^2$	DW	SSR	COND.
EQ1	2.009 (11.92)	0.057 (12.07)				0.81	2.10	34.57	1.1
EQ2	2.891 (13.49)		0.165 (10.35)			0.75	1.72	44.01	1.7
EQ3		0.056 (12.71)		-0.141 (-12.88)		0.90	2.04	30.46	1.1
EQ4			0.166 (11.61)	-0.203 (15.33)		0.88	1.84	35.31	1.6
EQ5		0.053 (8.62)		-0.131 (-7.73)	0.077 (0.78)	0.95	2.12	29.90	3.2
EQ6			0.149 (7.95)	-0.179 (-8.12)	0.138 (1.38)	0.89	1.99	33.39	3.5
Selected regressions using greater lags for opinion variables.									
		(SEAP+SFAP +ACHT)-1	CCI-1						
EQ3 bis		0.057 (10.56)		-0.134 (-10.57)		0.86	1.77	40.97	1.0
EQ4 bis			0.161 (8.61)	-0.195 (-11.89)		0.82	1.45	55.11	1.6
		(SEAP+SFAP +ACHT)-2	CCI-2						
EQ3 ter		0.053 (7.62)		-0.127 (-7.98)		0.79	1.38	64.74	1.0
EQ4 ter			0.148 (6.33)	-0.184 (-9.42)		0.73	1.12	80.49	1.6

	Constant	Opinion variables					Economic variables		Statistical tests			
		SEAD-3	EPAR-4	CCI-3	Δ_4PRAP	Δ_4ACHT	(C/YD)-4	Δ_4YD	$\bar{R}^2$	DW	SSR	COND
EQ1	3.511 (2.81)	0.100 (1.44)	0.232 (5.96)						0.60	0.95	120.95	7.7
EQ2	3.889 (3.69)	0.131 (2.23)	0.144 (3.99)		0.074 (1.90)	0.069 (2.13)			0.75	1.25	71.41	8.8
EQ3	1.610 (5.94)		0.176 (4.97)		0.096 (2.41)	0.044 (1.36)			0.72	1.12	82.87	2.7
EQ4	5.440 (4.59)	0.222 (3.39)			0.112 (2.46)	0.095 (2.49)			0.63	0.91	108.12	7.9
EQ5	5.343 (4.04)			0.157 (2.93)	0.173 (4.84)				0.60	0.92	122.90	8.1
EQ6		0.036 (0.50)	0.236 (5.39)				-0.126 (-1.82)		0.68	0.95	136.16	7.4
EQ7		0.080 (1.20)	0.143 (3.38)		0.068 (1.51)	0.075 (1.96)	-0.160 (-2.45)		0.78	1.26	86.09	9.3
EQ8				0.209 (3.66)			-0.366 (-4.84)		0.48	0.95	228.57	6.3
EQ9				0.100 (1.92)	0.177 (4.43)		-0.213 (-3.05)		0.66	0.99	143.31	7.3
EQ10		0.160 (3.31)	0.054 (1.65)		0.066 (2.13)	0.061 (2.30)	-0.222 (-4.80)	0.303 (5.88)	0.90	1.41	39.96	10.4
EQ11			0.115 (3.66)		0.105 (3.17)	0.022 (0.79)	-0.073 (-5.91)	0.255 (4.49)	0.86	1.05	54.59	3.1
EQ12		0.204 (4.96)			0.071 (2.24)	0.071 (2.69)	-0.262 (-6.50)	0.341 (7.27)	0.90	1.46	43.57	8.5
EQ13				0.152 (4.66)	0.065 (1.93)	0.062 (2.32)	-0.266 (-6.11)	0.337 (7.00)	0.89	1.40	45.93	8.5
With correction for auto-correlation												
EQ10bis		0.128 (2.40)	0.067 (1.89)		0.077 (2.34)	0.051 (1.67)	-0.192 (-3.80)	0.275 (5.54)	0.79	2.06	35.93	7.7
EQ12bis		0.185 (4.02)			0.080 (2.38)	0.066 (2.20)	-0.245 (-5.52)	0.317 (6.76)	0.78	2.03	40.15	6.4

D. UNITED KINGDOM

	Constant	Opinion variables				Economic variables		Statistical tests			
		(SFAP+SEAD) -2	CCI-2	Δ_4Pe-2	Δ_4EPAP	(C/YD)-4	Δ_4YD	$\bar{R}^2$	DW	SSR	COND.
EQ1	7.282 (10.92)	0.060 (6.30)		-0.220 (-3.22)				0.82	2.66	39.11	7.9
EQ2	6.782 (9.54)	0.054 (5.57)		-0.193 (-2.85)	0.057 (1.67)			0.83	2.90	35.19	8.4
EQ3	5.966 (8.00)		0.153 (5.65)	-0.227 (-3.10)				0.80	2.40	44.29	8.0
EQ4	5.416 (7.37)		0.138 (5.36)	-0.182 (-2.58)	0.077 (2.26)			0.82	2.82	36.76	8.7
EQ5		0.087 (6.27)		0.044 (0.58)		-0.385 (-6.94)		0.71	1.92	76.60	6.3
EQ6		0.073 (5.41		0.053 (0.76)	0.112 (2.61)	-0.344 (-6.54)		0.76	2.32	60.23	6.6
EQ7			0.221 (7.02)	-0.009 (-0.13)		-0.289 (-5.82)		0.75	1.96	66.48	5.9
EQ8			0.190 (6.53)	-0.015 (0.25)	0.116 (3.06)	-0.262 (-5.95)		0.81	2.58	48.33	6.2
EQ9		0.034 (2.33)			0.105 (2.81)	-0.216 (-3.57)	0.282 (3.18)	0.83	2.25	43.86	7.8
EQ10			0.114 (2.88)		0.109 (3.20)	-0.193 (-4.55)	0.217 (2.29)	0.84	2.44	40.05	6.0
		Regression using greater lags for opinion variables									
		(SFAD+SEAD) -3	CCI-3								
EQ1bis	7.356 (8.16	0.039 (3.16)		-0.319 (-3.55)				0.67	1.86	71.38	7.7

Table 13. Basic statistics of predicted and actual values of real consumption growth (a).

	Mean	S.D.	Max.	Min.
FRANCE				
Actual	3.35	1.51	6.28	0.50
Standard economic model	3.21	1.42	5.86	0.70
Survey model (eq.1)	3.29	1.34	6.49	1.38
Mixed model (eq.3)	3.13	1.55	6.46	0.46
GERMANY				
Actual	1.86	2.28	5.31	-3.01
Standard economic model	2.26	1.63	4.33	-1.18
Survey model (eq.1)	1.84	2.07	4.20	-2.09
Mixed model (eq.3)	1.82	2.16	4.61	-2.68
ITALY				
Actual	1.88	3.04	6.59	-4.17
Standard economic model(b)	1.85	2.33	5.96	-3.10
Survey model(eq.2)	2.47	2.71	9.13	-3.95
Mixed model (eq.8)	1.85	2.37	6.24	-3.53
UNITED KINGDOM				
Actual	1.35	2.88	7.69	-3.35
Standard economic model	1.36	2.62	5.97	-3.36
Survey model (eq.2)	1.46	2.65	6.49	-2.15
Mixed model (eq.6)	1.28	2.55	6.81	-3.40

(a) Numbers of equations refer to the Table 12.
(b) With correction for autocorrelation.

(as in the economic model). In the UK models (and contrary to France) the sign of the expected inflation variable is negative.

Rough stability tests have been made by regressing the models over a number of sub-periods. The stability of the reported equations is satisfactory with the exception of the German survey models (but not the mixed models) which perform very poorly in the period between the oilshocks.

V. FORECASTING PERFORMANCES

The economic, survey and mixed models presented in sections II and IV were reestimated for the periods ending 1980-3 in order to assess their forecasting performances during the 8 quarters of the period 1980-4 to 1982-3. Three main tests are presented: graphical presentations of predicted (past and forecast periods) and observed consumption growth, analysis of the regression residuals, and finally an inspection of the ability to predict turning points.

