CONSUMER ATTITUDES, BUYING INTENTIONS AND CONSUMPTION
EXPENDITURES:
AN ANALYSIS OF THE SWEDISH HOUSEHOLD SURVEY DATA

by

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ABSTRACT

Surveys collecting data on consumer attitudes and buying intentions have been performed in Sweden since 1973. This paper examines the predictive ability of such data in models for total private consumption and expenditures on durables. The study shows that this type of data has a predictive value in addition to other economic variables. In particular, we have found that intention variables perform very well in the model for durables both as regards the contribution to the explanatory power and the improvement of the ex post forecasts.

1. INTRODUCTION

Surveys collecting information on households' attitudes and buying intentions have been performed in many countries since they were initiated by Katona and his colleagues at the Survey Research Center (SRC) at the University of Michigan in the 1940's (Katona&Mueller, 1952, 1956). The basic idea behind this approach is that consumers' consumption and saving decisions are determined not only by their ability to buy but also by their willingness to buy. The ability to buy is measured by economic variables such as the disposable income whereas the willingness to buy is measured by attitudes and intentions.

Several studies of the predictive value of attitudes and buying intentions were performed by Katona and Mueller in the 50's. These were based on a rather small number of surveys. In a study by Mueller (1963), 22 surveys from the period 1952-1961 were used. She found that discretionary spending to a large extent is explained by the income level and the state of consumer optimism and confidence measured by an attitude index. However, the buying intentions index did not add anything when taken together with the attitude index. The above studies triggered off a number of studies looking into various aspects of using attitudes and intentions in consumption models, e.g., factors explaining attitudes, index construction and the predictive value of this kind of data.

Some of these studies are for the US (Adams & Green 1965 and Mishkin 1978), for Canada (Shapiro & Angevine 1969) and for some EG countries (Ward & Pickering 1981, Abeele 1983, Biart & Praet 1987 and Praet & Vuchelen 1989). The results of these studies are not conclusive as regards the predictive value of attitudes and intentions variables. However, several of the studies indicate the usefulness of such data especially in equations concerning durables. Katona's argument that attitudes measure consumers' willingness to buy and disposable income their ability to buy implies that one should expect attitudes to play a more important role for predicting durable expenditures than non-durable expenditures. This is so since purchases of durables can be done or postponed at the households' own decision (discretionary purchases) whereas non-durables have to be purchased with a certain regularity.

In Sweden the regular collection of data on consumer attitudes and buying intentions started in 1973 and has since been done on a quarterly basis. In Öhlen (1984) a model for total private consumption is analyzed using semi-annual data from 1974:1 to 1981:2. He finds that the prediction properties are substantially improved by including a buying plan variable and an index of separate consumer attitudes. On the basis of two equations for total private consumption Malmberg & Lindblad (1988) find only marginal improvements in predictive ability by adding different attitude variables. They did not include any intentions variables in their study.

The main objective of our study is to examine the predictive ability of both attitude and intentions variables in addition to other variables in models for expenditures on total private consumption and also on durables (cars + other durables). We will start in Section 2 by describing and analyzing the attitude and intentions data collected by Statistics Sweden and some indices are proposed. The economic models to be used are introduced in Section 3. In Section 4 results concerning the individual contribution of the alternative indices in the models are presented together with estimated models. A small study of the forecasting properties is done in Section 5 and the final section contains some concluding remarks.

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2. THE ATTITUDE AND INTENTIONS DATA

2.1 Background. Regular quarterly collections of data on consumer attitudes and buying intentions (HIP-surveys) have been carried out by Statistics Sweden since October 1973. Since the start the sample sizes and sample designs have undergone several changes. In the beginning the number of households investigated was about 10 000. From July 1985 the January and July surveys cover 1 500 households and the April and October surveys 4200 households. The two panels are independent and one third is replaced at every occasion. This particular feature of the design will not be dealt with in this study.

The questions are inspired by Katona and Mueller (1952, 1956). The present Swedish surveys contain attitudinal questions about the economic development a year ahead (e.g. the general economic development, the personal financial situation, the unemployment), perceptions of the personal financial situation now compared with a year ago and buying intentions about cars. Katona and Mueller used a more comprehensive questionnaire, e.g. are the questions about the longer economic outlook missing in the Swedish surveys. The question concerning unemployment is included from the third quarter in 1976 and we have therefore excluded data previous to this quarter in our study. All the Swedish questions about attitudes and intentions to be used in our study are presented in Appendix A.

2.2 The attitudinal data. The scale of the attitudinal questions is the same in the HIP-surveys as in the SRC-surveys, a three point scale of the form "Better", "The same" and "Worse". A common practice is to calculate an index based on the difference between the proportion of responses to the alternatives "Better" and "Worse". It is worth mentioning that this is equivalent to averaging over a three point scale with equal scale steps. Another index is obtained by just giving weight to responses on "Better".

The most common way to summarize information from different questions is by averaging. Other ways of weighting have been proposed as for instance weights obtained from principal components analysis (Adams 1964).

