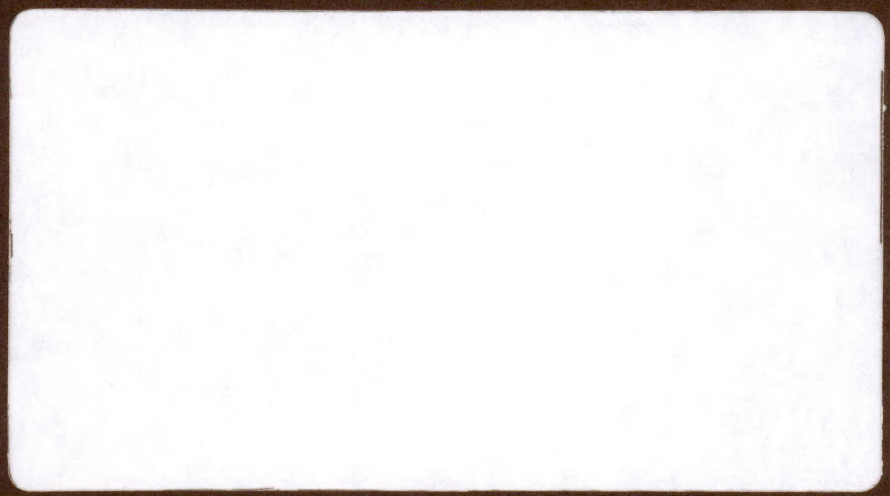


Bank of Canada
Technical Reports

Rapports techniques
Banque du Canada

February, 1982

Technical Report 30

THE LEADING INDICATOR PROPERTIES OF SURVEYED CONSUMER ATTITUDES AND BUYING INTENTIONS

Bruce Rayfuse

ACKNOWLEDGEMENTS

The author would like to thank Fritz Schmidt and Richard Vrooman for extensive technical assistance in preparing this report. He would also like to thank his colleagues in the Research Department at the Bank of Canada--particularly Jack Selody, Peter Jarrett, Brian O'Reilly, Lloyd Kenward and Bill White--for their insightful comments. As well, Janet Jarrett, formerly with the Conference Board of Canada, contributed useful comments on an earlier version. Any remaining errors or omissions are entirely the responsibility of the author.

TABLE OF CONTENTS

		Page
	ACKNOWLEDGEMENTS	ii
	ABSTRACT	v
	RESUME	vi
1	INTRODUCTION	1
2	SURVEY DATA ON CONSUMER SENTIMENT AND INTENTIONS	3
	2.1 Index of Consumer Attitudes	3
	2.2 Consumer Buying Intentions	6
3	PREVIOUS EMPIRICAL RESEARCH	9
4	BIVARIATE CAUSALITY TESTS	13
	4.1 The Tests	13
	4.2 Results for Consumer Sentiment	15
	4.3 Results for Buying Intentions	19
	4.4 Conclusion	24
5	SENTIMENT MEASURES IN A MODEL OF CONSUMER DURABLES EXPENDITURE	25
	5.1 Model I	25
	5.2 The Data	26
	5.3 The Results	27
	5.4 Conclusion	31
6	BUYING INTENTIONS DATA IN A MODEL OF CONSUMER DURABLES EXPENDITURE	35
	6.1 Model II	35
	6.2 The Data	39
	6.3 The Results	39
	6.4 Conclusion	44
7	CONCLUSIONS	45

TABLE OF CONTENTS
(Continued)

	Page
APPENDIX A	47
APPENDIX B	51
BIBLIOGRAPHY	53
FIGURE	
Indices of Consumer Attitudes: Canada, 1962-79	5
LIST OF TABLES	
1. Regression Results: Consumer Sentiment	17
2. Hypothesis Tests: Consumer Sentiment	18
3. Regression Results: Buying Intentions	20
4. Hypothesis Tests: Buying Intentions	22
5. Model I: Regression Results, Aggregate Indices	28
6. Model I: Regression Results, Individual Questions	32
7. Model II: Regression Results, Aggregate Indices	40

ABSTRACT

The author attempts to discover whether the Conference Board of Canada's Survey of Consumer Buying Intentions is a useful leading indicator of consumer durable expenditure. Two aspects of the Survey are considered separately, the overall Index of Consumer Attitudes and the various buying intentions questions. Both are tested using bivariate reduced form Granger techniques and structural models of consumer behaviour.

The results of the tests indicate that movements in the Index of Consumer Attitudes do tend to lead movements in durables expenditure by one quarter. This conclusion holds whether one uses the actual published Index, a variant including neutral responses, or a filtered version of the Index, where the filtered version is calculated as in a number of American studies. The relationship is especially significant for expenditures on automobiles and parts.

There is little indication, however, that buying intentions as recorded in the Survey are useful leading indicators of subsequent consumer behaviour. Only in the furniture and floor coverings category is there a significant positive relationship between intentions and expenditure, and it is contemporaneous. One reason is that, while the Survey indicates what proportion of households intend to purchase certain items, it does not measure relative values of the intended purchases. Thus, a failure to link buying intentions with future expenditure is not an indictment of the accuracy or the validity of the Survey in its own terms.

RESUME

Dans cette étude, l'auteur tente de déterminer si l'enquête du Conference Board of Canada sur les intentions d'achat des consommateurs est un bon indicateur précurseur de la dépense en biens durables. Il y étudie, d'une part, l'indice global des attitudes des consommateurs et, d'autre part, les diverses questions se rapportant aux intentions d'achat de ces derniers. Les deux éléments étudiés sont testés à l'aide de la technique de Granger - modèle de forme réduite à deux variables - et à l'aide de modèles structurels du comportement des consommateurs.

Il ressort de ces tests que les variations qu'enregistre l'indice des attitudes des consommateurs tendent à précéder d'un trimestre les variations de la dépense en biens durables. Cette conclusion vaut tant pour l'indice publié, pour la variante de l'indice original qui ne fait pas abstractions des réponses neutres, que pour le version "filtrée" de l'indice original, calculée sur le modèle d'un certain nombre d'études faites aux Etats-Unis. La relation est particulièrement marquée dans le cas des dépenses en automobiles et pièces détachées.

Il n'est guère évident, toutefois, que les intentions d'achat révélées par l'enquête puissent servir d'indicateurs précurseurs du comportement du consommateur. Les meubles et les revêtements de sol sont la seule catégorie où une variation des intentions d'achat s'accompagne d'une forte variation positive de la dépense, et la relation est simultanée. Cela s'explique par le fait que, même si l'enquête indique quelle proportion des ménages a l'intention d'acheter un certain type de biens, elle ne détermine pas la valeur relative de ces marchandises. Aussi, le fait de ne pas pouvoir lier les intentions d'achat à la dépense future ne met-il pas en cause la validité de l'enquête telle qu'elle se présente.

Chapter 1

INTRODUCTION

The Survey of Consumer Buying Intentions conducted for the Conference Board of Canada is sometimes viewed as a leading indicator of household expenditure.* The questions posed in the Survey seek to elicit two types of information: consumer attitudes towards the general economic environment (sentiment) and the near-term purchasing plans of the respondents (buying intentions). A copy of the questionnaire is provided in Appendix A, page 47.

A number of studies, including Angevine's Canadian study (1974), have concluded that survey measures of consumer attitudes or sentiment are significant explanatory variables in expenditure functions.** Some of these studies have also tested measures of buying intentions for their predictive ability, with results that are more mixed. A criticism of these latter tests has been that the relationships between surveyed buying intentions and other economic variables, including sentiment measures, have not been adequately considered.***

The present study undertakes to determine whether the Conference Board Survey of sentiment and intentions is a good predictor of consumer expenditure behaviour. As noted above, Angevine found that a consumer sentiment measure was a significant aid in forecasting expenditures in Canada. To some extent, then, the present work is an updating of Angevine's

---

* See for example Conference Board of Canada, Survey of Consumer Buying Intentions, 2nd Quarter 1981 (1981 p. 3), and Mark Lukasiewicz, "Consumer Confidence Takes a Nosedive", Globe and Mail, May 27, 1981, p. B6.

** For studies with U.S. data see Juster and Wachtel (1972a and b), Thomas (1975) and Mishkin (1978). Defris and McDonnell (1976) use Australian data, while Ward and Pickering (1981) use British data.

*** See comments by Hymans and Duesenberry on Juster and Wachtel (1972b).

results. However, besides estimating a structural model of consumer expenditures that is in a number of important respects different from Angevine's, this study includes other tests designed to determine the most appropriate form of consumer sentiment index. Further, it tests the buying intentions data in the Survey both in bivariate reduced form and in structural models.

For the purposes of this work the Survey is taken "as is", and a number of important issues are not discussed. For example, the appropriateness of the questions and of the sample itself are taken for granted. Whether the design of the Survey is lacking or could be improved might prove to be a fruitful avenue for further research.

The plan of the study is as follows. In Chapter 2, some of the issues regarding the construction of the sentiment and buying intentions measures are discussed, followed in Chapter 3 by a brief review of some of the previous empirical work on Survey variables. In Chapter 4, as a prelude to the more formal structural models introduced later in the paper, Granger-Sims causality tests are performed with the data. Results of such tests can only be suggestive, however, since they are based solely on correlation. The tests in Chapter 4 then, in effect, let the data speak for themselves. In the last two chapters, an attempt is made to test the Survey data more rigorously by including variables based on the data in structural expenditure functions.

To preview the conclusions, the sentiment measure (the Index of Consumer Attitudes) does seem to be a leading indicator of consumer expenditure for durable goods. Generally speaking, a change in consumer confidence in a given quarter will be reflected in expenditure behaviour one quarter later.

Little success was realized with measures of buying intentions. In only one category is there any indication that buying intentions reflect subsequent expenditures, and even in that case there is no lag. Thus the value of surveyed intentions as a leading indicator of expenditures seems doubtful.

Chapter 2

SURVEY DATA ON CONSUMER SENTIMENT AND INTENTIONS

The Survey of Consumer Buying Intentions, conducted quarterly by the Conference Board of Canada, consists of 14 questions on the near-term economic outlook of the households surveyed (Appendix A, page 47). Some of these questions pertain to consumer attitudes towards the economic environment, while others ask about intentions to buy certain major items within the next six months. The distinction between attitudes (sentiment) and buying intentions is important to remember when using Survey variables in consumption functions. While attitude, it has been argued, supplements such variables as income and prices in an expenditure model,* buying intentions should indicate that households have taken all such information into consideration, and should therefore replace the other variables. For this reason the two measures are tested separately in this paper.

2.1 INDEX OF CONSUMER ATTITUDES

The aggregate Index of Consumer Attitudes is constructed using responses to the following questions from the Survey:

9. Considering everything, would you say that your family is better off financially, the same, or worse off now than it was say six months ago?