1. Graphical presentation of predicted and observed values

For each country we present three typical graphs for economic, survey and mixed models. The selected equations are numbered according to table 12. A few observations are worth making:

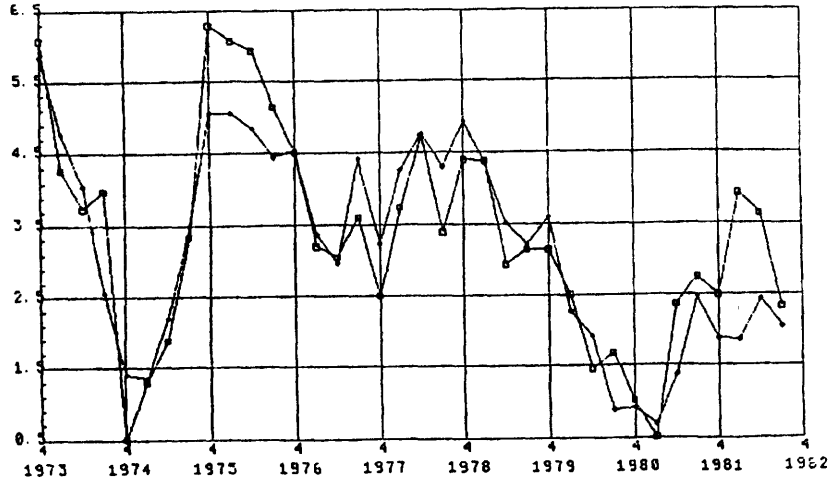
- -The smooth pattern of survey models is particularly apparent for Germany;
- -Peaks and throughs for predicted values are generally underestimated in all models. This is a rather general phenomenon in forecasting;
- -Predicted turning points can lead or lag actual turning points. One reason is that we have models with fixed lags, while in the reality consumers react to the environment with variable speed;
- -For individual countries, note that the sharp increase in consumption growth in the 1981-1 to 1982-2 period in France is well predicted by the survey model, that the falling trend in consumption growth between 1981-3 and 1982-3 in Germany is well predicted by the survey and mixed models, that the predicted values of survey models during the 1980-2 to 1981-2 period in the UK are much closer to the actual values than the predicted values of the economic model(31). A reason for the poorer performances of the Italian survey

(31)However, no model has predicted the sharp rise in consumption during the second quarter of 1979 preceding the VAT increase from 8 to 15 % in june 1979.

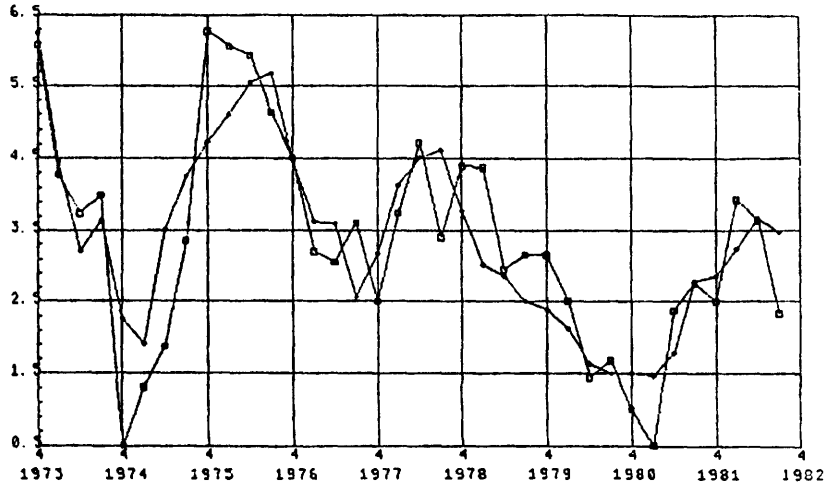
Graphs 1. Observed and predicted values of real consumption growth.

A. FRANCE

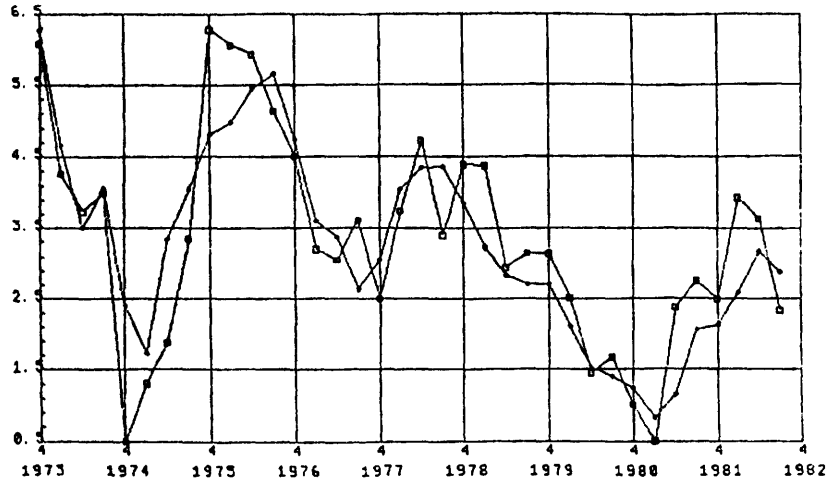
Economic model



Survey model (eq.2)

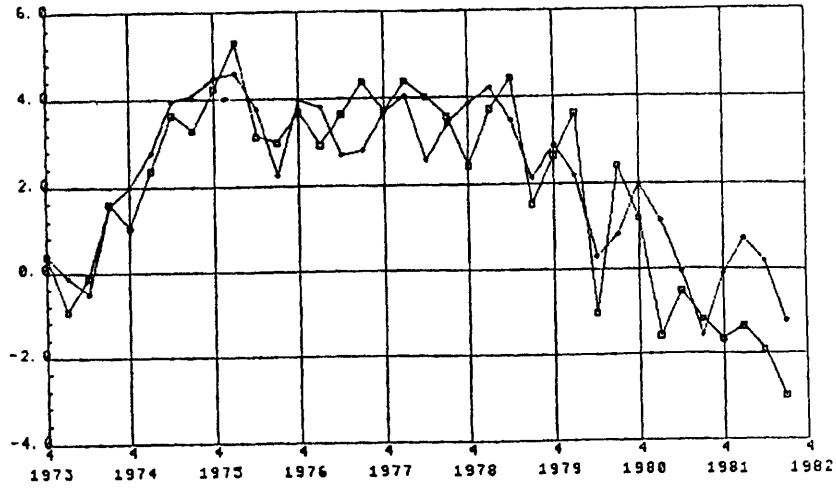


Mixed model (eq.4)

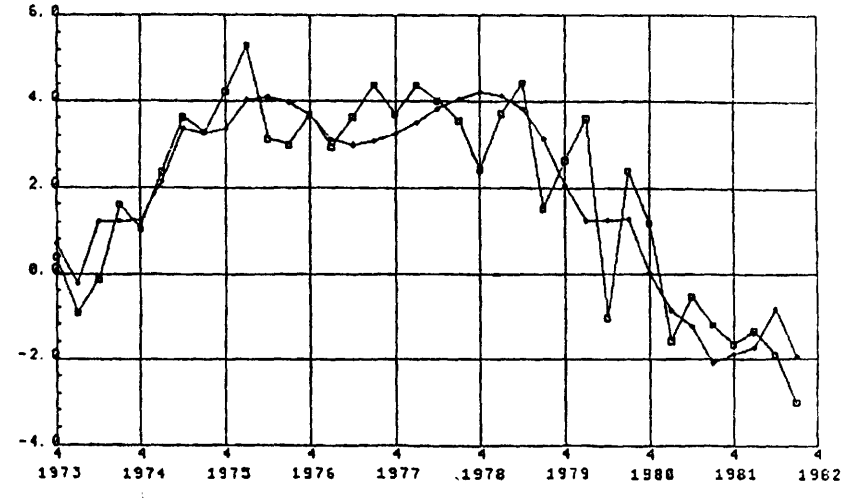


SYMBOL SCALE NAME
o : observed
. : predicted

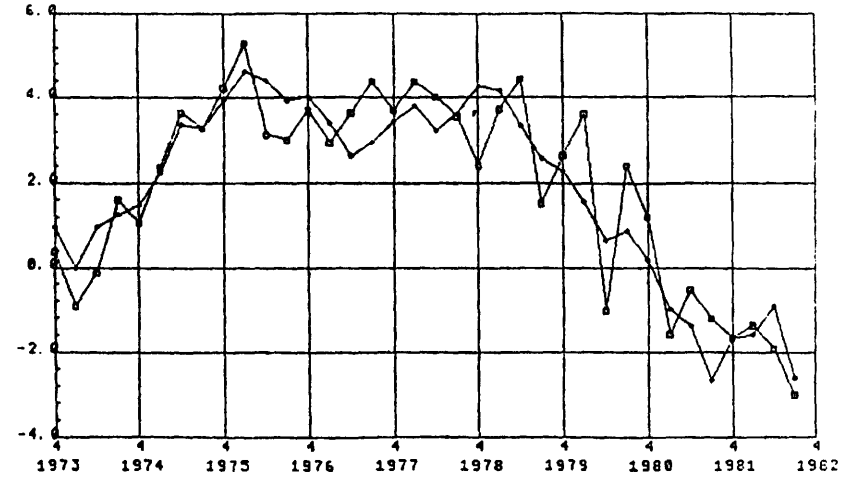
Economic model



Survey model (eq.1)