In order to get a short way in the forthcoming sections to discuss the various attitude indices we will now define the notations to be used. All the indices are estimated proportions (in %) of households in the population in the given response categories. The variable labels consist of five letters, the first one denotes type of index (A = attitude), the second and third denote type of variable, the fourth is B for better and W for worse and the last is B for backward looking and F for forward looking.

APFBB = Personal Financial situation , Better , Backward.
APFWB = Personal Financial situation , Worse, Backward.
APFBF = Personal Financial situation , Better, Forward.
APFWF = Personal Financial situation, Worse, Forward.
AGEBF = General Economic situation , Better, Forward.
AGEWF = General Economic situation, Worse, Forward.
AUPBF = UnemPloyment, Better, Forward.
AUPWF = UnemPloyment, Worse, Forward.

From these variables we define the difference variables between "Better" and "Worse" as

APFDB = APFBB - APFWB,
APFDF = APFBF - APFWF
AGEDF = AGEBF - AGEWF,
AUPDF = AUPBF - AUPWB.

The composite indices can then be constructed by the combination of two or more of the individual indices. Three of the questions are forward looking and one is backward looking. We will therefore look at the following indices:

AIB3 = APFBF + AGEBF + AUPBF
AIW3 = APFWF + AGEWF+ AUPWF
AID3 = APFDF + AGEDF + AUPDF

AIB4 = APFBF + AGEBF + AUPBF + APFBB
AIW4 = APFWF + AGEWF+ AUPWF+ APFWB
AID4 = APFDF + AGEDF + AUPDF + APFDB

An alternative to summing over the different variables is to use different principal components. We have found that the first principal component is very close to a simple summation of the indices. And as the questions are few the gain of using the second principal component can be doubted - we can equally well use the separate variables.

The number of indices defined above is considerable and we will now study if there are indices which are very closely related to others and therefore can be excluded. The pair-wise correlations between Difference indices vs Better/Worse indices are presented in Table 1. The correlations are rather high, especially between "Worse" and "Difference". This depends on the larger variability in the "Worse" indices which also shows up in the corresponding Difference indices. This gives us an opportunity to disregard indices based on "Worse" responses in the following study.

TABLE 1. Correlations between Difference vs Better/Worse indices.

	APFDB		APFDF		AGEDF		AUPDF
APFWB	-0.95	APFWF	-0.95	AGEWF	-0.98	AUPWF	-0.99
APFBB	0.89	APFBF	0.89	AGEBF	0.88	AUPBF	0.94

The following tables present correlations between the different variables and indices which will be used in our study. As can be seen the correlations

TABLE 2A. Correlations among the "Better" based indices.

	AIB3	AIB4	AGEBF	AUPBF	APFBF
AIB4	0.98				
AGEBF	0.80	0.71			
AUPBF	0.92	0.91	0.58		
APFBF	0.74	0.83	0.34	0.64	
APFBB	0.59	0.73	0.14	0.55	0.91

TABLE 2B. Correlations among the Difference based indices.

	AID3	AID4	AGEDF	AUPDF	APFDF
AID4	0.99				
AGEDF	0.92	0.89			
AUPDF	0.93	0.93	0.73		
APFDF	0.91	0.94	0.81	0.80	
APFDB	0.68	0.77	0.49	0.65	0.87

between the composite indices are very high. Using one or the other of these indices can not be expected to make any difference in our regression modelling. The correlations in Table 2B are with one single exception higher than the corresponding correlations in Table 2A. Striking is for example the low correlation between AGEBF and APFBF which means that households seem to have different expectations about improvements in their personal finances and improvements in the general economic situation.

2.3 **The buying intentions data.** An alternative to the measurement of consumer optimism and confidence by attitudes is to measure the buying plans of consumers. The only buying intention variable that now can be found in HIP is about cars. The car buying intentions within 3, 6, 12 and 24 months are measured on a probability scale from 0% to 100%. The respondents are also asked if they plan to buy a new or used car. To reduce the amount of alternative plan variables we will only look at the high probability variables (at least 70% probability) and we will skip the longer outlook variable "24 months".

TABLE 3. Correlations between "at least 70% probability of buying a car" and "100% probability of buying a car" in i = 3, 6, 12 months ahead.

	NEW			USED		
i:	3	6	12	3	6	12
r:	0.98	0.98	0.97	0.96	0.92	0.92

TABLE 4. Correlations between buying a car with 100% probability within 3, 6 and 12 months.

	NEW		USED	
	3	6	3	6
6	0.90		0.74	
12	0.84	0.93	0.55	0.78

From the first table above we can see that the correlations between at least 70%-probability series and 100%-probability series are very high. We have therefore decided to use only the last group of series. The correlations between the series buying "new" and "used" cars have been found to be not so high (.4 to .6) regardless of planning period. For this reason we will use them separately in our models. From the last table we can see that series concerning new car purchases with different looking ahead horizons are relatively high correlated but not high enough for excluding any of them. That leaves us with the following six plan variables:

PN_{it}= the percentage of households that are 100% sure that they will buy a new car within i months (i=3, 6 and 12).

PU_{it}= the percentage of households that are 100% sure that they will buy a used car within i months (i=3, 6 and 12).