10. Again, considering everything, do you think that your family will be better off financially, the same or worse off financially say six months from now than it is now?

11. How do you feel the job situation and overall employment will be in this community, in say six months from now? Do you think there will be more jobs, fewer jobs, or about the same as now?

---

* See Hymans' and Duesenberry's comments on Juster and Wachtel (1972b, p. 119). This distinction is not immediately obvious; incomes and prices and so on may be determinants of consumer mood. The bivariate causality tests in Chapter 4 should be of use in determining whether this is in fact the case.

13b. Do you think that right now is a good time or a bad time for the average person to make a major outlay for things such as a home or a car or some other major item?

The Index is computed by summing the positive or optimistic answers to each of the questions and rebasing so that 1961=100. The aggregate index is then seasonally adjusted.

The Conference Board measure of consumer sentiment, or mood, is one variant to be tested in this paper. Angevine argues that the proportion of neutral answers contains information that this index is disregarding. Thus, following the methodology employed by the Michigan Survey Research Center, he assigns a weight of 2 to optimistic answers and 1 to neutral answers.* The totals are summed and divided by 2 to give an index for each question. The four separate indices are combined, seasonally adjusted and rebased to 1961=100. The figure opposite shows the published Conference Board Index and that computed as in Angevine; although they tend to move together, the latter has a smaller variance.

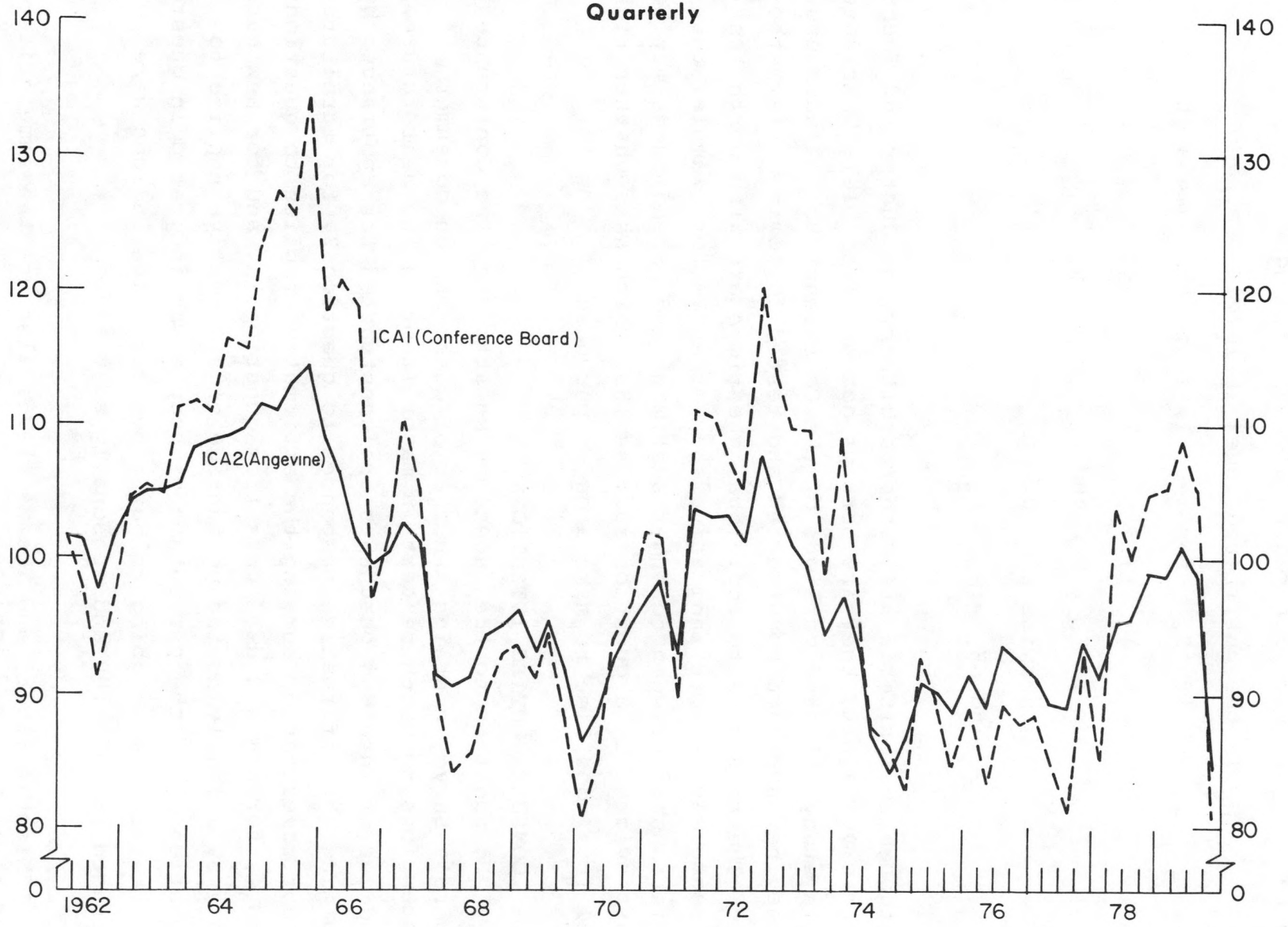
Juster and Wachtel (1972a and b) assert that systematic movements in an index are more relevant than its level, "systematic movements" being defined as either large or persistent. A movement is considered large if the change in the index is equal to or greater than seven points in two consecutive quarters, and persistent if it is in the same direction for at least three consecutive quarters. A one-quarter move in the opposite direction does not constitute a break in the trend if it is more than offset in the following quarter. Using these criteria, a "filtered" index is then constructed as follows:

$$F_t = .5Z_t(\Delta S_t) + .5Z_{t-1}(\Delta S_{t-1})$$

---

* Juster and Wachtel (1972a and b), Thomas (1975), and Mishkin (1978) use the Michigan S.R.C. index.

INDICES OF CONSUMER ATTITUDES: CANADA, 1962-79
Quarterly



where F_t is the filtered version of the index,

S_t is the unfiltered index in level form, and

$Z_t = 1$ if ΔS_{t-i} for i=0, 1, 2 are the same sign

or if $\Delta S_t + \Delta S_{t-1} \geq 7$

or if $Z_{t-2} = 1$ and $Z_{t-1} = 0$ and $|\Delta S_t| > |\Delta S_{t-1}|$

otherwise $Z_1 = 0$

and $\Delta S_t = S_t - S_{t-1}$.

Although the criteria are rather arbitrary, as Juster and Wachtel themselves admit, they are perhaps not unreasonable. Therefore in this study filtered versions of the Conference Board Index and the Angevine index are constructed and tested following this method.*

The responses to individual questions are also worth testing, as some may be more indicative than others. For example, the relationship between consumer sentiment and expenditures may be most evident in a question such as 13b, which asks whether right now is a good time to make a major purchase.

2.2 CONSUMER BUYING INTENTIONS

In addition to the questions on attitude, the Conference Board's Survey contains a number of questions on consumer intentions to purchase certain major items in the near future. Indices of intended purchases are constructed for appliances by summing the affirmative responses to question 2, for furniture and floor coverings by summing the affirmative replies to questions 3 and 4, for new and used cars from question 1a, and for new cars only by multiplying the percentage of affirmative replies to question 1a by the percentage of people who indicated in question 1c that they were going to buy a new car. The indices were rebased to 1971=100 and seasonally adjusted.

---

* Mishkin (1978) and Thomas (1975) also use the same criteria for their filtered indices.

At the outset, one must concede that tests of the relationship between the measures of intentions and actual expenditures are not entirely fair. The Survey measures are intended to indicate what proportion of households are planning to purchase a given item in the near future, but they tell us nothing of the relative values of the intended purchases. Thus, as in the present study, when the range of values of individual items in an expenditure category is very large, the link between intentions and expenditures is potentially quite weak. While it is still useful to see whether a discernible relationship exists, the failure to find one is not necessarily an indictment of the accuracy or the validity of the Survey.

Chapter 3

PREVIOUS EMPIRICAL RESEARCH

In the United States, where data on consumer attitudes, or sentiment, have been compiled over a longer period of time, numerous studies of consumption behaviour have included "anticipatory" variables available from surveys. Angevine has tested sentiment data for Canada, while Defris and McDonnell (1976) have conducted some experiments with Australian data and Ward and Pickering (1981) with data from the United Kingdom.* For the most part these tests have consisted of inserting some measure of sentiment into an "objective" model.**

The actual form of the sentiment variable has differed from study to study, and the discrepancies in reported results are not encouraging. Juster and Wachtel, for instance, report little success with the published index, but instead find that a "filtered" index performs best. Mishkin (1978) reports just the opposite, and still another paper, Thomas (1975), found both significant.*** Angevine achieved his results with an unfiltered index computed for Canada using methodology developed at the Michigan Survey Research Center.

The preferred equations for testing sentiment variables have been durable goods equations. It is sometimes argued that these would be the most likely to be influenced by consumer attitudes since durable goods purchases are the most easily postponed.

---

* Since the Australian index had begun only recently, in 1972, Defris and McDonnell had merely 14 observations to work with. Similarly, British data were only available over the period 1974Q2-1978Q3; moreover, since the survey is taken only three times a year, the third quarter observations were interpolated.

** The terms "anticipatory" and "objective" come from Juster and Wachtel (1972a). Objective models employ, as independent variables, such economic aggregates as relative prices, income, interest rates and so on. Anticipatory models use variables such as sentiment or buying intentions computed from consumer survey data.

*** All three studies used the Juster and Wachtel filter. See Section 2.1.

Mishkin (1978), however, holds that it is the illiquid aspect of durable goods as opposed to their discretionary nature through which attitudes operate. According to his hypothesis, a household with a relatively illiquid portfolio may be unable to meet its financial commitments in the event of a negative income or wealth shock. Hence, when the estimated probability of such a shock increases, the household will tend to allocate wealth away from durable goods and other illiquid assets towards more liquid assets. Sentiment variables, Mishkin contends, measure the estimated probability of a negative income or wealth shock. In earlier work* he used household debt and financial asset position to represent the degree of exposure felt by households. In an equation that already included debt and financial assets, therefore, a consumer sentiment measure would have a smaller role to play.

In comments on Mishkin's paper, it was pointed out that it is also plausible to argue that the willingness of households to incur debt or add to financial asset holdings is determined by consumer sentiment.** Such continuing uncertainty about the precise channels through which the sentiment variables work is one reason bivariate causality tests such as those performed in the next chapter are useful.