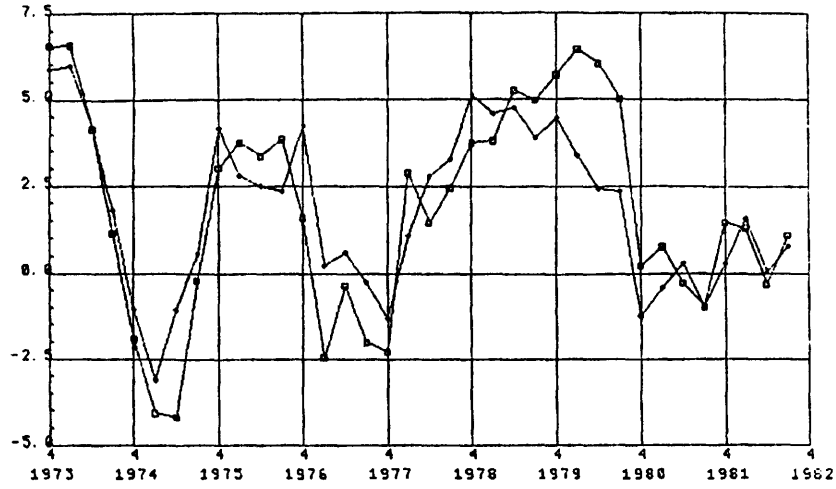


Mixed model (eq.3)

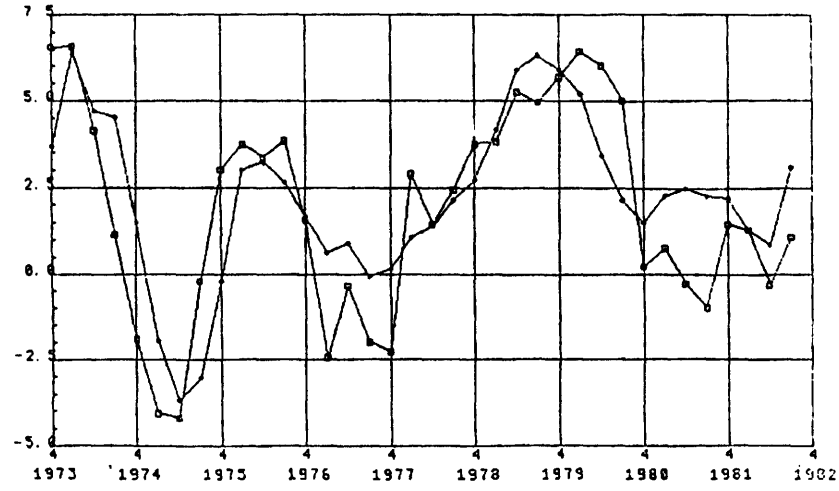


SYMBOL SCALE NAME
o : observed
. : predicted

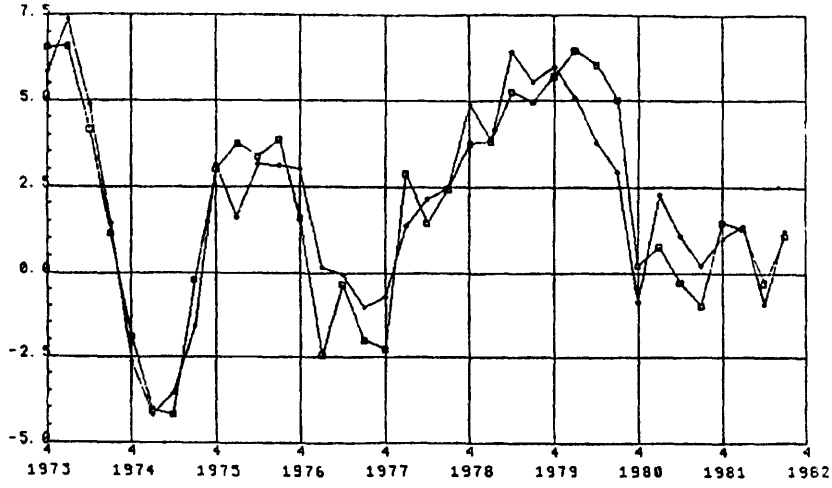
Economic model (with correction for autocorrelation)



Survey model (eq.5)

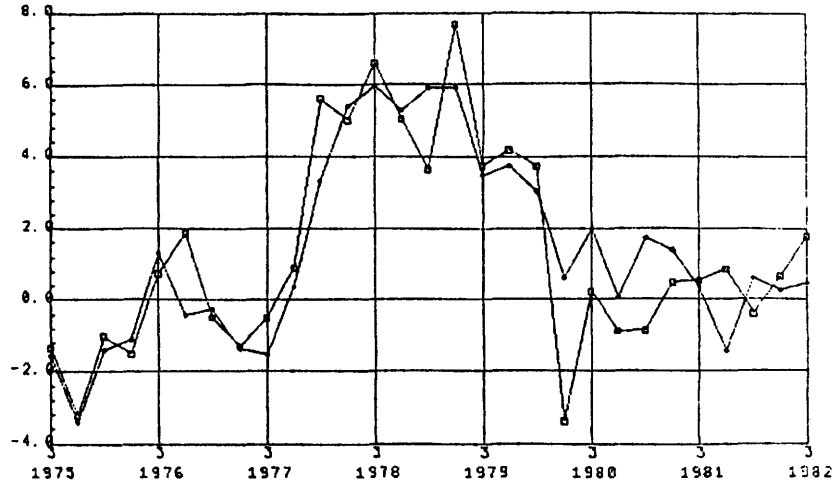


Mixed model (eq.13)

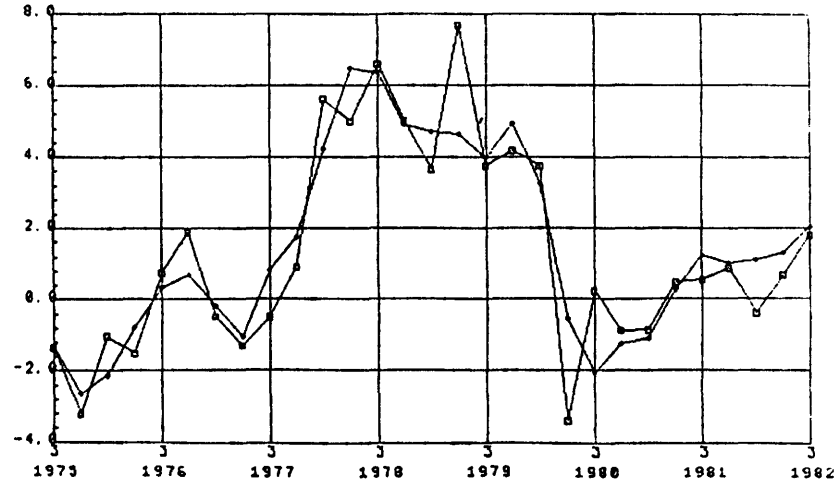


SYMBOL SCALE NAME
o : observed
. : predicted

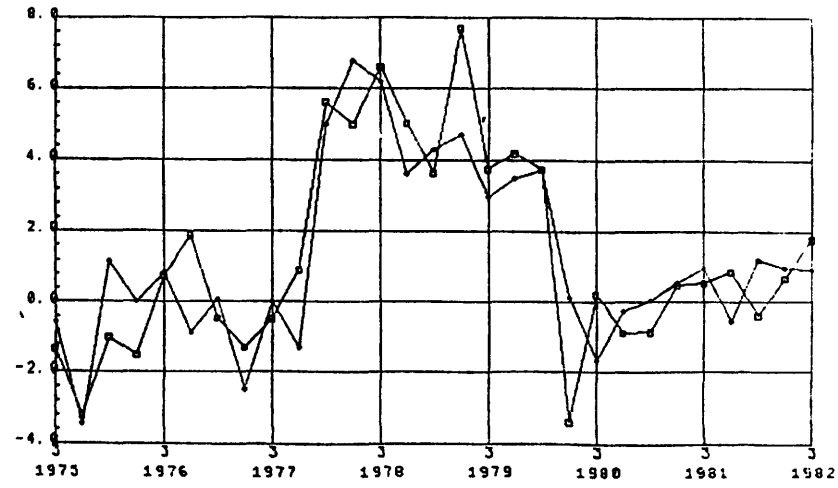
Economic model



Survey model (eq.3)



Mixed model (eq.6)



SYMBOL SCALE NAME
o : observed
. : predicted

and mixed models is that they lead the actual changes in consumption flows in the 1979-1 to 1980-3 period.