We will also consider the sum of PN_{it} and PU_{it} as a measure of buying intentions.

2.4 **Simple graphical description of some of the indices.** In Figure 1 we illustrate the development of four of our attitude indices, AID3, AUPDF, AGEDF and APFDF. It is to be noted that the first one, AID3, is the sum of the latter three ones. For comparative purposes we also present the employment rate and an index from the quarterly Business Tendency Surveys performed by the National Institute of Economic Research (to be called the NIER-index). This index measures the utilization of resources and is based on reports on full utilization of capacity and shortage of labour.

FIGURE 1. The development of four of the attitude indices and two economic
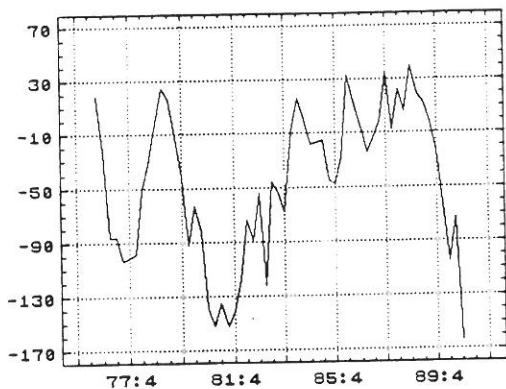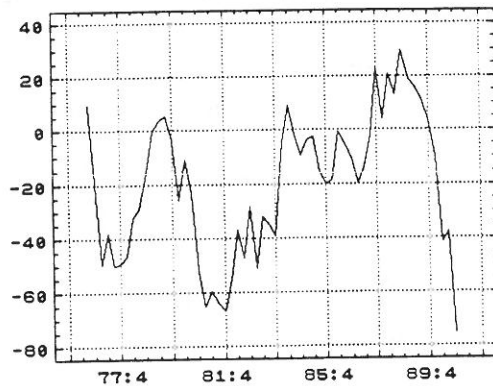indicators during 1976:3 - 1990:4.
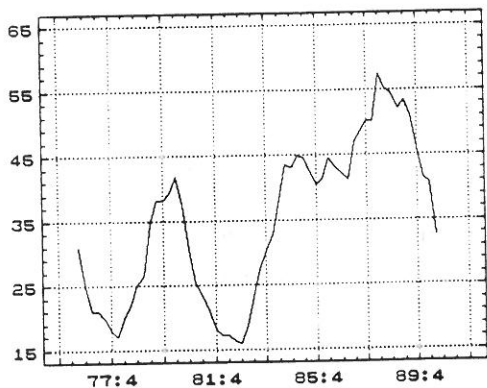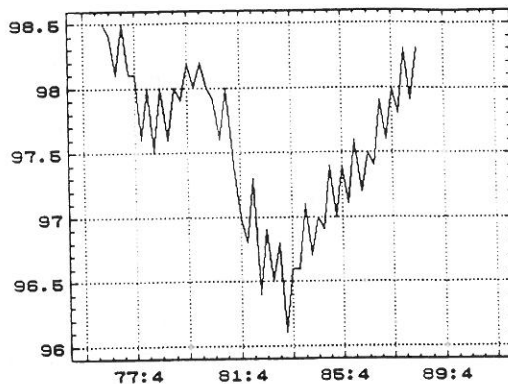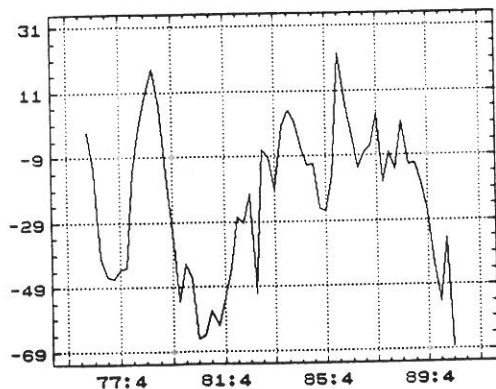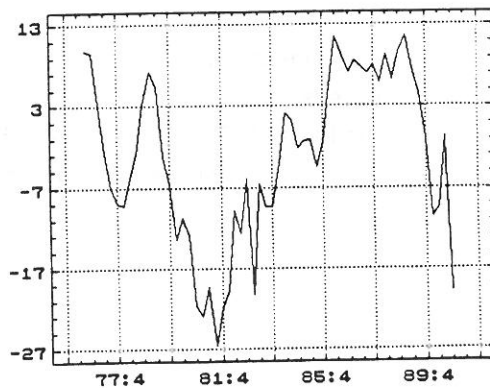
All the attitude indices show a similar pattern. However, the range is seen to be considerably smaller for APFDF indicating some caution in households as regards the view of their own future finances. An implication of this is that the influence of APFDF on the composite index is smaller than that of the two others included in AID3. When comparing the indices with the NIER-index we find a close agreement , especially so for AUPDF. Noticeable is, however, that the indices do not seem to be in phase with each other, for example can we see that AID3 seem to lead with 2-4 quarters. The indices do not to the same extent agree with the development of the employment rate but even here the long cycles can be observed.