While the aggregate index of consumer sentiment is used most frequently, Thomas (1975), Defris and McDonnell (1976), and Ward and Pickering (1981) decompose the aggregate and test individual components or questions as determinants or leading indicators. In the first two studies, evidence was found to indicate that some components are better leading indicators of consumer expenditures than others. Defris and McDonnell found that evaluations of the current unemployment situation, the future inflation rate and the ratio of unfavourable to favourable economic news items did best, although they also found relatively long lags of three or four

---

* See Mishkin (1977).

** See J. Shoven's comments at the end of the Mishkin paper.

quarters. Thomas discovered that the explanatory power of the consumer sentiment index was derived from two of its five component questions: the one asking whether it was a good time to buy a durable good and the one about the household's expected financial situation a year from now.

Although sentiment variables have been used in numerous models, the buying intentions portion of consumer surveys have attracted relatively little attention. Defris and McDonnell did test intentions data in equations for new car registrations in Australia but found that, though statistically significant, the intentions variables did not perform as well as components of the sentiment index. Ward and Pickering in their turn reported little success with measures of buying intentions in the United Kingdom. When Juster and Wachtel constructed an anticipatory model for new automobile purchases in the United States using both sentiment and intentions data, several commentators pointed out that sentiment and intentions data are conceptually quite different. While sentiment measures do not displace objective variables, a buying intentions variable would. In other words, buying intentions would themselves be a function of a set of objective variables; another set would explain the deviation of actual from intended purchases. The buying intentions model in Chapter 6 incorporates these ideas.

The next chapter describes the bivariate causality tests used in this study.

Chapter 4

BIVARIATE CAUSALITY TESTS*

While significant correlation between two variables does not necessarily imply causation, correlation analysis can nevertheless be useful in identifying causal relationships. Moreover, whereas causality is implied by predictability according to a law or set of laws,** a less restrictive definition of causality can be expressed, following Granger (1969) and Sims (1972), in terms of predictability according to prior information. That is:

> . . . a variable X causes another variable Y, with respect to a given universe or information set that includes X and Y, if present Y can be better predicted by using past values of X than by not doing so, all other information contained in the past of the universe being used in either case.***

In this chapter, Granger-Sims techniques are used to test for the existence of a causal relationship between consumer sentiment and consumer expenditures, where causal is defined according to the above quotation. Similar tests are conducted with the buying intentions portion of the survey.

4.1 THE TESTS

The tests operate on the bivariate reduced form:

$$\begin{aligned} CDUR_t &= B_{11}(L)CDUR_t + B_{12}(L)ICA_t + u_{1t} \\ ICA_t &= B_{21}(L)CDUR_t + B_{22}(L)ICA_t + u_{2s} \end{aligned} \qquad s \gtrless t \qquad (1)$$

---

* This chapter utilizes Time Series Processing (TSP) routines that were created by Fleet and Kelly (1980) for Jarrett and Selody (1981) in their examination of feedback relationships between inflation and productivity growth. The author is indebted to Jack Selody in particular for help in setting up the tests and interpreting the test results.

** This is Zellner's definition, quoted in Jarrett and Selody (1981, p. 10).

*** Pierce and Haugh (1977) p. 266.

where $CDUR_t$ is constant-dollar consumer expenditures for durable goods,

ICA_t is a measure of consumer attitudes,

L is the lag operator, and

u is an error term.

It is assumed that u_{1t} and u_{2s} are independent for all t and s or, in other words, that the influence of all other variables determining CDUR and ICA are adequately captured in distributed lags of the dependent variable. Should the error terms prove to be related, then one could conclude that the reduced form model is misspecified and any inferences as to causality are undermined. Hence, tests are conducted later for the independence of u_1 and u_2. It should also be noted that, because equations (1) are by construction a reduced form, they are not useful in identifying contemporaneous causality.

Assuming that the error independence criterion is met, equations (1) can be used to identify the dynamic relationship between consumer survey variables and actual expenditures on durables. From the equations, four possibilities are evident:

(a) $B_{12}(L) = B_{21}(L) = 0$ would imply "intertemporal independence" of the consumer sentiment and expenditure variables.

(b) $B_{21}(L) = 0$ but $B_{12}(L) \neq 0$ would indicate that consumer sentiment Granger-causes durables expenditures, but that durables expenditures do not similarly cause consumer sentiment.

(c) $B_{12}(L) = 0$ but $B_{21}(L) \neq 0$ would mean that while expenditures cause sentiment, they themselves are independent of consumer sentiment.

(d) $B_{12}(L) \neq 0$, $B_{21}(L) \neq 0$ would represent a "feedback" relationship between sentiment and expenditures.

From the point of view of using the sentiment and anticipations measures as leading indicators of durables expenditures, our preferred hypothesis would be (b). Should (a) or (c) turn out

to be "true", then the tests would suggest that the Survey measures are of dubious value as leading indicators.

Although intuitively one might feel that causality should run in one direction, from the sentiment or intentions measures to expenditures, there is reason to suspect that causality might run in the other direction as well. Some studies have included sentiment measures, for example, in consumption expenditure functions along with other factors such as income and prices. It may be, however, that sentiment is determined at least in part by these other variables, in which case, since their influence is supposed to be captured in the lagged expenditures variable, a causal link may be found running from expenditures to sentiment.

The lengths of the distributed lags were determined as follows. First, a maximum allowable length of eight quarters was imposed because, since the Survey asks households to look only six months ahead, long lags are clearly inappropriate. Given this restriction on the maximum lag length, the procedure recommended by Hsaio (1979) was then employed to determine lengths more precisely. This method involves regressing one of the two variables on its own lagged values and choosing the lag length that minimizes Akaike's final prediction error (FPE).* The process is repeated for the other variable. Finally, different lag lengths for the lagged values of the dependent variable are tried again to confirm the choice made in the first step of the procedure.

4.2 RESULTS FOR CONSUMER SENTIMENT

The test results for two of the sentiment measures and for total durable goods expenditure (CDUR) are shown in Table 1. The

---

* Akaike's final prediction error is defined as follows:

$$FPE_y(m,n) = \frac{T + m + n + 1}{T - m - n - 1} \cdot \sum_{t=1}^{T} (y_t - \hat{y}_t)^2 / T$$

where m is the order of lag on the lagged dependent variable y and n is the order of lag on the independent variable. The circumflex denotes the predictor of y.

two sentiment measures used were the Conference Board's published Index of Consumer Attitudes (ICA1) and an index calculated as in Angevine to include neutral responses (ICA2). At this stage, because the results are intended to be only suggestive rather than firm estimates of elasticities, no disaggregation of durable expenditures was attempted. As well, since the tests required stationary series, the variables were expressed in first differences in the natural logarithms; the resulting series did appear to be covariance stationary. Because the indices were effectively in percentage change form, it was deemed unnecessary to test their filtered versions separately.

The results presented in Table 1 suggest that there is a significant relationship of Granger-causality running from the sentiment measure to durables expenditure with a lag of one quarter. Notice that in terms of statistical significance and improved fit, there is very little difference between the results obtained with ICA1 and ICA2, although the coefficient on ICA2 is more than twice as large as that on ICA1. The estimated elasticities are .22 with a one-quarter lag for ICA1 rising to .26 in the long run, while for ICA2 the corresponding elasticities are .48 and .65.

By contrast, there was no indication that previous changes in expenditure influenced consumer attitudes. In fact, the attitudes movements appear to be generated by a "white noise" process.

The hypothesis tests in Table 2 reinforce the results shown in Table 1, which suggest the restriction that, in equations (1) earlier in this chapter, $B_{21}(L) = 0$. In lines A(1) and B(1) of Table 2 this restriction is tested against the alternative of bidirectional causality or no restrictions at all. The model is not significantly improved by the removal of the restriction, and hence the restriction needs to be rejected. In line A(2) and B(2) the null hypothesis of restrictions $B_{21}(L) = 0$ and $B_{21}(L) = 0$ or intertemporal independence is tested against the alternative of only $B_{21}(L) = 0$ or one-way causality running from attitudes to expenditure. In this case the likelihood ratio deteriorates

Table 1

REGRESSION RESULTS: CONSUMER SENTIMENT
(1964Q1 - 1979Q4)

	$\bar{R}^2$	F	SER
A. Conference Board Index of Consumer Attitudes (ICA1)			
(1) $ICA1 = -.0050 - .1798 \cdot J1L(ICA1)$ (-1.32)	-.0116	1.7382	.0804
(2) $CDUR = .0095 + .2281 \cdot J1L(ICA1) - .2082 \cdot J1L(CDUR) + .0359 \cdot J2L(CDUR) + .1167 \cdot J3L(CDUR)$ $(3.57) \quad (-1.77) \quad (.31) \quad (1.00)$ $- .1521 \cdot J4L(CDUR) + .2235 \cdot J5L(CDUR) + .1490 \cdot J6L(CDUR) - .1135 \cdot J7L(CDUR)$ $(-1.29) \quad (1.91) \quad (1.30) \quad (-1.00)$	.2437	3.5375	.0359
B. Consumer Attitudes Index Including Neutral Responses (ICA2)			
(1) $ICA2 = -.0036 - .0244 \cdot J1L(ICA2)$ $(-.17)$	-.0157	.0289	.0402
(2) $CDUR = .0092 + .4821 \cdot J1L(ICA2) - .2218 \cdot J1L(CDUR) + .0047 \cdot J2L(CDUR) + .1617 \cdot J3L(CDUR)$ $(3.54) \quad (-1.87) \quad (.04) \quad (1.38)$ $- .1546 \cdot J4L(CDUR) + .2225 \cdot J5L(CDUR) + .1811 \cdot J6L(CDUR) - .0799 \cdot J7L(CDUR)$ $(-1.31) \quad (1.89) \quad (1.57) \quad (-.72)$	.2411	3.5020	.0360

Note

Figures in parentheses are t-statistics.

significantly; hence the restriction that $B_{12}(L) = 0$ (attitudes do not influence expenditure) is rejected.

Table 2

HYPOTHESIS TESTS: CONSUMER SENTIMENT

Null Hypothesis(H0)	Alternative Hypothesis	Test Statistic	$\chi^2(.05)$	Result
A. Conference Board Index of Consumer Attitudes (ICA1)				
(1) ICA1 $\rightarrow$ CDUR	ICA1 $\overrightarrow{\leftarrow}$ CDUR	.059	3.841	Do not reject H0
(2) ICA1 $\not\rightarrow$ CDUR	ICA1 $\rightarrow$ CDUR	13.697	3.841	Reject H0
B. Index of Consumer Attitudes with Neutral Responses (ICA2)				
(1) ICA2 $\rightarrow$ CDUR	ICA2 $\overrightarrow{\leftarrow}$ CDUR	.061	3.841	Do not reject H0
(2) ICA2 $\not\rightarrow$ CDUR	ICA2 $\rightarrow$ CDUR	13.797	3.841	Reject H0

Since imposing the restriction $B_{12}(L) = 0$ did improve the model, and removing the restriction that $B_{21}(L) = 0$ did not, it can be inferred that causality runs in one direction, from attitudes to expenditure.