2. Analysis of the squared residuals

Table 14 compares the average squared residuals (normalized and not normalized (32))for predicted values of the past and for the forecasting period 1980-4 to 1982-3. For the past, only in Germany is the economic model superior. In the other countries, mixed models perform the best. For the future, two survey models (France and the UK), one mixed model (Germany) and one economic model (Italy) give the best results.

The sum of the squared residuals (not normalized) is smaller in the forecasting period, due to the average fall of the growth of consumption during this period. When normalized, it appears that predictions have been much poorer for the future. The French and German models perform the best. For Italy, out-of-sample predictions are very unsatisfactory: the Theil's inequality coefficient is greater than unity for all models except for the economic model (33).

Insight into the sources of forecasting errors is given in table 15 which decomposes the inequality coefficient into three sources of forecast error: an average bias component (U_M), a variance component (U_S) and a covariance component (U_C). U_M and U_S show if the cause of the discrepancy between predictions and observed values is the difference between their means (U_M) or the difference between their variance (U_S). The covariance component shows if the cause of the discrepancy is the imperfect covariance between predicted and observed values. The three components are expressed in percentages of the average of the squared residuals(34). An ideal case would be a minimum inequality coefficient associated with a close to unity covariance component (meaning that errors are non systematic). The table shows that for predictions of the past, the bias proportions (U_M and U_S) are small, except for Italy. For the forecast period, the bias proportions are generally important(35). For France and Germany, the best

---

(32) Normalized average squared residuals (Theil's inequality coefficient) are obtained by dividing the average squared residuals by the average of the squared observed values.

(33) Note that when the average of the squared observed values of a variable is close to zero (which was the case for Italy) Theil's coefficient is very sensitive to forecasting errors.

(34) See footnote (a) of table 15.

(35) One should expect forecasters to be able to reduce such systematic errors in the course of time (see Theil(1966)).

Table 14. Prediction performances of alternative models.

	$\frac{1}{N_J}\sum_J (P_i - A_i)^2$ (a)			$\sum_J (P_i-A_i)^2/\Sigma A_i^2$ (a)	
	Sample(b)	Forecast(c)	(2)/(1)=	Sample(b)	Forecast(c)
	(1)	(2)	(3)	(4)	(5)
FRANCE					
Standard eco. model	0.417	0.921	2.21	0.027	0.133
Survey model (eq.1)	0.536	0.697	1.30	0.035	0.101
Survey model with CCI (eq.2)	0.656	0.426	0.65	0.043	0.062
Mixed model (eq.3)	0.356	1.693	4.76	0.023	0.244
Mixed model with CCI (eq.4)	0.553	0.575	1.04	0.036	0.083
GERMANY					
Standard eco. model	0.790	4.588	5.81	0.078	1.600
Survey model (eq.1)	1.036	0.698	0.67	0.102	0.243
Survey model with CCI (eq.2)	1.360	1.239	0.91	0.134	0.432
Mixed model (eq.3)	0.907	0.664	0.73	0.089	0.232
Mixed model with CCI (eq.4)	1.090	0.705	0.65	0.108	0.246
ITALY					
Standard eco. model (d)	2.402	1.392	0.58	0.176	0.832
Survey model (eq.2)	1.753	8.404	4.79	0.111	9.945
Survey model with CCI (eq.5)	3.611	3.534	0.98	0.228	4.182
Mixed model (eq.7)	2.574	2.119	0.82	0.163	2.508
Mixed model with CCI (eq.8)	4.687	1.543	0.33	0.296	1.827
Alternative mixed model (eq.10)	1.141	1.516	1.33	0.072	1.794
Alternative mixed model with CCI (eq.13)	1.381	0.944	0.68	0.087	1.117
UNITED KINGDOM					
Standard eco. model	1.972	2.076	1.05	0.148	2.487
Survey model (eq.2)	1.595	0.421	0.26	0.120	0.504
Survey model with CCI (eq.4)	1.655	0.416	0.25	0.125	0.499
Mixed model (eq.6)	2.569	0.824	0.32	0.193	0.988
Mixed model with CCI (eq.8)	1.660	0.901	0.54	0.156	0.865
Alternative mixed model (eq.9)	1.656	1.412	0.85	0.125	1.691
Alternative mixed model with CCI (eq.10)	1.532	1.347	0.88	0.115	1.613

(a) Pi= predicted values; Ai= actual values; J=1,...n_1 for periods of sample; J=n_1,...N
(b) 1973-4 to 1980-3 for France, Germany and Italy; 1975-3 to 1980-3 for the UK.
(c) 1980-4 to 1982-3.
(d) With correction for autocorrelation.

Table 15. Sources of forecast errors of selected models (a) in %.

	Sample(b)			Forecast(c)		
	U_M	U_S	U_C	U_M	U_S	U_C
FRANCE						
Standard eco. model	0.1	11.0	88.9	49.3	28.1	22.6
Survey model (eq.1)	-	7.3	92.7	7.7	37.5	54.8
Survey model with CCI (eq.2)	-	9.3	90.7	10.4	17.9	71.6
Mixed model (eq.3)	-	7.4	92.6	60.1	12.1	27.8
Mixed model with CCI (eq.4)	-	11.6	88.4	24.1	16.3	60.0
GERMANY						
Standard eco. model	0.1	5.3	94.6	82.7	0.3	17.0
Survey model (eq.1)	-	13.2	86.8	0.7	33.3	66.0
Survey model with CCI (eq.2)	-	19.1	80.9	51.8	20.4	27.9
Mixed model (eq.3)	-	11.5	88.5	6.0	11.6	82.3
Mixed model with CCI (eq.4)	-	14.5	85.5	22.6	2.6	74.8
ITALY						
Standard eco. model (d)	0.2	32.6	67.2	19.5	0.1	80.2
Survey model (eq.2)	-	4.7	95.3	83.0	0.2	16.8
Survey model with CCI (eq.5)	-	10.8	89.2	71.6	0.7	27.8
Mixed model (eq.7)	0.2	35.3	64.5	6.5	-	93.5
Mixed model with CCI (eq.8)	0.4	11.1	88.5	8.0	0.4	91.6
Alternative mixed model (eq.10)	0.4	79.6	20.0	9.1	-	90.9
Alternative mixed model with CCI (eq.13)	-	3.5	96.5	7.6	6.2	86.2
UNITED KINGDOM						
Standard eco. model	0.2	4.6	95.2	1.2	-	98.8
Survey model (eq.2)	-	4.5	95.5	38.5	7.9	53.7
Survey model with CCI (eq.4)	-	4.6	95.4	21.5	15.2	63.3
Mixed model (eq.6)	1.2	4.4	94.4	4.8	8.6	86.6
Mixed model with CCI (eq.8)	0.5	4.0	95.5	17.9	15.3	66.8
Alternative mixed model (eq.9)	-	4.2	95.8	20.6	2.2	77.3
Alternative mixed model with CCI (eq.10)	-	4.5	95.9	35.3	6.4	58.3

(a) $U_M = (\bar{P}-\bar{A})^2 / \frac{1}{n}\sum(P_i-A_i)^2$ (bias proportion);

$U_S = (S_P-S_A)^2 / \frac{1}{n}\sum(P_i-A_i)^2$ (variance proportion);

$U_C = 2(1-r_{PA})S_P-S_A / \frac{1}{n}\sum(P_i-A_i)^2$ (covariance proportion).

$U_M+U_S+U_C=100\%$.

$\bar{P}$ and $\bar{A}$ are respectively the means of predicted and actual values, S_P and S_A the standard deviations, and r_{PA} the correlation coefficient .

(b) 1973-4 to 1980-3 for France, Germany and Italy; 1975-3 to 1980-3 for the UK.

(c) 1980-4 to 1982-3.

(d) With correction for autocorrelation.

forecasting models in terms of Theil's inequality coefficient have also the highest covariance proportions (survey and mixed models). For Italy, the inequality coefficients are very high in the forecast period, especially for survey models. For these models, and contrary to the other Italian models, the main source of errors is an average bias meaning that the models reproduce relatively well the general evolution of the observed variable but that it is systematically over- or underestimated. A constant adjustment should in principle correct this bias. For the UK, the average bias is also important for the survey models.

On the whole, while the inequality coefficient for the forecast period is greater than for the sample period, an important part of the errors finds its origin in systematic bias rather than in the imperfect covariance between predicted and observed values.