Finally Figure 2 shows the development of the estimated proportion of households that plan to buy a new or used car within 6 months with a stated probability of 100%. The pattern is different from the indices in Figure 1 possibly a certain similarity can be found in the employment rate.

FIGURE 2. Estimated proportions of households who plan to buy new (PN6) or used(PU6) cars within 6 months with a probability of 100%.

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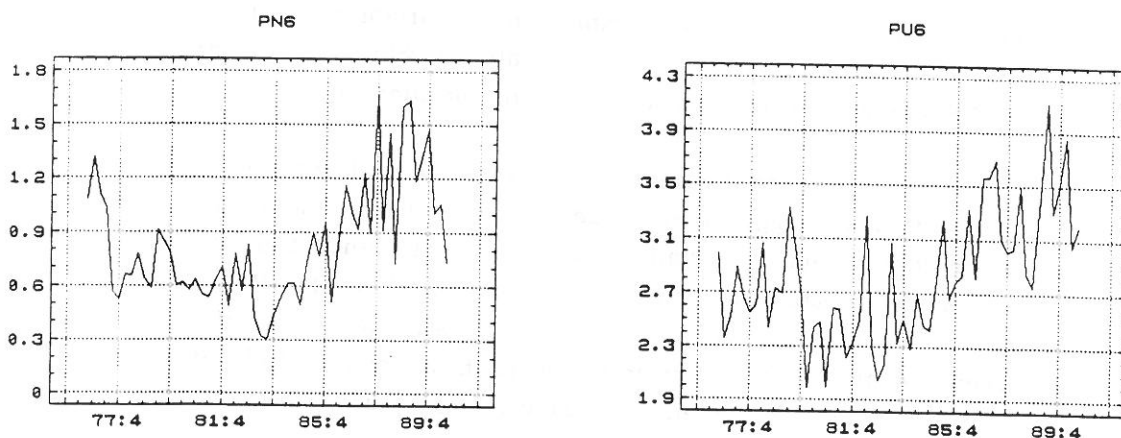
3. SPECIFICATION OF THE MODEL.

3.1 Background. The early studies of the predictive value of attitudes and intentions by Mueller (1960, 1963) considered models for durable expenditures with current or lagged disposable income and lagged consumption as the major explanatory variables. Adams (1964) and Friend & Adams (1964) tried various measures of general cyclical movements such as the unemployment rate, length of the work week and stock prices in addition to disposable income. Shapiro & Angevine (1969) basing their models on Friedman's Permanent Income hypothesis also included a price index in their equation of automobile expenditure, other durable expenditures and models of non-durables. Their composite index of consumer mood significantly improved their automobile equation. Angevine (1974) tried an attitude index in a multi-equation macro model of the Canadian economy. In several of the studies mentioned intentions data were also included but found of less predictive value than attitudes.

Using data from the Swedish Surveys of Consumer Buying Expectations, Öhlen (1984), studied equations for total private consumption derived from the habit persistence theory, using disposable income and lagged consumption as the only explanatory variables besides various attitude/intentions based indices. Also Malmberg&Lindblad (1988) included these variables in their study of total private consumption.

In studies of the predictive value of attitude and intentions data on consumption or disaggregated consumption expenditures the number of other explanatory variables is usually kept to a minimum since it is believed that households' expectations and intentions should catch up the effect of left out factors. Our approach will be to specify and estimate the model as well as possible on the basis of a given economic theory and to find out whether attitudes and/or buying intentions add anything to such a model.

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3.2 Total private consumption.

The study by Öhlen is based on a model proposed by Brown (1952), $C_t=\alpha+\beta_1Y_t+\beta_2C_{t-1}$ originating from the theory of habit persistence. For comparative purposes we will use this model together with a model derived from the life-cycle hypothesis (Modigliani, 1975),

$$C_t = \alpha + \beta_1Y_t + \beta_2C_{t-1} + \beta_3W_{t-1} + \varepsilon_t ,$$

The notation used is C = total private consumption, Y = disposable income and W = wealth. For these models we will evaluate the effect of introducing indices of attitudes and intentions assuming a direct linear effect on consumption.

3.3 Durable consumption expenditures.

We will use a model for durable expenditures based on the classical stock adjustment approach. Consumers are assumed to try to attain a certain "desired" level of their stock of durables. The actual change in the stock of durables is believed to be a fraction of the desired change. It is also assumed that consumers at time t replace a fraction of their existing stock (SD) at time t-1. The desired stock is assumed to depend on a number of economic factors such as expectations of future income, existing wealth at the beginning of the period, the real interest rate (r) and relative prices (PD). Furthermore we assume that income expectations can be approximated by a weighted average of current and lagged disposable income. Using the assumptions above the following model can be derived (cf Berg, 1990)

$$CD_t = \alpha + \beta_1Y_t + \beta_2Y_{t-1} + \beta_3SD_{t-1} + \beta_4W_{t-1} + \beta_5 PD_t + \beta_6r_t + \varepsilon_t$$

As for our model of total private consumption we will also here analyze the predictive value of attitudes/intentions indices by assuming a direct linear effect on durable consumption expenditures.