It will be recalled that the validity of the tests was predicated on the assumption of independent error terms. Cross-correlograms* between the error terms of the two equations in each set indicated that as a group there was no significant correlation of residuals. There did, however, seem to be a significant correlation between the contemporaneous error terms, which points to the not surprising possibility that the reduced form fails to account for the influence of certain contemporaneous factors on consumption expenditures.

---

* See Jarrett and Selody (1981), pp. 12-13.

4.3 RESULTS FOR BUYING INTENTIONS

As noted in the previous section, the linkage between buying intentions and actual expenditures is potentially very weak because of the absence of information on the value* of the intended purchases. Thus a poor showing by the intentions data is not necessarily an indictment of the Survey's accuracy. It is still useful, however, to see whether buying intentions tend to foretell movements in the National Accounts aggregates. The buying intentions data available for these tests cover the period 1971Q1 to 1979Q4.

For one category, new cars, it is possible to construct a series representing unit purchases. Following Juster and Wachtel (1972a and b), total consumer expenditure on new cars is divided by the average unit value of new cars to approximate the number of new cars purchased.**

The results of the causality tests for automobile purchases and expenditures on household appliances and furniture and floor coverings are given in Table 3. Table 4 shows the results of hypothesis tests for the same categories.

For the three automobile categories, the causality test results were not encouraging. In both the new car expenditure and the new car unit sales equations the maintained hypothesis, or that which minimized the FPE of the regression equations, was one-way negative causality running from the expenditure variable to buying intentions! This result would perhaps not be too surprising if the tests had indicated that the intentions variable was an accurate reflection of consumers' plans. In that case the negative relationship of expenditures to intentions would merely imply that the household, having made its purchase, was no longer planning it. Only in the new and used car expenditure equation is

---

* "Value" refers to the relative worth of the item exclusive of the effects of inflation.

** Data on the total number of units sold are available but these figures include cars sold to businesses as well as to individuals.

Table 3

REGRESSION RESULTS: BUYING INTENTIONS
(1971Q1 - 1979Q4)

	$\bar{R}^2$	F	SER
A. New Automobile Unit Sales			
(1) CBINC = -.0220 - .4594·J1L(UNNC) - .3351·J1L(CBINC) - .1522·J2L(CBINC) (-1.91) (-1.82) (-.86) - .5378·J3L(CBINC) - .3861·J4L(CBINC) (-3.06) (-2.17)	.3122	3.9062	.1195
2) UNNC = .0014 - .6629·J1L(UNNC) - .1214·J2L(UNNC) - .1927·J3L(UNNC) - .1903·J4L(UNNC) (-3.61) (-.66) (-1.09) (-1.07) + .3748·J5L(UNNC) + .3380·J6L(UNNC) (2.02) (1.97)	.4064	4.6521	.0729
B. New Automobiles Expenditures			
1) CBINC = - .0077 - .4942·J1L(EXPNC) - .2362·J2L(EXPNC) - .3618·J3L(EXPNC) (-2.40) (-1.02) (-1.68) - .3767·J1L(CBINC) - .2281·J2L(CBINC) - .4764·J3L(CBINC) - .3808·J4L(CBINC) (-2.02) (-1.23) (-2.78) (-2.22)	.3751	3.7437	.1139
(2) EXPNC = .0204 - .4668·J1L(EXPNC) - .1369·J2L(EXPNC) - .3415·J3L(EXPNC) (-2.41) (-.62) (-1.95) - .2703·J4L(EXPNC) + .2414·J5L(EXPNC) (-1.50) (1.39)	.2863	3.5668	.0950
C. New and Used Cars			
(1) CBINUC = - .0046 - .2462·J1L(EXPNUC) - .0279·J1L(CBINUC) - .4295·J2L(CBINUC) (-1.29) (-.15) (-2.34) - .2189·J3L(CBINUC) - .3245·J4L(CBINUC) (-1.15) (-1.65)	.1477	2.1094	.0937
(2) EXPNUC = .0116 + .2757·J1L(CBINUC) - .4462·J1L(EXPNUC) (1.72) (-2.70)	.1778	2.1460	.0865

D. Household Appliances

(1)	CBIAPP = - .0087 - .2738·J1L(CBIAPP) (-1.50)	.0376	2.2513	.1677
(2)	EXPAPP = .0076 + .0721·J1L(CBIAPP) + .2538·J1L(EXPAPP) (1.66) (1.50)	.0633	2.0829	.0390

E. Furniture and Floor Coverings

(1)	CBIFFC = - .0130 + .1556·J1L(EXPFFC) - .2066·J2L(EXPFFC) + 1.3970·J3L(EXPFFC) (.41) (-.57) (3.27) - .4004·J4L(EXPFFC) - .2102·J5L(EXPFFC) - .3209·J6L(EXPFFC) (-.84) (-.44) (-.75) - .4821·J1L(CBIFFC) (-2.96)	.3565	3.5328	.0682
(2)	EXPFFC = .0085 - .0931·J1L(EXPFFC) (-.53)	-.0229	.2830	.0344

Notes

Numbers in parentheses are t-statistics.

JxL is the lag operator, e.g., J1L is a one-quarter lag.

Mnemonics are listed in Appendix B, p. 51.

Table 4

HYPOTHESIS TESTS: BUYING INTENTIONS

Null Hypothesis(H0)	Alternative Hypothesis	Test Statistic	$\chi^2(.05)$	Result
A. New Car Units				
CBINC ← UNNC	CBINC ⇇ UNNC	.002	3.841	Do not reject H0
CBINC ↚ UNNC	CBINC ← UNNC	4.335	3.841	Reject H0
B. New Car Expenditures				
CBINC ← EXPNC	CBINC ⇄ EXPNC	.136	3.841	Do not Reject H0
CBINC ↚ EXPNC	CBINC ← EXPNC	10.271	7.815	Reject H0
C. New and Used Car Expenditures				
CBINUC ←- EXPNUC	CBINUC ⇄ EXPNUC	3.185	3.841	Do not reject H0
CBINUC ↚ EXPNUC	CBINUC ⇄ EXPNUC	5.038	5.991	Do not reject H0
CBINUC → EXPNUC	CBINUC ⇄ EXPNUC	1.955	3.841	Do not reject H0
D. Household Appliances				
CBIAPP → EXPAPP	CBIAPP ⇄ EXPAPP	1.307	3.841	Do not reject H0
CBIAPP ↚ EXPAPP	CBIAPP → EXPAPP	2.880	3.841	Do not reject H0
E. Furniture and Floor Coverings				
CBIFFC ← EXPFFC	CBIFFC ⇄ EXPFCC	.387	3.841	Do not reject H0
CBIFFC ↚ EXPFFC	CBIFFC ← EXPFFC	11.550	12.592	Do not reject H0

Note

Mnemonics are listed in Appendix B, p. 51.

there any indication of intentions leading expenditure,* and even the relationship selected by the FPE criterion is bidirectional causality.

The furniture and floor covering equations again depict causality running in one direction, from expenditures to intentions. Only in the appliance equations does the preferred hypothesis of intentions leading expenditures receive some albeit weak (given the low t-statistic) support.

The results of hypothesis tests performed to try the strength of the regressions, presented in Table 4, appear to undermine even the limited success achieved with the regression equations. Following procedures outlined in the previous section we can, for the new car units and expenditure categories, reject the hypothesis of independence, and the assumption of bidirectional causality does not improve the model. By inference then, a one-way causal relationship from intentions to expenditure can be rejected. The results in the furniture and floor coverings equation are not quite so clear. Although the regressions suggest that expenditures Granger-cause intentions, intertemporal independence cannot be rejected. The same is unfortunately true for household appliances; while the regressions yielded the desirable result of one-way causality running from intentions to expenditure, the hypothesis tests do not permit the rejection of the hypothesis of independence.

Thus while the tests did not reverse the conclusions in those instances where causality seemed to run only from expenditures to intentions, doubt was cast upon both cases where causality was indicated to run from intentions to expenditures. In new and used automobile expenditures, whereas the maintained hypothesis was of bidirectional causality, the test results did not allow any of the restrictions to be rejected. Similarly, in the household appliances equations, although the regressions showed causality

---

* The used car component in this aggregate is, since National Accounts data is being used, only the value-added portion.

running from intentions to expenditures, the restriction of intertemporal independence could not be rejected.

4.4 CONCLUSION

In summary, the results of tests on the sentiment and intentions variables were quite different. The tests with sentiment variables indicated a causal relationship running from the Index of Consumer Attitudes to durables expenditure. It made little difference to the equations whether neutral responses were included in the Index. The error term cross-correlogram indicated that the test results may have been influenced by omitted contemporaneous variables.

The results of tests with the intentions variables were not at all encouraging. There was little evidence to show a relationship in which causality ran from intentions to expenditures. Indeed, the dominant finding was that causality ran in the other direction.

Chapter 5

SENTIMENT MEASURES IN A MODEL OF CONSUMER DURABLES EXPENDITURE

In the previous chapter, tests for Granger causality indicated that a relationship did exist between measures of consumer sentiment and expenditures on durable goods. The test results seemed to point to a relationship in which causality ran in one direction, from sentiment to expenditures. Tests conducted on the residuals of the reduced form equations, however, did raise some question as to the causal relationship since there were instances of significant correlation among the residuals. The existence of such correlations implied that significant influences existed that were not captured in the lagged dependent variable. To clarify the relationship between sentiment and expenditure, a structural model of consumer durables expenditure is estimated using sentiment measures, as described in this chapter.

5.1 MODEL I

The model employed in this chapter is a stock adjustment-permanent income model as outlined in Darby (1975). The general form of the estimating equation is:

$$EXPDUR = \beta_0 + \beta_1 YPERM + \beta_2 YTRAN + \beta_3 (PDUR/PCON) + \beta_4 KDUR \quad (2)$$

where EXPDUR is constant dollar expenditures on durable goods

YPERM is permanent income

YTRAN is transitory income

PDUR/PCON is the price of durable goods relative to the price of all consumption goods, and

KDUR is the stock of durable goods.

In this chapter, durables are disaggregated into automobiles and parts, household durables, and miscellaneous

durables.* Equation (2), then, is the basic model into which the various consumer sentiment measures are incorporated. Further, other variables specific to each category are tried.