3. Turning point errors.

In Graphs 2 are plotted along the vertical axis the changes of observed real consumption growth and along the horizontal axis the predicted changes in real consumption growth. Points lying in quadrants I and III show if the models predict well the direction of the change in consumption growth. Points falling in quadrants II and IV show turning point errors.The 45° line through the origin is the line of perfect forecast. The least-squares lines are obtained by regressing the predicted changes in real consumption growth against the observed changes. One can notice that the slopes of the least-squares lines are always smaller than unity, implying that changes in consumption growth have been on average underestimated. This phenomenon is the most marked for pure survey models (in particular in Germany). This is notably the result of measurement errors in the survey variables.

Information on turning point errors is summarized in table 16. On the whole, turning point errors represent for the four countries about one third of total observations(36).The proportions are in general of the same magnitude in the various types of models. If one excludes the points lying in the -0.5%— +0.5% band around the line of perfect forecast, the average falls to less than 30% of total observations. Important turning point errors (defined as errors outside

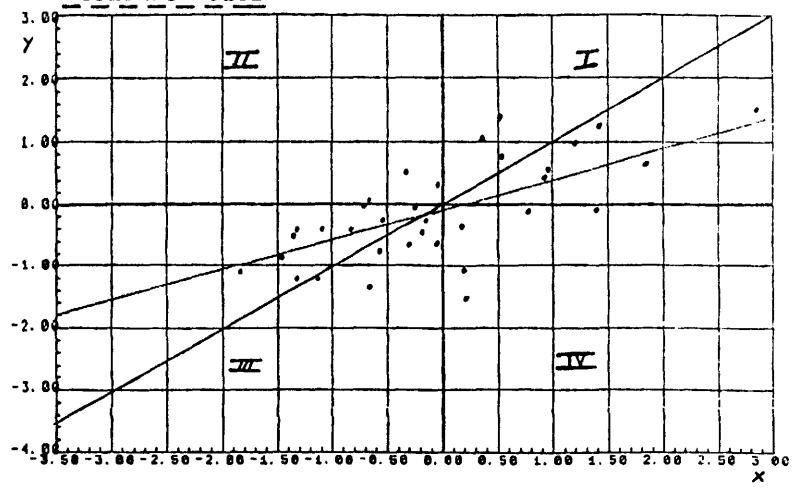
(36)This may appear important,but recall that second differences of consumption flows are here examined.

the -1%—+1% band around the line of perfect forecast) represent 20% of total observations. Except in France, pure survey models have the lowest number of important turning point errors.

Graphs 2. Prediction-realization diagrams of quarterly changes in real consumption growth.

A. FRANCE

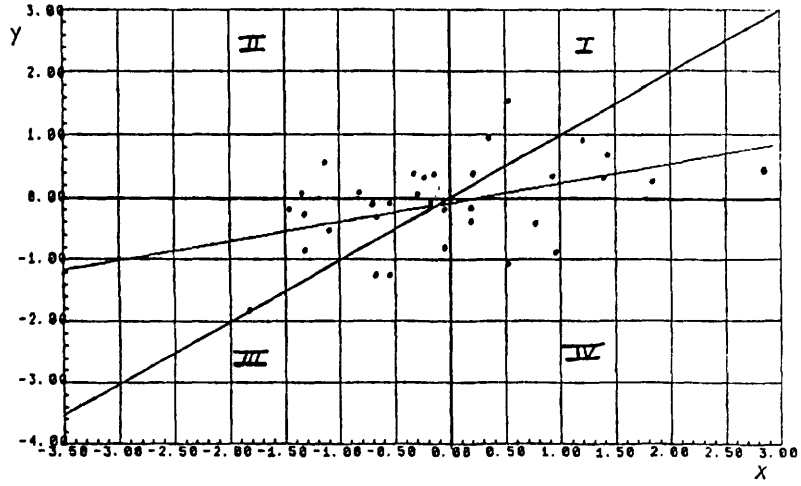
Economic model



TIME BOUNDS: 1974 1ST TO 1982 3RD

LEAST-SQUARES LINE IS: Y = 0.489951*X-0.056131

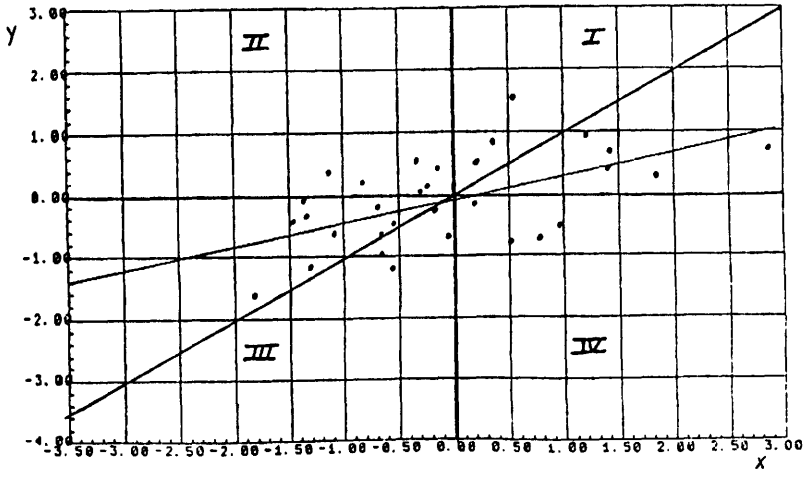
Survey model (eq.2)



TIME BOUNDS: 1974 1ST TO 1982 3RD

LEAST-SQUARES LINE IS: Y = 0.310935*X-0.046165

Mixed model (eq.4)