4. EMPIRICAL RESULTS

4.1 Introduction. When attempting to find a useful model the final result is dependent on the approach being used in the search procedure. The procedure we have used is basically:

1) determining the "best" equation involving pure economic variables, in accordance with the discussion in Section 3, and dummy variables for specific economic events and seasonal variation.

2) finding out whether the attitude or intentions variables as defined in Section 2 improves the equation obtained in step 1.

We have chosen to specify all our models to be log-linear in the economic variables with the attitude/intention and dummy variables added linearly to the equation. This specification means that we have assumed constant elasticities and multiplicative seasonal effects.

The estimation period is 1976:3 to 1987:4. The remaining part of the observation period 1988:1 to 1989:4 will be used for an evaluation of the predictive ability of the estimated models.

All the variables (including dummy variables) being used in our study are defined in Appendix B where also their sources are presented.

4.2 Total private consumption. The model specified in the previous section is based on the life-cycle hypothesis where the wealth variable plays a central role. This means that the main difference between this model and the model used in Öhlen's study is the occurrence of the wealth variable in the former model. We intend to estimate both models in order to compare the importance of the attitude/intention variables.

The estimation results are presented in Table 4 where model A denotes the simpler model and model B the life-cycle based model. The estimates

TABLE 4. Estimation results of Model A and B of Total Private Consumption, 1976:3 - 1987:4.

VARIABLE	A1	A2	B1	B2
Constant	-.7804 (.6897)	-.1865 (.6570)	.7100 (.6688)	2.3023 (.8590)
$\ln Y_t$	.1217 (.0525)	.1157 (.0477)	.1598 (.0438)	.1297 (.0420)
$\ln C_{t-1}$	.9415 (.0581)	.8970 (.0548)	.6770 (.0776)	.5265 (.0912)
$\ln FW_{t-1}$			.0447 (.0125)	.0583 (.0126)
$\ln HW_{t-1}$			.0462 (.0277)	.0712 (.0273)
D_{2t}	.0729 (.0063)	.0675 (.0060)	.0538 (.0069)	.0407 (.0081)
D_{3t}	-.0033 (.0057)	-.0066 (.0053)	-.0172 (.0057)	-.0251 (.0061)
D_{4t}	.1160 (.0190)	.1126 (.0173)	.0771 (.0178)	.0673 (.0168)
Moms80	.0246 (.0088)	.0222 (.0080)	.0205 (.0072)	.0181 (.0067)
Moms83	.0271 (.0090)	.0238 (.0083)	.0265 (.0074)	.0240 (.0069)
AC87	.0288 (.0134)	.0312 (.0122)	.0272 (.0109)	.0262 (.0101)
AGEDF		.0222 (.0075)		
PN6t				.0211 (.0079)
R^2 - adjusted	95.4%	96.2%	96.9%	97.4%
Durbin's h	2.03	1.24	1.05	1.55

presented under A1 and B1 do not include attitudes/intentions variables whereas those under A2 and B2 do. To begin with we analyze the result for

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models A1 and B1. Both models fit well to the data with R^2-values around 96%. The tests for serial correlation do not indicate any problems for model B1 whereas the test results are more inconclusive for model A1. All the estimated parameters show the expected signs and the only significant difference between the parameter estimates is found for lagged consumption.

In model A1 this estimate is close to one implying an unrealistic long-run income elasticity of about 2. In model B1 the corresponding elasticity is found to be about .5. The wealth has been disaggregated into two parts one measuring financial assets (FW) and one measuring real estate assets (HW). The elasticities with respect to these variables are as expected rather low about .045. Adding these two variables to model A1 increased the explanatory power significantly ($F(2,35)=10.2$). It is worth mentioning that total wealth measured by the sum of FW and HW does not contribute significantly to Model A1.

In order to investigate the predictive ability of the attitudes/intentions variables defined in Section 2 we have systematically added one at a time to Model A1 and to Model B1 . The results are summarized in terms of adjusted R^2-values and p-values in Tables 5-6. Comparing the number of significant variables among attitudes vs intentions variables the most striking pattern to be observed in the tables is the predominance of significant attitude variables for Model A and significant intentions variables for Model B. This of course depends on the effect of including or not including the wealth variables. We now give some comments on Models A and B separately:

Model A: Starting with the composite attitude indices we find them all to contribute significantly. The fact that all behave similarly is in line with what could be expected from our correlation study in Section 2. Among the individual indices the attitudes about the general economic development (AGEBF, AGEDF) seem to be better than most of the other indices (except for APFBF). No general conclusion can be drawn whether the indices should be based on proportions "Better" or differences between "Better" and "Worse". The only significant intentions index is the estimated proportion of households planning to buy a new or used car within three months with a probability of 100%.

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Table 5. The contribution of attitudes/intentions variables. Model A.