5.2 THE DATA

In equation (2) the expenditure, income and stock variables are all deflated by price and labour force population. The price index used is the implicit consumption deflator from the National Accounts. Since expenditures on durable goods are often associated with household formation, it would seem that the labour force population, or the population aged 15 years and over, rather than total population would be the more relevant demographic deflator.

The permanent income concept used in this paper is constructed using a rolling regression technique as outlined in Kennedy and Lynch (1979). In essence, if permanent income is defined as the average of all expected future income streams discounted back to the present, and if it is assumed that the discount rate is equal to the underlying rate of income growth, then permanent income can be modelled as a time trend. To re-create the conditions faced by households when planning future consumption, the condition is imposed that permanent income expectations are formed with only the information available at the time.

In other words, income expectations are formed as follows. In period t, per capita income up to period t-1 is regressed against time. Using the parameters of that regression, the individual makes a forecast for period t. This forecast is permanent income, while the difference between the forecast and the actual level of income is transitory income.** Unlike the

---

* Since this research was originally undertaken in the hope of improving or supplementing the consumption sector of RDXF, durables are disaggregated into the same categories as in RDXF. (See Robertson and McDougall (1982).)

** Kennedy and Lynch further disaggregate transitory income into cyclical income and "true" transitory income. Expectations of the former are modelled as a second-order autoregressive process, while the latter is the white noise residual.

Kennedy and Lynch study where the data set was enlarged by one observation each period, this study keeps the data set at a constant 10-year size.

The price terms used were the National Accounts deflators for the relevant categories relative to the aggregate consumption deflator.

As mentioned above, a number of other variables were tried in some of the equations to reflect influences specific to those categories of goods. In the automobiles equation, for example, dummy variables were included for periods during which there were provincial sales tax rebates and strikes in the automobile industry. As well, a variable representing the relative price of gasoline was tried. In the household durables equation, several variables reflecting activity in housing construction were tried.

The consumer sentiment indices used were ICA1 and lCA2 from the previous chapter. As well, filtered versions (see section 2.1) of each were calculated and used. Finally, the responses to individual questions were included separately to see whether some had more informational content than others. The results of the causality tests in the previous chapter indicated that the lags between changes in sentiment and changes in expenditure were very short, in fact, only one quarter. With this in mind, as well as the fact that the time horizon in the questions is very short, lag lengths were kept short in these equations.

5.3 THE RESULTS

Aggregate Indices

The results of the regressions using variants of the aggregate Index of Consumer Attitudes are shown in Table 5 (page 28). The equations shown in Part A of the table have total durables expenditure as their dependent variable as did the reduced form equations in Chapter 4. In Parts B, C, and D, separate equations were constructed for automobiles and parts, household durables, and miscellaneous durables respectively. Equations (1) in every case contained no sentiment term, while

Table 5

MODEL I: REGRESSION RESULTS, AGGREGATE INDICES

A. Total Durables

	Intercept	YPERM	YTRAN	PDUR	KDUR	QREB	Sentiment JOL	Sentiment J1L	RHO	$\bar{R}^2$	D.W.	SER
(1)	2338.38	.4593	.1228	-2213.85	-.7958	19.1717			.8284	.9903	2.12	15.083
		(2.32)	(3.52)	(-6.30)	(-2.58)	(3.15)			(9.79)			
(2)	2202.09	.4906	.1147	-2208.69	-.8381	15.9700		.7723	.8443	.9914	2.12	14.192
		(2.79)	(3.50)	(-6.61)	(-3.09)	(2.75)		(2.97)	(11.19)			
(3)	2230.82	.4737	.1087	-2275.88	-.8229	17.6815		1.6209	.8406	.9917	2.13	14.078
		(2.81)	(3.34)	(-6.28)	(-3.16)	(3.11)		(3.00)	(11.14)			
(4)	2588.94	.4412	.1054	-2379.77	-.8013	17.4138		2.5690	.8754	.9917	2.07	14.049
		(3.20)	(3.20)	(-7.18)	(-2.86)	(3.12)		(3.13)	(12.81)			
(5)	2466.71	.3583	.1071	-2216.82	-.6362	20.5331	1.3018		.8448	.9914	2.12	14.348
		(1.88)	(3.18)	(-6.65)	(-2.17)	(3.54)	(2.56)		(10.80)			

B. Automobiles and Parts

	Intercept	YPERM	YTRAN	PCAR	KCAR	QSTR	QREB	Sentiment JOL	Sentiment J1L	RHO	$\bar{R}^2$	D.W.	SER
(1)	1410.78	.2115	.0553	-1007.56	-1.1403	-.0009	18.2489			.8655	.9493	2.02	11.589
		(2.54)	(2.04)	(-5.61)	(-2.76)	(-1.97)	(3.83)			(12.29)			
(2)	1304.48	.1822	.0424	-1005.12	-.9747	-.0011	18.2582	.3373	.4459	.9695	.9530	2.16	11.160
		(2.51)	(1.60)	(-5.81)	(-2.73)	(-2.34)	(3.89)	(1.69)	(2.14)	(12.61)			
(3)	1305.42	.1974	.0472	-1000.35	-1.0557	-.0010	17.9815		.8270	.8587	.9513	2.18	11.355
		(2.56)	(1.77)	(-5.70)	(-2.75)	(-2.24)	(3.85)		(1.87)	(12.06)			
(4)	1380.59	.1964	.0484	-980.30	-1.0649	-.0011	17.8964		1.5840	.8674	.9530	2.08	11.158
		(2.45)	(1.84)	(-5.64)	(-2.66)	(-2.31)	(3.91)		(2.40)	(12.54)			
(5)	1374.93	.1838	.0480	-989.021	-.9889	-.0010	19.2787	.8542		.8672	.9521	2.02	11.248
		(2.15)	(1.81)	(-5.66)	(-2.34)	(-2.22)	(4.14)	(2.18)		(11.07)			

C. Household Durables

	Intercept	YPERM	YTRAN	PHHDU	J1L(IRCA/NPOP)	Sentiment J0L	Sentiment J1L	Sentiment J2L	RHO	$\bar{R}^2$	D.W.	SER
(1)	52.0991	.0361	.0513	-74.1179	.0659					.9821	1.68	4.6743
		(9.85)	(9.96)	(-2.42)	(3.14)							
(2a)	67.0983	.0350	.0511	-80.0241	.0668	.0468				.9845	1.70	4.3523
		(9.12)	(9.90)	(-2.57)	(3.18)	(.97)						
(2b)	60.0692	.0356	.0514	-77.4429	.0658		-.0237			.9843	1.71	4.3765
		(9.27)	(9.91)	(-2.46)	(3.12)		(-.49)					
(2c)	71.5251	.0349	.0521	-81.3669	.0659			-.0697		.9848	1.66	4.3138
		(9.35)	(10.14)	(-2.65)	(3.17)			(-1.45)				
(3)	67.9684	.0351	.0507	-76.3907	.0682		-.1027			.9846	1.74	4.3378
		(9.35)	(9.82)	(-2.50)	(3.25)		(-1.17)					
(4)	59.9286	.0352	.0502	-79.1090	.0686		-.1387			.9844	1.69	4.3735
		(8.86)	(9.07)	(-2.48)	(3.18)		(-.57)					
(5)	73.2326	.0335	.0459	-86.6658	.0733	.1185	-.3651		.1721	.9848	1.95	4.2769
		(7.62)	(7.51)	(-2.34)	(3.10)	(.73)	(-2.05)		(1.29)			

D. Miscellaneous Durables

	Intercept	YPERM	YTRAN	PMISC	KMISC	Sentiment J0L	Sentiment J1L	RHO	$\bar{R}^2$	D.W.	SER
(1)	-39.3580	.1039	.0521	-178.965	-.1421			.5125	.9956	2.11	4.5329
		(3.82)	(6.59)	(-2.91)	(-1.29)			(4.16)			
(2)	-224.999	.1560	.0406	-144.326	-.3123		.1418	.7348	.9957	2.13	4.4974
		(3.39)	(4.18)	(-2.37)	(-1.82)		(1.66)	(7.00)			
(3)	-253.529	.1630	.0392	-146.689	-.3379		.2813	.7587	.9957	2.16	4.5182
		(3.32)	(3.91)	(-2.36)	(-1.84)		(1.50)	(7.47)			
(4)	-50.5921	.1091	.0488	-180.318	-.1622	.2163		.5867	.9957	2.14	4.5136
		(3.56)	(5.66)	(-2.87)	(-1.34)	(1.30)		(4.84)			
(5)	-24.1266	.0931	.0523	-182.399	-.1272	.2384		.5060	.9956	2.11	4.5393
		(3.69)	(6.67)	(-2.95)	(-1.17)	(.91)		(4.12)			

Notes

Equations (1) contain no sentiment term. Equations (2) contain ICA_1, and equations (3) include ICA_2. Equations (4) and (5) contain filtered versions of ICA_2 and ICA_1 respectively.

Mnemonics are listed in Appendix B, p. 51.

equations (2) contained ICA1 and equations (3) included ICA2. Equations (4) and (5) contained filtered versions of ICA2 and ICA1 respectively.

An autocorrelation correction was applied to all of the equations and proved highly significant in all except those for household durables. The presence of autocorrelation often indicates that important explanatory variables have been omitted; obvious candidates in the equations of Table 5 would be financial influences. In fact, a number of real and nominal interest rates were tried, as were several real money balance measures, as prescribed by Darby (1975). None of these variables achieved anything close to correctly signed, significant coefficients, however, and were therefore dropped.

The stock terms proved difficult in some equations, particularly in those for household durables, where both the stock of household durables and the stock of houses were tried but with no success. Instead, lagged investment in residential construction* was included, and it appeared with a positive sign on its coefficient, as might be expected.

The total durables equations seem to confirm the results of the hypothesis tests conducted in the previous chapter (Table 1, page 17). Consumer sentiment variables do enter significantly and usually with a one-period lag. Only the filtered version of the Conference Board's Index of Consumer Attitudes was different; it was significant with no lag. It appears to make little difference to the equations whether the Index is calculated with or without the neutral answers or whether or not it is filtered. The elasticity is not greatly different, at least in the short run, from that arrived at in Chapter 4. A change in the Index (ICA1) of 1 per cent leads, in the next quarter, to a change in real

---

* Investment in residential construction takes into account not only the construction of new houses, but also sales of existing houses, improvements and alterations to existing houses, the construction of cottages and so on, all of which might give rise to the purchase of furniture and appliances.

durables expenditure of .15 per cent. With the stock term, however, the elasticity falls to approximately .08 in the long run.