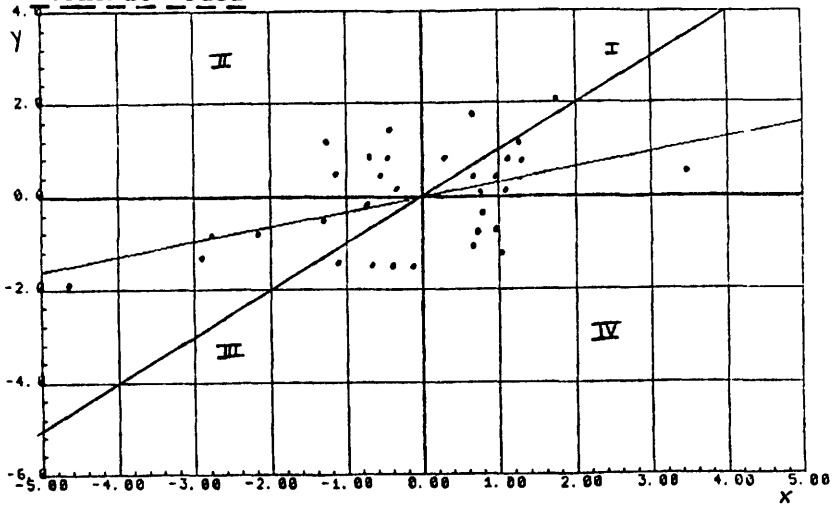
$X = \Delta_1 \Delta_4 C$

$Y = \Delta_1 \Delta_4 \hat{C}$

TIME BOUNDS: 1974 1ST TO 1982 3RD

LEAST-SQUARES LINE IS: Y = 0.377431*X-0.055845

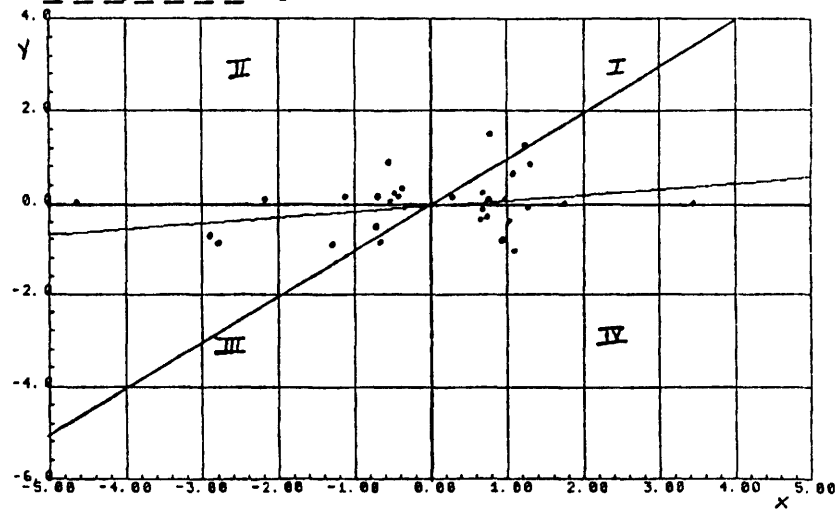
Economic model



TIME BOUNDS: 1974 1ST TO 1982 3RD

LEAST-SQUARES LINE IS: Y = 0.317511*X-0.015835

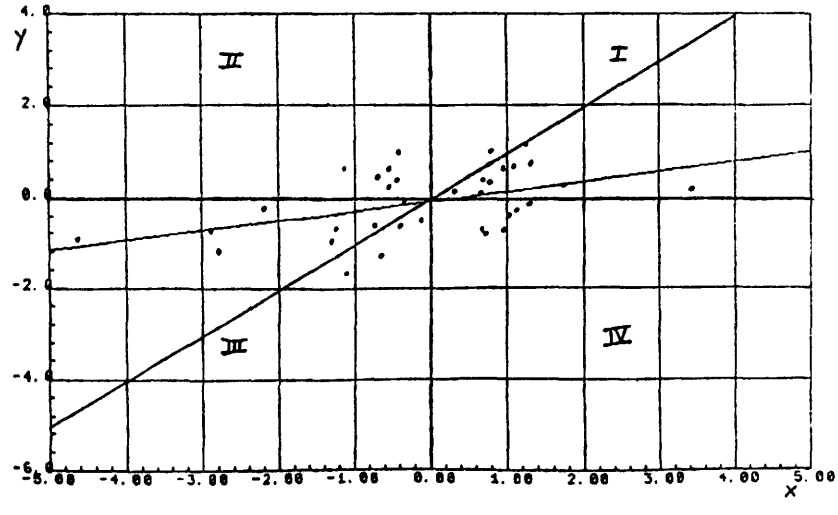
Survey model (eq.1)



TIME BOUNDS: 1974 1ST TO 1982 3RD

LEAST-SQUARES LINE IS: Y = 0.128254*X-0.063312

Mixed model (eq.3)



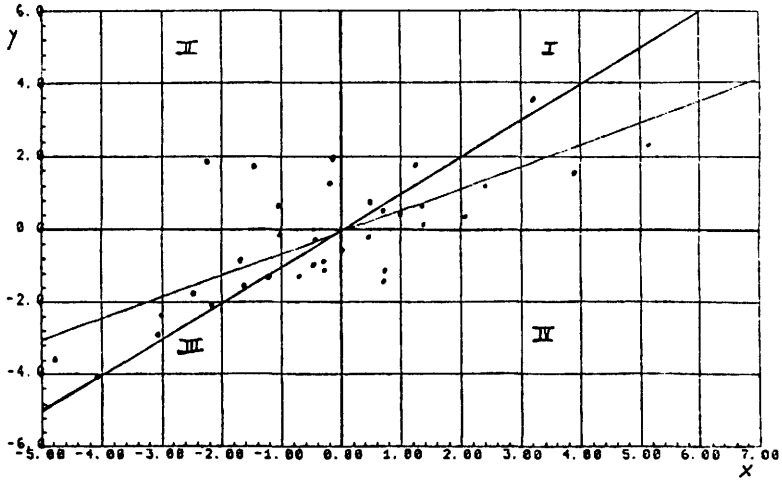
TIME BOUNDS: 1974 1ST TO 1982 3RD

LEAST-SQUARES LINE IS: Y = 0.217216*X-0.080479

$X = \Delta_1 \Delta_4 C$

$Y = \Delta_1 \Delta_4 \hat{C}$

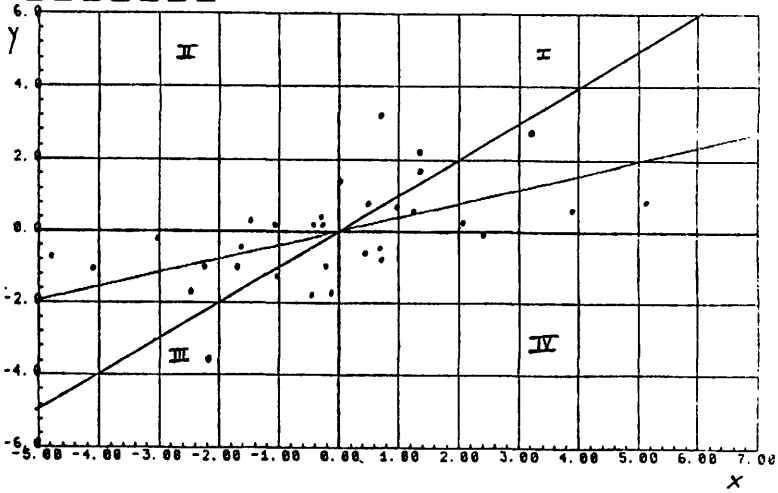
Economic model (with correction for autocorrelation)



TIME BOUNDS: 1974 1ST TO 1982 3RD

LEAST-SQUARES LINE IS: Y = 0.595105*X-0.05324

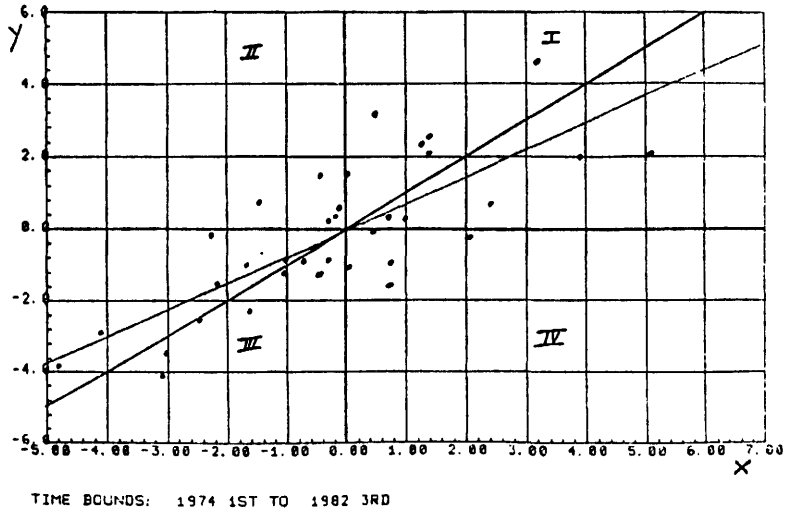
Survey model (eq.5)



TIME BOUNDS: 1974 1ST TO 1982 3RD

LEAST-SQUARES LINE IS: Y = 0.389737*X+0.043645

Mixed model (eq.13)