Attitude variables			Car-buying intentions		
Index	R^2-adj	p-value	Index	R^2-adj	p-value
AGEBF	95.9%	.018	PN3	95.5%	.166
AUPBF	95.6	.074	PU3	95.5	.116
APFBF	96.1	.007	PN6	95.3	.559
APFBB	95.5	.130	PU6	95.6	.070
AGEDF	96.2	.005	PN12	95.2	.925
AUPDF	95.7	.057	PU12	95.4	.220
APFDF	95.6	.078	PN3+PU3	95.8	.029
APFDB	95.2	.836	PN6+PU6	95.6	.071
AIB3	96.0	.015	PN12+PU12	95.3	.378
AID3	96.0	.014			
AIB4	96.0	.015			
AID4	95.8	.026			

Table 6. The contribution of attitudes/intentions variables. Model B.

Attitude variables			Car-buying intentions		
Index	R^2-adj	p-value	Index	R^2-adj	p-value
AGEBF	96.9%	.284	PN3	97.3%	.027
AUPBF	97.0	.181	PU3	96.9	.451
APFBF	97.2	.040	PN6	97.4	.012
APFBB	97.2	.048	PU6	97.0	.194
AGEDF	97.0	.139	PN12	97.3	.022
AUPDF	97.0	.132	PU12	97.0	.146
APFDF	97.1	.086	PN3+PU3	97.2	.035
APFDB	97.1	.117	PN6+PU6	97.3	.016
AIB3	97.0	.146	PN12+PU12	97.2	.039
AID3	97.1	.100			
AIB4	97.1	.110			
AID4	97.1	.089			

<u>Model B</u>: Only two of the attitude indices are significant, both concerning households' financial situation (APFBF and APFBB) none of them strongly significant. All indices based on plans of buying new cars are significant. The best ones are those concerning plans on six months horizon. (PN6 and PN6+PU6).

Some further considerations:

i) Combinations of attitudes and plan variables do not seem to improve the models.

ii) Lagging attitudes and plan variables do not seem to improve the models.

In Table 4 we have presented the estimated equations (A2 and B2) obtained by adding the best index as found in our previous discussion to models A1 and B1 respectively. As expected we have obtained a substantial increase in the adjusted R^2-values for both equations and the tests of serial correlation give satisfactory results. All the parameter estimates have the expected signs. The major difference concerning the parameter estimates is found for the long-run income elasticity . For Model A this is now 1.1 and for Model B it is 0.3. Comparing with our previous estimates the former is of a more realistic size whereas the latter is perhaps too low. In Appendix C we have illustrated actual and fitted values as obtained from Model B2.

4.3 Durable consumption expenditures. According to our theoretical model presented in the previous section there are a number of explanatory variables in the equation for durable expenditures. The estimated model with all these variables is presented as Model I in Table 7. As can be seen the results are not satisfactory since a number of parameter estimates are far from significant. The "best" model we have found after step 1) in our search procedure is presented as Model II in the table. All the estimated parameters have the expected signs and are significantly different from zero on the 5% level probably even when taking into account the low value of the Durbin-Watson test-statistic. The estimated income elasticities seem to be too high. The elasticity with respect to financial wealth is estimated to .16% which is as expected higher than the estimate obtained for total consumption.

TABLE 7. Estimation results of the model of durable expenditures, 1976:3 - 1987:4.

VARIABLE	I	II	III	IV
Constant	-9.180 (6.762)	-14.60 (3.516)	-5.637 (3.610)	-5.037 (3.538)
$\ln Y_t$	.7225 (.3289)	.9401 (.2351)	.5080 (.2198)	.4637 (.2137)
$\ln Y_{t-1}$	.4798 (.3597)	.9218 (.2420)	.6104 (.2131)	.6083 (.2125)
$\ln FW_{t-1}$	.3356 (.1309)	.1630 (.0270)	.1303 (.2364)	.1242 (.0226)
$\ln HW_{t-1}$	.4038 (.2569)			
$\ln SD_{t-1}$	-.4104 (.6434)			
$\ln PD_t$	-.0264 (.5725)			
$\ln r_t$	.5196 (.5794)			
D_{2t}	.2085 (.1176)	.3604 (.0745)	.2480 (.0671)	.2456 (.0669)
D_{3t}	.0194 (.1221)	.1719 (.0807)	.0779 (.0703)	.0802 (.0701)
D_{4t}	.0720 (.1298)	.1490 (.1069)	.1727 (.0884)	.1861 (.0869)
Moms80	.0862 (.0437)	.0918 (.0424)	.0850 (.0350)	.0849 (.0349)
Moms83	.1094 (.0457)	.1136 (.0446)	.0860 (.0374)	.0827 (.0372)
AC87	.1700 (.0660)	.1742 (.0633)	.1474 (.0527)	.1458 (.0525)
AVB76	.1206 (.0620)	.1115 (.0433)	.0361 (.0400)	
PN6t			.1660 (.0398)	.1822 (.0354)
R^2 - adjusted	86.1%	86.5%	90.8%	90.9%
DW	1.09	1.05	1.45	1.48

Following the same procedure as in the previous section we now investigate the influence of the different attitude/intentions variables (see Table 8). None of the attitude variables yields a significant contribution to Model II! Among the car-buying intention variables all indices based on plans of new car purchases are significant and the best one is PN6. The combined longer horizon indices also perform very well. We have also investigated the effect of lagging the indices 1 or 2 steps. In the table we have shown results for the best three of these lagged indices, all concerning new-car purchases. It is seen that they work almost as well as the corresponding current indices and might therefore be useful as predictors in a forecasting model. Furthermore, it is worth mentioning that lagging the attitude variables improves the results marginally among the group of attitude variables.