From Table 5, it would seem that the significance displayed by the sentiment measures in the total durables equations stems almost entirely from the automobiles and parts category, where all variants of the aggregate index turn up significant and with the same lags as in the total durables equations. The elasticities in the automobiles and parts equations are .20 in the short run and .08 in the long run. In the miscellaneous durables equations the unfiltered versions of the Index approach significance, while in the household durables equations the indices are almost invariably insignificant and of the wrong sign.

Individual Questions

As suggested previously (see Chapter 3), other researchers have found that responses to individual questions differ in the extent to which they reliably lead consumer expenditures. To test this result with Canadian data, the responses to each of the four questions in the Conference Board's aggregate index were inserted separately into expenditure equations; equations in which sentiment variables proved significant are shown in Table 6. The results indicate that the explanatory power exhibited by the aggregate index derives principally from question 10 concerning the household's expected financial condition in six months' time (FCGMF). The question was significant in both the total durables and the automobile equations, and marginally so in the miscellaneous durables equations.

Question 13b, concerning whether the household felt that the present was a good time to make a major outlay, was also significant in the automobile equation, but with no lag.

5.4 CONCLUSION

The results obtained with this structural model were similar to those realized with the reduced form model in Chapter 4, i.e.,

TABLE 6

MODEL I: REGRESSION RESULTS, INDIVIDUAL QUESTIONS

A. Total Durables

	RHO	$\bar{R}^2$	D.W.	SER
(1) CDUR = 2213.36 + .4951·YPERM + .0960·YTRAN − 2249.80·PDUR − .8614 KDUR (2.87) (3.00) (−7.07) (−3.28) + 17.0966·QREB + 1.5330·FCGMF + 4.3206·J1L(FCGMF) (3.24) (1.42) (4.04)	.8982 (14.97)	.9923	1.93	13.574
(2) CDUR = 2455.64 + .3284·YPERM + .1082·YTRAN − 2205.71·PDUR − .5885·KDUR (1.84) (3.18) (−6.50) (−2.15) + 20.9573·QREB + 35.0663·GIMP (3.51) (2.18)	.8120 (9.63)	.9912	2.20	14.538

B. Automobiles and Parts

(1) CMV = 1269.15 + .1812·YPERM + .0307·YTRAN − 9931.57·PCMV − 1.0016·KCAR (2.59) (1.23) (−6.33) (−2.90) − .0014·QSTR + 18.4665·QREB + 1.6635·FCGMF + 3.8289·J1L(FCGMF) (−3.32) (4.29) (2.05) (4.55)	.8632 (11.70)	.9614	2.00	10.107
(2) CMV = 1403.98 + .1729·YPERM + .0465·YTRAN − 1034.44·PCMV − .9505·KCAR (2.23) (1.76) (−5.94) (−2.50) − .0010 QSTR + 19.3812 QREB + 27.8675 GIMP (−2.13) (4.22) (2.27)	.8722 (12.19)	.9525	2.05	11.203

C. Miscellaneous Durables

(1) CDMIS = −178.739 + .1444·YPERM + .0452·YTRAN − 160.802·PCDMIS (3.82) (5.06) (−2.62) − .2702·J1L(KMISC) + .3311·FCGMF + .2899·J1L(FCGMF) (−1.89) (1.71) (1.59)	.6499	.9957	2.14	4.478

Notes

Figures in parentheses are t-statistics.

Mnemonics are listed in Appendix B., p. 51.

consumer sentiment measures were found to have a significant influence on durables expenditure, with a lag of one quarter. Dissaggregation of the durables expenditure term, however, suggested that it was the automobile component of durables that was most responsive to sentiment measures. When individual components of the aggregate attitudes Index were tested separately, the question relating to the household's expected financial position in six months' time was the one most closely related to expenditures.

Chapter 6

BUYING INTENTIONS DATA IN A MODEL OF CONSUMER DURABLES EXPENDITURE

Previous work has treated consumer buying intentions data in one of two ways. Juster and Wachtel (1972a and b) created a "complete" anticipatory model using both intentions and sentiment data. However, because they had not made the crucial distinction between intentions and sentiment, the model was considered to be conceptually faulty. Defris and McDonnell (1976) and Ward and Pickering (1981) merely regressed expenditures aggregates against lagged intentions data--primarily because of the small number of observations available to them. In the latter study, the results are undermined by the possibility of specification error.

The approach in Chapter 4 of this study is somewhat similar to the one in Ward and Pickering, except that it includes lags on the dependent variable as well as an attempt at capturing the influence of omitted variables. The present chapter seeks to supplement the bivariate tests conducted in Chapter 4 with a structural model that accurately reflects the role of surveyed buying intentions. In the next section, the model and its underlying rationale are laid out. The estimates are discussed in the following section and then some conclusions are drawn.

6.1 MODEL II

The chief assumption of this model is that consumers plan expenditures taking into account the latest information at their disposal. Plans will then be altered if new, relevant information comes into their possession. Thus the intentions measure displaces variables such as expected income, expected prices and so on in an expenditure function, but is supplemented by differences between actual and expected values of these variables.

The model can be outlined as follows:

$$ {}_{t-i}CBI_{jt} = f({}_{t-i}Y_t,\ {}_{t-i}(P_j/PCON)_t,\ ICS_{t-i},\ Z) \qquad (3) $$

$$ EXP^p_{jt} = g({}_{t-i}CBI_{jt}) \qquad (4) $$

$$ EXP^u_{jt} = h[(Y_t - {}_{t-i}Y_t),\ (P_{jt} - {}_{t-i}P_{jt}),\ (PCON_t - {}_{t-i}PCON_t)\ (ICS_t - ICS_{t-i})] \qquad (5) $$

$$ EXP_{jt} = EXP^p_{jt} + EXP^u_{jt} \qquad (6) $$

where ${}_{t-i}CBI_{jt}$ is the proportion of households in period t-i who intend to purchase good j in period t,

${}_{t-i}Y_t$ is the expectation held in period t-i of income in period t,

${}_{t-i}(P_j/PCON)_t$ is the price of good j relative to total goods that is expected to prevail in period t,

ICS_{t-i} is a measure of consumer sentiment at the time future purchasing plans are made,

Z is a matrix of other variables that affect expenditure plans,

EXP^p_{jt} is planned expenditure on good j undertaken in period t, and

EXP^u_{jt} is unplanned expenditure on good j in period t.

Equation (3) is essentially the same sort of consumption function as that estimated in Chapter 5. Intentions are formed on the basis of such factors as expected income and prices. The vector Z might include variables such as existing stocks and so on, but since they are less likely to fluctuate significantly from expected values, at least in the short run, they are not emphasized here. Actual planned purchases in equation (2), or

purchases indicated in the Survey, are then a function of the proportion of households indicating that they were going to make such expenditures.

For one reason or another, household expectations of incomes, prices, and so on may not be realized and as a result expenditure plans are modified, either positively or negatively. Thus equation (5) shows unplanned expenditures being determined by differences between actual and expected incomes and prices and by changes in consumer mood. Notice that the price term has changed between equations (3) and (6). In the former there is a relative price term while in the latter the price of the good and the general price level terms enter separately, to take into account the fact that unexpected inflation may have effects on expenditures over and above the effect of lowering the relative price of good j.*

Total expenditure on good j, in equation (6), is the sum of planned and unplanned expenditures. Combining equations (4), (5) and (6) yields the following equation to be estimated.**

$$EXP_{jt} = a_0 + a_1(Y_t - {}_{t-i}Y_t) + a_2(PCON_t - {}_{t-i}PCON_t) + a_3(P_{jt} - {}_{t-i}P_{jt}) + a_4(ICS_t - {}_{t-i}ICS_t) + \sum_{i=1}^{n} b_i \cdot {}_{t-i}CBI_{jt} + u_t \qquad (7)$$

Before estimating the model, some attention should be paid to two considerations, the linkage between the buying intentions measure and expenditures, and the length of lags.

As has been pointed out previously, the linkage between the

---

* Although the equation as shown here contains the simple difference between actual and expected magnitudes, in the estimation the difference as a proportion of the expected value was used.

** If, for example, unexpected inflation increases uncertainty about real incomes, expenditure on good j could decrease. See Juster and Wachtel (1972c).

Survey intentions measure and the expenditure aggregates is potentially quite weak, since the Survey gives no information on the value of an intended purchase. Consider the following identity:

$$EXP^{p}_{jt} = HH^{p}_{t} \cdot VALUE^{p}_{jt} \qquad (8)$$

where HH^{p}_{jt} is the number of households planning to purchase a good from category j in period t, and

$VALUE^{p}_{jt}$ is the planned real value of that purchase.

The Survey intentions measure represents the number of households planning to make a purchase. Equation (2), then, implicitly assumes that the value is the same for all purchases, or that when a household plans a purchase from category j it is a standard item or basket of items. Even so $VALUE^{p}_{jt}$ would, for a number of social, demographic and economic reasons, be expected to exhibit a rising trend over time. Deflating the expenditure magnitudes by labour force population and prices would capture some of these influences; however, either a time trend or a permanent income variable was included as well to proxy any remaining trend factors.

As for the length of lags, if the Survey is accurate one would expect consistency from one sampling to the next. Thus, for example, if a household replies in a survey taken at time t-2 that it plans to purchase a new automobile at time t, then in the absence of information that causes it to change its income and price expectations it should also answer in the affirmative in a survey taken at time t-1.* If, on the other hand, information acquired in the interval between t-2 and t-1 does induce a change in plans the household should give a negative reply in the t-1 survey. In other words, the t-1 survey should reflect all the

---

* In fact, the same households are not surveyed each time although, if the sample selection is valid, this should not affect the results.

information available up to time t-1.

This has several implications for the lengths of lags in the estimating equation. In the first place the lag on the buying intentions variable must include t-1; longer lags are permitted but only if t-1 is included, since it supposedly reflects the latest information available to households when they are planning expenditures. It also follows that income and prices are properly forecast one period ahead.

6.2 THE DATA

Equations were estimated for the same intentions-expenditure categories as in Chapter 4. Once again expenditures were expressed in constant dollar terms deflated by labour force population. An equation was also estimated for new automobile unit sales.

The expected income series are permanent income as calculated in Chapter 5. Expected prices were estimated following the Kennedy-Lynch (1979) methodology, as a moving seventh-order autoregressive process with a seven-year sample period. The sentiment measures were those used in Chapter 5.

6.3 THE RESULTS

The estimation results are shown in Table 7. The proxy for the value of consumer purchases, whether a straight time trend or permanent income, clearly improves the expenditure equations. Since the equation for the new automobile units would not be affected by the value problem, as the expenditure equations are, it was not deemed necessary to include a permanent income measure. To capture other trend factors that might be at work, however, a time trend was inserted into some of the equations.