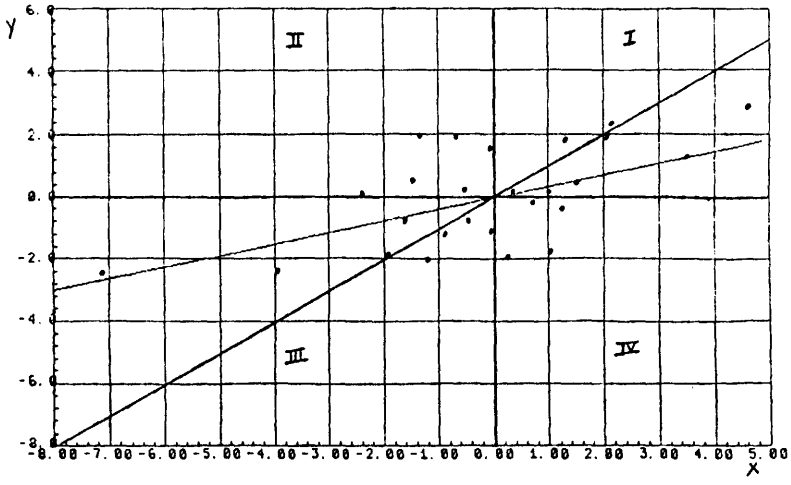
TIME BOUNDS: 1974 1ST TO 1982 3RD

LEAST-SQUARES LINE IS: Y = 0.73924 *X-0 015184

$X = \Delta_1 \Delta_4 C$

$Y = \Delta_1 \Delta_4 \hat{C}$

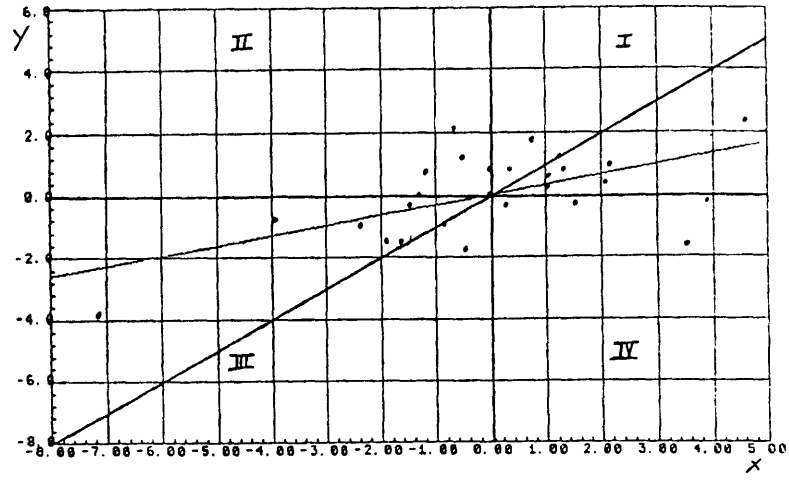
Economic model



TIME BOUNDS: 1975 4TH TO 1982 3RD

LEAST-SQUARES LINE IS: Y = 0.373628*X+0.03239

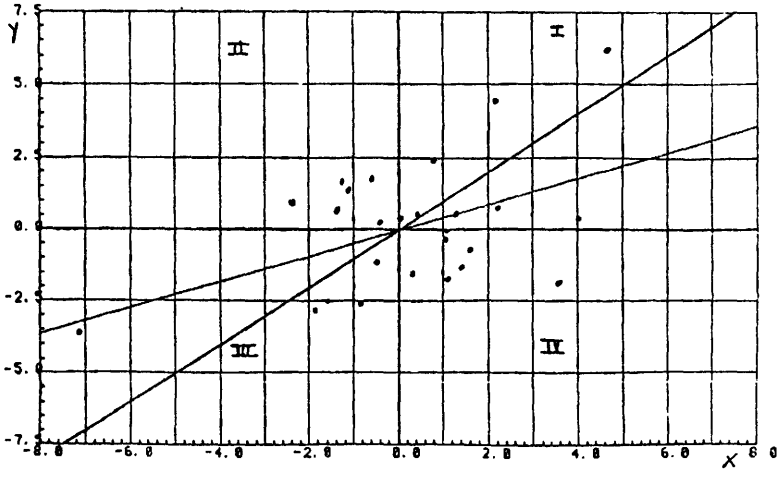
Survey model (eq.3)



TIME BOUNDS: 1975 4TH TO 1982 3RD

LEAST-SQUARES LINE IS: Y = 0.325389*X+0.082439

Mixed model (eq.6)



$X = \Delta_1 \Delta_4 C$

$Y = \Delta_1 \Delta_4 \hat{C}$

TIME BOUNDS: 1975 4TH TO 1982 3RD

LEAST-SQUARES LINE IS: Y = 0.450059*X+0.004255

Table 16. Information on turning point errors for selected models (% of total observations) (a)

	Total (quadrant II+IV)	Excl.points in the -0.5--+0.5% band(b)	Turning point errors outside the -1--+1% band (b)
FRANCE			
Economic model	23	17	9
Survey model (eq.2)	34	23	14
Mixed model (eq.4)	29	20	14
GERMANY			
Economic model	34	31	29
Survey model (eq.1)	45	45	23
Mixed model (eq.3)	34	34	29
ITALY			
Economic model	26	26	20
Survey model (eq.5)	23	14	14
Mixed model (eq.13)	29	20	17
UNITED KINGDOM			
Economic model	35	35	29
Survey model (eq.3)	32	29	21
Mixed model (eq.6)	43	43	39
Unweighted averages			
Economic models	30	27	22
Survey models	34	28	18
Mixed models	34	29	25

(a)All sample considered
(b)Around the line of perfect forecast

VI. CONCLUDING REMARKS

A comparison of forecasting performances of alternative models is a difficult task because there is no single statistical criterion that gives clear-cut responses. Personal judgement is unavoidable in such an exercise.

This research shows that in absolute as well as in relative terms (i.e. in comparison with a standard economic model) consumption functions incorporating opinion variables perform surprisingly well if one considers the important measurement problems: missing data, qualitative character of the responses, strong collinearity among responses,... It is important to recall that no sophisticated statistical technique has been applied to the original survey data. The models are thus simple not only in their algebraic form, but also in their easiness of updating. On the whole, the mixed models for France and Germany (eq.3), the survey model for the United Kingdom (eq.2) should be helpful guides in very short-term forecasting. For Italy, a pure survey model (eq.2) could be retained, considering the average systematic bias of forecasts. An interesting finding of this research is that consumers' opinions predict changes in consumption only for the very short-term (between 0 and 3 quarters) although survey questions refer to yearly periods. The absence of marked differences between opinions on the past and for the next twelve months confirms the "very recent past" or "very near future" character of consumers' opinions. It results that if performances of economic and opinion models are not very different, the benefit of using opinion models in a forecasting exercise is reduced. However, data on disposable income and other economic variables are available with long delays so that opinion models retain their usefulness in short term consumption forecasting.

REFERENCES

ADAMS F.G., KLEIN L.(1972) "Anticipation Variables in Macro-econometric Models" in: Human Behavior in Economic Affairs, Strumpel, Morgan, Zahn ed., Elsevier Cy.

BELSLEY D.A., KUH E., WELSCH R.E.(1980) Regression Diagnostics: Identifying Influential Data and Sources of Collinearity, John Wiley & Sons.

CARLSON J.A., PARKIN M.(1975) "Inflation Expectations" Economica 42.

COMMISSION OF THE EUROPEAN COMMUNITIES "Consumer Survey Results" European Economy, Supplement C.

DAVIDSON J.E.H., HENDRY D.F., SRBA F., YEO S.(1978) "Econometric modelling of the aggregate time-series relationship between consumers'expenditure and income in the United Kingdom" The Economic Journal 88, december.

DRAMAIS A. (1982) "Formal Structure of the Business Survey Model" Report to the Commission, january (internal).

DRAMAIS A., WAELBROECK-ROCHA E. (1981) "A Probabilistic Approach to the Quantification of Business Survey Data" Journal of the American Statistical Association, forthcoming 1983.

HAIG R.M. (1921) The Federal Income Tax. Columbia University Press.

HEALD G. (1971) "Intentions and Attitude Data in Short-Term Forecasting of Consumer Durable Expenditures. A Report of British Experiences" 10th CIRET-Conference, Brussels, september.

HOWARD D.H. (1978) "Personal Saving Behavior and the Rate of Inflation" The Review of Economics and Statistics, november.

JUSTER F.T., WACHTEL P.(1972) "A Note on Inflation and the Savings Rate" Brookings Papers on Economic Activity n°3.

KNÖBL A. (1974) "Price Expectations and the Actual Price Behavior in Germany" International Monetary Fund Staff Papers, 21.

LOHAN H. (1980) "The Effect of Inflation on Household Consumption" European Economy n°5, Commission of the European Communities, march.

MOUTET G., VANGREVELINGHE G. (1969) "Attitudes and Buying Intentions of Private Households" 9th CIRET-Conference, Madrid, September.

NERB G. (1976) "Zur Aussagefähigheit von Indikatoren aus den Harmonisierten Konjunkturumfragen bei den Konsumenten in den Ländern der Europäischen Gemeinschaft" Report to the Commission of the European Communities, december (internal).

PAPADIA F., BASANO V. (1981) "Survey based Inflationary Expectations for the EEC Countries" Economic Papers, Commission of the European Communities, may.

PESARAN M.H., GULAMANI R. (1982) "Expectations Formations and Macroeconometric Modelling" Colloque International sur les Développements Récents de la Modélisation Macroéconomique. Paris, 13,14,15 septembre.

ROBINSON P.W., SMITH D.B., WARBURTON P.J.(1981) "The Use of European Community Business Survey Data for Forecasting. An Econometric Analysis of the Four Major Countries" Report to the Commission of the European Communities, november (internal).

SHAPIRO H.T. (1972) "The Index of Consumer Sentiment and Economic Forecasting: A Reappraisal" in: Human Behavior in Economic Affairs. Strumpel, Morgan, Zahn ed., Elsevier Cy.

SIMONS H.C. (1938) Personal Income Taxation. University of Chicago Press.

STRUMPEL B., KUSS A., CURTIN R. (1979) "The Use of Consumer Anticipations Data in the Member Countries of the European Community" Report to the Commission of the European Communities, november (internal).

THEIL H. (1966) Applied Economic Forecasting. North Holland Publ.Cy.

VAN DERLINDEN E.J. (1977) "Principal Component Analysis with Data from the EEC-Entrepreneurial and Consumer Surveys" CIRET 13th Conference, september Munich.

WACHTEL P. (1977) "Survey Measures of Expected Inflation and their Potential Usefulness" in: Analysis of Inflation 1965-74, J.Popkin ed.,Studies in Income and Wealth n°42, november.

WARD A.V. (1980) "The Forecasting Performance of Indices of Consumer Attitudes: some Results from the EEC Consumer Attitudes Survey" Report to the Commission of the European Communities , september (internal).

Appendix I . Short-term propensity to consume, in%.