TABLE 8. The contribution of attitudes/intentions variables. Model II.

Attitude variables			Car-buying intentions		
Index	R^2-adj	p-value	Index	R^2-adj	p-value
AGEBF	86.1(%)	.908	PN3	88.1(%)	.024
AUPBF	86.6	.278	PU3	86.4	.440
APFBF	86.2	.702	PN6	90.8	.000
APFBB	86.3	.502	PU6	86.4	.450
AGEDF	86.1	.942	PN12	90.0	.001
AUPDF	86.3	.522	PU12	86.3	.506
APFDF	86.4	.417	PN3+PU3	86.4	.423
APFDB	86.8	.201	PN6+PU6	88.9	.006
AIB3	86.2	.592	PN12+PU12	87.6	.054
AID3	86.2	.638	PN6t-1	88.6	.011
AIB4	86.3	.550	PN12t-1	89.2	.004
AID4	86.3	.537	PN12t-2	88.8	.008

In Table 7 we have augmented Model II with PN6t which was found to be the best intention variable (see Model III). However, in this equation one of the dummy variables was found insignificant and therefore excluded and the model reestimated (Model IV). Compared with Model II the adjusted R^2 -

value has improved considerably and so the value of the Durbin-Watson test statistic. The estimated income elasticity is now of a more realistic size indicating a long-run elasticity of just above 1%. In Appendix C the actual and fitted values based on Model IV are illustrated.

4.4 Concluding remarks about the search procedure. When searching for the attitude/intention variables which contributed most to the predictive power in addition to the economic variables we examined a great number of alternatives. Of course, with such a procedure, there is a risk that the final choice is somewhat dependent on the sample period. This has not been investigated systematically. However, the search procedure has been replicated after having excluded observations for 3 years in the beginning of the sample period and the results were found to be mainly the same both as regards the selected indices and the parameter estimates.

5. FORECAST EVALUATION

5.1 Introduction. In this section we will present a forecast evaluation of the estimated models for total private consumption and durable consumption expenditures. For total private consumption all the estimated equations in Table 4 will be used. In model A2 the attitude index AGEDF is being used. We have also tried one of the composite indices, AID3, instead of AGEDF in this evaluation (Model A21). For durables we have used models II and IV in Table 7. Model IV includes PN6t as a measure of buying intentions. We also noted in Table 8 that lagged plan variables performed well. Hence we have also tried one of these, PN12t-1, as an alternative to PN6t (Model IV2).

The evaluation will be performed by doing ex post forecasts for the period 1988:1-1989:4 using the estimated models in Tables 4 and 7. The comparison between outcome and forecast will be summarized in terms of three measures, the mean absolute percentage error (MAPE), the mean square error (MSE) and the mean percentage error (MPE). MPE is included since it gives information about tendencies of the forecasts to under- or overestimate the actual values. MAPE and MSE both measure the variability in the

forecast errors, the first one is easy to interpret and the second one is included since it is closely related to our criteria for estimating the models.

5.2 Results of the forecast comparisons.

In Table 9 the summarizing measures of prediction errors of the ex post forecasts for the period 1988:1-1989:4 are presented. The individual percentage errors for each quarter can be found in Table 10. We will first give some comments on the overall measures beginning with total private consumption (see Table 9A).

Comparing the models including the wealth variables (B1 and B2) with those without wealth (A1, A2 and A22) the former ones perform somewhat worse than the latter ones at least when considering MAPE. Turning to the predictive value of our attitude/intention variables the results show no improvement by inserting them, one can even observe a deterioration in some of the measures.

TABLE 9A. Evaluation results. Total private consumption.

MODEL	INDEX	MAPE(%)	MSE('000)	MPE(%)
A1	---	1.00	2749	.13
A2	AGEDF	1.06	3183	.56
A22	AID3	1.02	2988	.43
B1	---	1.10	3592	.36
B2	PN6t	1.50	5249	.39

TABLE 9B. Evaluation results. Durable consumption expenditures.

MODEL	INDEX	MAPE(%)	MSE('000)	MPE(%)
II	---	12.03	3141	12.03
IV	PN6t	9.33	2220	8.91
IV2	PN12t-1	6.93	1468	6.93

In Table 9B we present the results for durables we can see that the intention variables both improve the forecasts considerably, the measures being reduced by about 25% for Model IV and up to 50% for Model IV2.. However,

the forecast errors are quite large and we can observe from MPE that this is due to a systematic underestimation during the forecast period. This can also be studied in Table 10B where the individual forecast errors are presented. The superiority of Models IV and IV2 can be seen for example by observing that four out of eight forecast errors are smaller than or equal to the smallest forecast error of Model II.

TABLE 10A. Individual forecast errors (%). Total private consumption.