For reasons outlined earlier, separate variables were included for the actual versus the expected general price levels and the actual versus the expected own prices. As well, however, a variable representing an actual versus na expected relative price was tried. In the automobile expenditure equations, those

Table 7

MODEL II: REGRESSION RESULTS, AGGREGATE INDICES
1971Q1-1979Q4

A. New Automobile Units

	Intercept	YTRAN	UPCON*	UPNCAR**	URELP***	GTMP	QREB	TIME	CBINC J1L	CBINC J2L	$\bar{R}^2$	D.W.	SER
(1)	.0543	$.816\ 10^{-5}$	.0654	-.0338		.0061	.0054		-.0030	-.0098	.3551	1.36	.0031
		(2.96)	(.92)	(-1.81)		(1.94)	(2.99)		(-.54)	(-1.87)			
(2)	.0092	$.1805\ 10^{-4}$	.0855	-.0377		.0063	.0049	$.33*10^{-3}$	.0036	-.0036	.5652	1.82	.0025
		(5.24)	(1.46)	(-2.45)		(2.43)	(3.28)	(3.81)	(.75)	(-.78)			
(3)	.0049	$.1849\ 10^{-4}$	.0861	-.0356		.0062	.0049	$.35*10^{-3}$	.0022		.5714	1.75	.0025
		(5.48)	(1.48)	(2.36)		(2.41)	(3.28)	(4.40)	(.50)				
(4)	.0105	$.1836\ 10^{-4}$			-.0359	.0067	.0050	$.32*10^{-3}$	.0282	-.0038	.5684	1.68	.0025
		(5.38)			(-2.34)	(2.63)	(3.34)	(3.77)	(-.59)	(-.83)			

B. New Automobile Expenditures

	Intercept	YTRAN	UPCON	UPNCAR	URELP	GTMP	QREB	TIME	YPERM	CBINC J1L	CBINC J2L	$\bar{R}^2$	D.W.	SER
(1)	309.868	-.0108	618.147	-197.445		18.0027	30.4952			-53.2758	-89.7763	.4595	1.14	20.411
		(-.59)	(1.32)	(-1.59)		(.86)	(2.54)			(-1.46)	(-2.58)			
(2)	-143.962	.0973	820.075	-227.804		20.3901	24.9029		.0665	5.5162		.8336	2.06	11.324
		(6.04)	(3.13)	(-3.34)		(1.76)	(3.72)		(9.19)	(.27)				
(3)	-104.971	.0799	803.034	-232.872		19.6008	25.8120	3.0241		7.3979	-32.3523	.8162	2.02	11.902
		(4.94)	(2.92)	(-3.21)		(1.61)	(3.68)	(7.44)		(.32)	(-1.49)			
(4)	-98.2795	.0969			-216.865	25.6065	25.9507		.0617	3.5359	-25.9378	.8071	1.54	12.194
		(5.48)			(-2.93)	(2.08)	(3.61)		(7.29)	(.15)	(-1.14)			
(5)	-89.1271	.0837			-210.283	24.2041	26.5420	2.9541		-2.2534	-35.2776	.7899	1.48	12.726
		(4.85)			(-2.72)	(1.89)	(3.54)	(6.81)		(-.09)	(-1.52)			

C. New and Used Automobile Expenditures

	Intercept	YTRAN	UPCON	UPNCAR	URELP	GTMP	QREB	TIME	YPERM	CBINUC J1L	CBINUC J2L	$\bar{R}^2$	D.W.	SER
(1)	286.854	-.0178	1338.38	-169.702		8.7548	27.8277			-.5760		.1406	.88	27.828
		(-.70)	(2.05)	(-1.48)		(.30)	(1.70)			(-1.19)				
(2)	-148.567	.1165	719.735	-57.9245		23.9356	25.7259		.0721	.1749		.7958	1.98	13.565
		(6.28)	(2.22)	(-1.01)		(1.68)	(3.23)		(9.70)	(.71)				
(3)	-152.604	.1043	735.847	-48.3817		22.2615	26.0852	3.5855		.0484		.7674	1.86	14.477
		(5.49)	(2.13)	(-.79)		(1.46)	(3.07)	(8.90)		(.18)				
(4)	-160.060	.1234			-10.3117	24.7417	26.6980		.0748	.1760	-.0840	.7608	1.46	14.681
		(6.20)			(-.17)	(1.60)	(3.08)		(9.42)	(.90)	(-.29)			
(5)	-158.787	.1121			3.9755	22.8673	27.4894	3.7245		.2086	-.1993	.7329	1.40	15.514
		(5.52)			(.06)	(1.40)	(3.00)	(8.74)		(.64)	(-.64)			

D. Household Appliances

	Intercept	YTRAN	UPCON	UPRAPP	URELP	GTMP	TIME	YPERM	CBIAPP J1L	CBIAPP J2L	RHO	R^2	D.W.	SER
(1)	87.3923	-.0299	147.861	161.583		-20.6368			.1188			.1842	.41	8.979
		(-3.09)	(.77)	(1.52)		(-2.28)			(1.25)					
(2)	-26.9768	.0242	133.282	-16.9249		-3.7585		.0225	.0307		.5542	.9019	1.34	3.115
		(2.82)	(2.12)	(-.47)		(-.85)		(6.07)	(.89)		(3.25)			
(3)	-41.9767	.0249	138.555	-3.4049		-3.4049	1.2130		.0210		.5178	.9013	1.36	3.123
		(3.06)	(2.19)	(-.78)		(-.78)	(6.66)		(.60)		(3.04)			
(4)	-11.6346	.0156			-35.2950	-1.1253		.0189	.0316		.7060	.8955	1.28	3.215
					(-1.08)	(-.25)		(3.38)	(.92)		(4.95)			
(5)	-44.7161	.0335			5.3779	-3.5789	1.3002		-.0273			.8766	1.50	3.492
		(5.82)			(.13)	(-.99)	(13.61)		(-.72)					

Table 7 is continued on the following page.

Table 7 (continued)

E. Furniture and Floor Coverings

	Intercept	YTRAN	UPCON	UPFURN	UPREL	GTMP	TIME	YPERM	CBIFFC J0L	CBIFFC J1L	$\bar{R}^2$	D.W.	SER
(1)	105.766	-.0152	-24.5627	161.363		-4.834			-.0247		.0778	.42	8.596
		(-1.80)	(-.12)	(1.49)		(-.55)			(-.16)				
(2)	-43.4018	.0288	30.7907	12.7270		3.7853		.0236	.1323	.0519	.8989	1.97	2.846
		(6.22)	(.39)	(.34)		(1.26)		(15.05)	(2.51)	(.82)			
(3)	-40.9988	.0307	-2.3301	18.1396		4.122		.0239	.1536		.9002	2.12	2.830
		(7.63)	(-.03)	(.49)		(1.39)		(15.74)	(2.86)				
(4)	-42.2404	.0283	8.2689	23.0123		4.0119	1.2080		.0999		.8922	1.91	2.939
		(6.94)	(.12)	(.60)		(1.31)	(15.09)		(1.82)				
(5)	-41.4153	.0309			17.5365	4.1919		.0240	.1548		.9031	2.13	2.786
		(7.88)			(.48)	(1.44)		(16.0)	(2.94)				
(6)	-43.0067	.0286			21.7424	4.1468	1.2126		.1021		.8949	1.93	2.902
		(7.18)			(.58)	(1.37)	(15.44)		(1.88)				

* $UPCON = (PCON_t - {}_{t-i}PCON_t)/{}_{t-i}PCON_t$

** $UPNCAR = (PNCAR_t - {}_{t-i}PNCAR_t)/{}_{t-i}PNCAR_t$

*** $URELP = [(PNCAR_t/PCON_t) - ({}_{t-i}PNCAR_t/{}_{t-i}PCON_t)]/{}_{t-i}PNCAR_t/{}_{t-i}PCON_t)$

Notes

Figures in parentheses are t-statistics.

Mnemonics are listed in Appendix B, p. 51.

with separate price variables were slightly better than those with the relative price term, though in the units equations there was little difference. In the furniture and floor coverings and household appliances equations, the coefficients on the price variable were not only all insignificant, but usually of the wrong sign as well.

While all of the consumer sentiment measures were tried, the GTMP measure* was significant most frequently. In the household appliances equation, however, it carried the incorrect sign. As well, although the model implies that the change in the sentiment variable is called for rather than its level, in fact the former was never significant with any of the sentiment measures. That the contemporaneous level of GTMP was often significant is perhaps not too surprising, since a relatively optimistic outlook is probably implicit in a high level of intentions. Whether the intentions are subsequently carried out depends more on whether the outlook is still favourable than if it has changed slightly.

The results with respect to the buying intentions variables appear to confirm the outcome of the causality tests in Chapter 4. Little evidence was found to indicate that measures of buying intentions are good predictors of expenditures. Various lag lengths were tried, with the proviso made earlier that they begin with t-1. Even contemporaneous buying intentions were tried, although if the intentions measures are to be used as predictors this is not strictly justified.

The sole case in which intentions were significant and of the expected sign was in the furniture and floor coverings equation. Even here, however, the value of the intentions measure as a leading indicator is diminished because intentions and expenditures appear to be contemporaneously related. It is somewhat disturbing that in the new automobile units equations the intentions variable was not at all significant. This equation

---

* As in the previous chapter, GTMP is defined as the proportion of respondents who viewed the present as a good time to make a major purchase.

after all would seem to be the least affected by the value problem outlined earlier.

6.4 CONCLUSION

As in Chapter 4, tests fail to reveal a leading indicator relationship between surveyed buying intentions and subsequent expenditures. Not even in the automobile unit sales equations did the intentions variables approach significance. The results of tests both with a structural and with a reduced form model, then, lead one to conclude that the intentions part of the Survey is of little use as a predictor of consumer expenditures.

Chapter 7

CONCLUSIONS

The evidence presented in this study indicates that measures of consumer sentiment do have some value as leading indicators of consumer expenditures on durables, but buying intentions do not.

Changes in consumer sentiment (attitudes) precede changes in expenditure by about one quarter, according to the tests carried out in this study on the Conference Board's Index of Consumer Attitudes. The expenditure category most responsive to the attitudes measures is automobiles and parts.

To be included in a macroeconomic model, however, a sentiment variable would have to be forecast because of the short one-quarter lag. No attempt was made to forecast such a variable in the present work, except in the causality tests discussed in Chapter 4, although Angevine (1974) did try. He found objective variables to be useful in this regard, but he had to make extensive use of dummy variables to capture the effects of such factors as anticipated tax changes, Expo 67 and so on. The inference is that sentiment measures in macroeconomic forecasting models should probably be limited to use as checks or subsidiary aids.