FRANCE

1970	83.3	83.2	82.8	83.8
1971	82.8	84.1	83.3	82.8
1972	83.5	82.3	84.0	82.8
1973	82.8	82.8	81.8	83.3
1974	84.6	83.2	82.2	80.7
1975	81.8	81.8	81.4	80.8
1976	83.0	83.8	83.3	84.2
1977	83.2	83.5	83.9	82.9
1978	82.6	83.1	82.5	81.9
1979	83.4	83.7	83.8	84.4
1980	86.0	85.0	85.0	85.1
1981	84.5	84.2	84.8	83.9
1982	83.5	83.6	84.2	85.1

GERMANY

1970	85.5	86.6	86.6	86.0
1971	85.6	88.3	87.4	84.9
1972	84.5	86.3	86.7	84.9
1973	85.0	88.3	86.3	85.1
1974	85.9	86.6	86.4	83.1
1975	83.1	84.8	87.2	84.5
1976	85.1	89.0	87.5	85.5
1977	84.7	90.7	89.6	86.4
1978	86.7	89.9	90.3	85.2
1979	84.7	90.5	89.2	85.3
1980	87.1	87.0	89.9	84.9
1981	85.2	86.8	90.4	83.6
1982	84.3	87.6	89.8	

ITALY

1970	84.2	85.5	83.3	83.9
1971	82.6	83.0	81.4	82.2
1972	79.3	81.7	82.6	82.9
1973	81.6	81.2	80.2	81.5
1974	81.6	82.2	84.2	85.0
1975	83.7	79.9	81.2	79.2
1976	89.6	84.2	82.7	78.8
1977	83.4	84.7	84.5	83.6
1978	84.4	81.8	83.8	80.0
1979	84.5	82.1	84.8	82.5
1980	85.0	85.1	84.8	89.2
1981	84.1	86.1	86.2	86.9
1982	84.1	86.7	86.4	

UK

1970	88.2	89.0	91.7	94.5
1971	89.5	91.6	93.7	95.0
1972	89.3	87.5	91.4	92.2
1973	88.0	86.0	88.0	91.4
1974	84.2	87.6	86.8	92.7
1975	82.7	87.5	87.3	92.1
1976	84.8	87.3	86.3	94.1
1977	86.9	89.0	89.2	91.8
1978	87.8	85.6	86.9	88.3
1979	83.8	85.6	86.8	86.0
1980	84.1	82.8	83.6	87.0
1981	82.8	84.3	86.6	92.2
1982	84.7	87.5	89.8	

Appendix 2. Regression results of economic models with survey proxy for inflationary expectations (a).

	Δ_4YD	$\Delta_1\Delta_4$YD	(C/YD)-4	Δ_4Pe	$\Delta_1\Delta_4$Pe	$\bar{R}^2$	DW	SSR	COND.
FRANCE	0.283 (2.96)	-0.188 (-1.40)	-0.272 (-6.23)	-0.267 (-4.11)	0.617 (3.12)	0.95	1.12	21.64	12.0
GERMANY	0.666 (5.52)	-0.424 (-3.18)	-0.244 (-4.14)	-0.642 (-4.16)	-0.114 (-0.27)	0.84	1.30	43.56	8.6
ITALY	0.487 (5.55)	-0.168 (-2.26)	-0.102 (-1.77)	-0.041 (-0.70)	0.468 (3.17)	0.74	1.13	94.27	7.1
UK	0.490 (6.87)	-0.065 (-0.55)	-0.185 (-3.79)	-0.149 (-2.64)	0.258 (2.00)	0.79	2.11	50.22	4.9

(a) Sample period: 1974-1 to 1882-3 for France, Germany and Italy; 1975-4 to 1982-3 for the UK.
Δ_4Pe= expected inflation, Papadia-Basano (1981) method; updatings by the European Commission.

Appendix 3 . Regression results of pure survey models using the loadings of the two first principal components to construct the explanatory variables.

	Constant	CCI_{PC1}(a)	CCI_{PC2}(a)	$\bar{R}^2$	DW	SSR	COND.
France	5.380 (4.63)	-0.035(b) (-8.45)	0.025(b) (2.29)	0.67	1.44	25.18	18.6
Germany	2.607 (8.69)	-0.018 (-9.06)	-0.013 (-0.73)	0.78	1.94	37.57	3.6
Italy	13.732 (7.48)	-0.036(c) (-4.64)	0.051(c) (4.57)	0.54	1.19	138.89	11.4
United Kingdom	6.752 (10.94)	-0.032(c) (-8.04)	-0.011(c) (-0.85)	0.77	2.18	50.22	5.5

(a) Confidence index constructed for the 12 consumer survey opinions.
(b) Lagged one period.
(c) Lagged two periods.

Economic Papers

The following papers have been issued. Copies may be obtained by applying to the address mentioned on the inside front cover.

No. 1 EEC-DG II inflationary expectations. Survey based inflationary expectations for the EEC countries, by F. Papadia and V. Basano (May 1981).

No. 3 A review of the informal economy in the European Community, by Adrian Smith (July 1981).

No. 4 Problems of interdependence in a multipolar world, by Tommaso Padoa-Schioppa (August 1983).

No. 5 European Dimensions in the Adjustment Problems, by Michael Emerson (August 1981).

No. 6 The bilateral trade linkages of the Eurolink Model : An analysis of foreign trade and competitiveness, by P. Ranuzzi (January 1982).

No. 7 United Kingdom, Medium term economic trends and problems, by D. Adams, S. Gillespie, M. Green and H. Wortmann (February 1982).

No. 8 Où en est la théorie macroéconomique, par E. Malinvaud (juin 1982).

No. 9 Marginal Employment Subsidies : An Effective Policy to Generate Employment, by Carl Chiarella and Alfred Steinherr (November 1982).

No. 10 The Great Depression : A Repeat in the 1980s ?, by Alfred Steinherr (November 1982).

No. 11 Evolution et problèmes structurels de l'économie néerlandaise, par D.C. Breedveld, C. Depoortere, A. Finetti, Dr. J.M.G. Pieters et C. Vanbelle (mars 1983).

No. 12 Macroeconomic prospects and policies for the European Community, by Giorgio Basevi, Olivier Blanchard, Willem Buiter, Rudiger Dornbusch and Richard Layard (April 1983).

No. 13 The supply of output equations in the EC-countries and the use of the survey-based inflationary expectations, by Paul De Grauwe and Mustapha Nabli (May 1983).

No. 14 Structural trends of financial systems and capital accumulation : France, Germany, Italy, by G. Nardozzi (May 1983).

No. 15 Monetary assets and inflation induced distortions of the national accounts - conceptual issues and correction of sectoral income flows in 5 EEC countries, by Alex Cukierman and Jorgen Mortensen (May 1983).

No. 16 Federal Republic of Germany. Medium-term economic trends and problems, by F. Allgayer, S. Gillespie, M. Green and H. Wortmann (June 1983).

No. 17 The employment miracle in the US and stagnation employment in the EC, by M. Wegner (July 1983).

No. 18 Productive Performance in West German Manufacturing Industry 1970-1980; A Farrell Frontier Characterisation, by D. Todd (August 1983).

No. 19 Central-Bank Policy and the Financing of Government Budget Deficits : A Cross-Country Comparison, by G. Demopoulos, G. Katsimbris and S. Miller (September 1983).

No. 20 Monetary assets and inflation induced distortions of the national accounts. The case of Belgium, by Ken Lennan (October 1983).

No. 21 Actifs financiers et distorsions des flux sectoriels dues à l'inflation : le cas de la France, par J.-P. Baché (octobre 1983).

No. 22 Approche pragmatique pour une politique de plein emploi : les subventions à la création d'emplois, par A. Steinherr et B. Van Haeperen (octobre 1983).

No. 23 Income Distribution and Employment in the European Communities 1960 - 1982, by A. Steinherr (December 1983).

No. 24 U.S. Deficits, the dollar and Europe, by O. Blanchard and R. Dornbusch (December 1983).

No. 25 Monetary assets and inflation induced distortions of the national accounts. The case of the Federal Republic of Germany, by H. Wittelsberger (January 1984).

No. 26 Actifs financiers et distorsions des flux sectoriels dues à l'inflation : le cas de l'Italie, par A. Reati (janvier 1984).

No. 27 Evolution et problèmes strucurels de l'économie italienne, par Q. Ciardelli, F. Colasanti et X. Lannes (janvier 1984).

No. 28 International Co-operation in Macro-economic Policies, by J.E. Meade (February 1984).

No. 29 The Growth of Public Expenditure in the EEC Countries 1960-1981 : Some Reflections, by Douglas Todd (December 1983).

No. 30 The integration of EEC qualitative consumer survey results in econometric modelling : an application to the consumption function, by Peter Praet (February 1984).