When the Index of Consumer Attitudes is decomposed, it becomes apparent that two of the Survey questions--the one relating to the household's expected financial condition in six months' time and the one asking whether the household felt that the present was a good time to make a major purchase--are responsible for the explanatory power of the aggregate index. These findings are consistent with a number of other studies conducted in Canada and the United States.

As for buying intentions, they do not appear to be related to subsequent expenditure behaviour, according to the findings in this study. One possible exception is the furniture and floor coverings category, and even here intentions appear to be concurrent with expenditures rather than leading them. As was

stressed earlier, however, the relationship between intentions as currently surveyed and dollar expenditures is potentially weak.

APPENDIX A

CONSUMER BUYING INTENTIONS

1a. Do you or do any members of your household have any plans to buy an automobile, either new or used, within the next six months?

1 YES
2 NO
V NOT SURE

IF "YES" IN Q.1a, ASK:

1b. As you probably know, there are four main types of automobiles now on the market. There are the small cars, such as Datsun, Gremlin, Pinto, Toyota, Vega, and Volkswagen; the compact cars such as Hornet, Maverick, Nova and Valiant; the intermediate size cars like Chevelle, Coronet, Cutlass, Matador and Montego; and the large standard cars like Ambassador, Chevrolet, Chrysler and Ford.

Keeping these four groups of cars in mind, now of course it is difficult for you to say, but in which one of the classes do you think you would actually be buying a car? A small car, a compact, an intermediate ar a standard model?

1 SMALL
2 COMPACT
3 INTERMEDIATE
4 STANDARD

1c. Will it be a used automobile or a new autamobile?

1 USED
2 NEW
V NOT SURE

2. Please tell me, as I read out this list of appliances, if you or any other member of your household have any plans ta buy any af these appliances within the next six months, that is, between now and the next six months?

	Yes	Na	Nat Sure
Refrigeratar	1	2	V
Washing Machine	1	2	V
Television	1	2	V
Air Conditioner	1	2	V
Dishwasher	1	2	V
Clothes Dryer	1	2	V
Deep Freezer	1	2	V
Vacuum Cleaner	1	2	V
Gas or Electric Range	1	2	V

3. Do you or does anyone in your household plan ta buy furniture within the next six months?

1 YES
2 NO
V NOT SURE

4. Do you ar does anyone in your household plan ta buy floor coverings, that is, carpeting, rugs, linoleum or floor tile within the next six months?

1 YES
2 NO
V NOT SURE

5a. Do you, or anyone in your household, have any plans to repair, remodel, or make improvements on your home between now and the end of the next six months?

1 YES
2 NO
V NOT SURE

IF "YES" IN Q. 5a, ASK:

5b. Will the total cost be $500 or more?

1 YES
2 NO
V NOT SURE

6a. Do yau plan to take a vacatian away from hame, during the next twelve months?

1 YES
2 NO
V NOT SURE

IF "YES" IN Q. 6a, ASK:

6b. Where do you plan to go?

1 ATLANTIC PROVINCES
2 QUEBEC
3 ONTARIO
4 PRAIRIES
5 BRITISH COLUMBIA
6 U.S.A. (EXCEPT FLORIDA)
7 EUROPE
8 FLORIDA
9 OTHER COUNTRIES
V UNDECIDED
X OTHER ANSWERS (Specify): _____

6c. Haw will you get there?

1 AUTOMOBILE
2 BUS
3 TRAIN
4 PLANE
5 SHIP
6 OTHER (Specify): _____
V UNDECIDED/NOT SURE

7a. Do you or any members of your household have any plans to buy a home, either new or lived in within the next six months?

1 YES
2 NO
V NOT SURE

IF "YES" IN Q. 7a, ASK:

7b. Will it be a new house or one that has been lived in?

1 NEW
2 LIVED IN
V NOT SURE

8. Based upon what you hear from people talking, would you say that jobs right now in this community are plentiful, not so plentiful, or hard to get. Or what do you hear?

1 PLENTIFUL
2 NOT SO PLENTIFUL
3 HARD TO GET
4 OTHER (Specify): _____

9. Considering everything, would you say that your family is better off financially, the same, or worse off financially now than it was say six months ago?

1 BETTER OFF
2 THE SAME
3 WORSE

10. Again, considering everything, do you think that your family will be better off financially, the same or worse off financially say six months from now than it is now?

1 BETTER OFF
2 THE SAME
3 WORSE

11. How do you feel the the job situation and overall employment will be in this community, in say six months from now? Do you think that there will be more jobs, fewer jobs, or about the same as now?

1 MORE
2 FEWER
3 ABOUT THE SAME

12. Compared to what's happening now, do you think prices in general will rise faster through the next few months, about the same as now, or more slowly?

1 FASTER
2 ABOUT THE SAME
3 MORE SLOWLY
V NOT SURE

13a. Do you think that right now is a good time or a bad time to buy a house?

1 GOOD
2 BAD
V NOT SURE

13b. Do you think that right now is a good time or a bad time for the average person to make a major outlay for things such as a home or a car or some other major item?

1 GOOD
2 BAD
V NOT SURE

14. Considering everything do you think economic conditions in the country as a whole will be better, the same or worse say six months from now than they are now ?

1 BETTER
2 THE SAME
3 WORSE
V DON'T KNOW

APPENDIX B

MNEMONICS LIST

CBIAPP - proportion of households intending to buy an appliance within the next six months.

CBIFFC - proportion of households intending to buy furniture and/or floor coverings within the next six months.

CBINC - proportion of households intending to buy a new automobile within the next six months.

CBINUC - proportion of households intending to buy a new or used automobile within the next six months.

CDUR - constant-dollar expenditure on consumer durables divided by labour force population.

EXPAPP - constant-dollar expenditure on household appliances divided by labour force population.

EXPFFC - constant-dollar expenditure on household furniture and floor coverings divided by labour force population.

EXPNC - constant-dollar expenditure on new passenger ears divided by labour force population.

EXPNUC - constant-dollar expenditure on new and used passenger ears divided by labour force population.

FCGMF - proportion of households that expect their financial position to improve over the next six months.

GTMP - proportion of households that regard the present as a good time to make a major outlay.

ICA1 - Index of Consumer Attitudes excluding neutral responses.

ICA2 - Index of consumer Attitudes including neutral responses.

IRCA - constant-dollar investment in residential construction divided by labour force population.

KCAR - stock of automobiles divided by labour force population.

KDUR - stock of durable goods divided by labour force population.

KMISC - stock of miscellaneous consumer durables divided by labour force population.

PCAR - implicit GNE deflator for automobiles and parts divided by the implicit GNE deflator for total consumption.

PCDMIS - implicit GNE deflator for miscellaneous consumer durables divided by the implicit GNE deflator for total consumption.

PDUR - implicit GNE deflator for consumer durables divided by the implicit deflator for total consumption.

PHHDU - implicit GNE deflator for household durables divided by the implicit deflator for total consumption.

QREB - dummy variable for automobile rebate schemes.
QSTR - dummy variable for strikes in the automobile industry.

UNNC - unit sales of new passenger cars.

UPCON - difference between actual and expected consumption deflator.
UPFFC - difference between actual and expected deflator for furniture and floor coverings.
UPNCAR - difference between actual and expected defaltor for new passenger cars.
UPNUCAR - difference between actual and expected deflator for new and used passenger cars.
UPRAPP - difference between actual and expected deflator for household appliances.
URELP - difference between actual and expected relative price for individual categories.

YPERM - permanent income divided by labour force population.
YTRAN - transitory income divided by labour force population.

REFERENCES

Angevine, Gerald E. "Forecasting Consumption With a Canadian Consumer Sentiment Measure." Canadian Journal of Economics, Vol. VII, No. 2, May 1974, pp. 273-289.

Darby, Michael R. "Postwar U.S. Consumption, Consumer Expenditures, and Saving." American Economic Review Papers And Proceedings, Vol. LXV, No. 2, May 1975, pp. 217-222.

Defris, L.V. and J.S. McDonnell. "The Demand for New Motor Vehicles." The Australian Economic Review, 4th quarter 1976, pp. 56-63.

Fleet, David and Daniel Kelly. "TSP Subroutines--To Test Exogeneity." Bank of Canada mimeo, RM-80-104, September 1980.

Hsiao, C. "Autoregressive Modeling of Canadian Money and Income Data." Journal of the American Statistical Association, Vol. LXXVII, No. 367, September 1979, pp. 553-60.

Jarrett, J. Peter and Jack G. Selody. "The Productivity-Inflation Nexus in Canada 1963-79," Technical Report 23. Ottawa: Bank of Canada, 1982.

Juster F.T. and P. Wachtel(a). "Anticipatory and Objective Models of Durable Goods Demand." American Economic Review Vol. LXII, No. 4, September 1972, pp. 564-79.

Juster F.T. and P. Wachtel(b). "Inflation and the Consumer." Brookings Papers on Economic Activity 1972:1, pp. 71-122.

Juster, F.T. and P. Wachtel(c). "A Note on Inflation and the Saving Rate." Brookings Papers on Economic Activity 1972:3, pp. 765-778.

Kennedy, Michael and K. Lynch. "The Modeling of Inflation Expectations." Bank of Canada mimeo, MFA 160-4-1, 1979.

Kennedy, Michael and K. Lynch. "The Formulation of Statistically Rational Expectations With An Application to a Permanent Income Model of the Demand for Money." Bank of Canada mimeo, MFA 160-3-2, 1979.

Linden, Fabian. "The Measure of Consumer Confidence." Across the Board, Conference Board, New York, April 1979.

Mishkin, Frederic. "Consumer Sentiment and Spending on Consumer Durables." Brookings Papers on Economic Activity, 1978:1, pp. 217-232.

Mishkin, Frederic. "What Depressed the Consumer? The Household Balance Sheet and the 1973-75 Recession." Brookings Papers on Economic Activity 1977:1, pp. 123-174.

Pierce, D.A. and L.D. Haugh. "Causality in Temporal Systems: Characterizations and a Survey." Journal of Econometrics, Vol. 5, No. 3, May 1977, pp. 265-293.

Robertson, Heather and Michael McDougall. "The Structure and Dynamics of RDXF," Technical Report 26. Ottawa: Bank of Canada, 1982.

Thomas, R. William. "The Effect of Averaging Components on the Predictability of the Index of Consumer Sentiment." Review of Economics and Statistics, Vol. LVII, No. 1, February 1975, pp. 84-91.

Ward, A.V. and J.F. Pickering. "Preliminary Testing of the Explanatory Power of the EEC Consumer Attitudes Survey in the United Kingdom." Applied Economics, Vol. 13, No. 1, 1981, pp. 19-34.

Printed in Canada Imprimé au Canada