Model	88:1	88:2	88:3	88:4	89:1	89:2	89:3	89:4
A1	2.51	-0.36	-1.24	-0.13	0.01	1.69	-1.79	0.33
A21	2.80	0.14	-0.77	-0.10	0.28	2.22	-1.14	1.03
A22	2.69	0.01	-0.90	-0.20	0.08	2.09	-1.26	0.93
B1	3.23	0.67	-0.48	0.16	0.01	1.76	-1.94	-0.52
B2	3.84	0.81	0.91	-0.29	-1.01	1.96	-2.06	-1.07

TABLE 10B. Individual forecast errors(%). Durable consumption expenditures.

Model	88:1	88:2	88:3	88:4	89:1	89:2	89:3	89:4
II	18.1	17.9	12.6	12.5	8.1	13.2	7.2	6.6
IV	18.0	12.0	17.7	5.1	-1.7	12.8	4.1	3.3
IV2	10.6	16.9	7.1	14.6	2.3	6.6	3.4	0.2

As can be seen from Table 10A the forecasts from the different models for total private consumption tend to over- or underestimate the actual values for different quarters in a similar way. As for durables we also here note the relatively large forecast errors for the first quarter of 1988. This of course can be due to the introduction of a change in rules for paying by instalments.

6. CONCLUDING REMARKS

A general conclusion to be drawn from our study is that the information in attitude and buying intentions data has a predictive value in addition to other economic variables. This has been found in the model for total private consumption where the majority of the attitude indices gave a significant contribution together with disposable income and lagged consumption. When the wealth variable is included the intention variables concerning new cars all contribute significantly whereas the attitude indices seem to play a minor role in this case. This highlights the importance of the model specification when it comes to the predictive ability of the attitudes and buying intentions variables.

As mentioned in the introduction one would expect attitude/intentions variables to perform better in models for durable expenditures. We found that the intentions about new cars contributed significantly and resulted in a reduction in the unexplained variation of about 30% which is about twice the reduction observed for total private consumption. Surprisingly, none of the attitude indices turned out to contribute significantly. On the other hand, this is in line with the results for the model of total private consumption that also included the wealth variable.

In the forecast evaluation we have used the "best" indices (see Tables 9A-B) and the period 1988-1989. The forecasts of durable expenditures are substantially improved when adding intention variables. However, forecasts of total private consumption were not improved by either attitudes or intentions. These results must be considered to be tentative mainly because of the very short forecast period being used.

The results especially for durables suggest some further investigations e.g. a more comprehensive forecasting evaluation and using further disaggregation. Of particular interest is to consider automobiles since the intentions are about car purchases.

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APPENDIX A

16 What is the chance in percents that you/your family will buy or change car within 2 years? Which of the alternatives between 0 to 100 do you choose?

Absolutely certain	100 %
	90 %
	80 %
	70 %
	-------
	20 %
	10 %
Absolutely no chance	0 %
Don't know	99

17 a-c What is the chance that you will buy or change car

	a) within 12 mths	b) within 6 mths	c) within 3 mths
Absolutely certain	100 %	100 %	100 %
	90 %	90 %	90 %
	---------	--------	---------
Absolutely no chance	0 %	0 %	0 %
Don't know			

18 If you will buy or change car will it be a new or used one?

1 New
2 Used
3 Don't know

43 What do you think the general economic situation of Sweden is going to be over the next 12 months? Will it be better, worse, or about the same as now?

1 Better
2 The same
3 Worse
4 Don't know

45 What do you think about unemployment in Sweden over the next 12 months? Will it decrease, increase or be about the same as now?

1 Decrease
2 The same
3 Increase
4 Don't know

46 Do you think that your/your family's financial situation is better, worse, or about the same compared to 12 months ago?

1 Better
2 The same
3 Worse
4 Unable to answer...
5 Don't know

47 What do you think about your/your family's financial situation is going to be over the next 12 months? Will it be better, worse, or about the same as now?

1 Better
2 The same
3 Worse
4 Don't know

APPENDIX B

Definitions and sources of variables.

C   Total Private Consumption Expenditures in 1985 prices.
CD   Car and Other Private Durable Expenditures in 1985 prices.
Y   Disposable Income in 1985 prices.
SD   Stock of Durables (Cars and Other Durables) in 1985 prices.
r   Real Rate of Interest
PD   Relative Price of CD compared to the Price of C.

All the above variables were obtained from the National Institute of
Economic Research, Stockholm.

FW   Net Financial Wealth of the households in 1985 prices.
HW   The Wealth of the Households in Dwelling (One- and two-dwelling
        houses, terrace houses, houses for seasonal and secondary use.) in
        1985 prices.

These variables are obtained from Berg (1990).

The following dummy variables take into account changes in the value added
tax:

Moms77   = 1 77:2 , = -1 77:3   (From 15.0% to 17.0% 1/6 1977.)
Moms80   = 1 80:3, = -1 80:4   (From 17.1% to 19.0% 8/9 1980.)
Moms81   =-1 81:3, = 1 81:4   (From 19.0% to 17.7% 16/11 1981.)
Moms83   = 1 82:4, = -1 83:1   (From 17.7% to 19.0% 1/1 1983.)

Two dummy variables were used to take into account changes in the sales tax
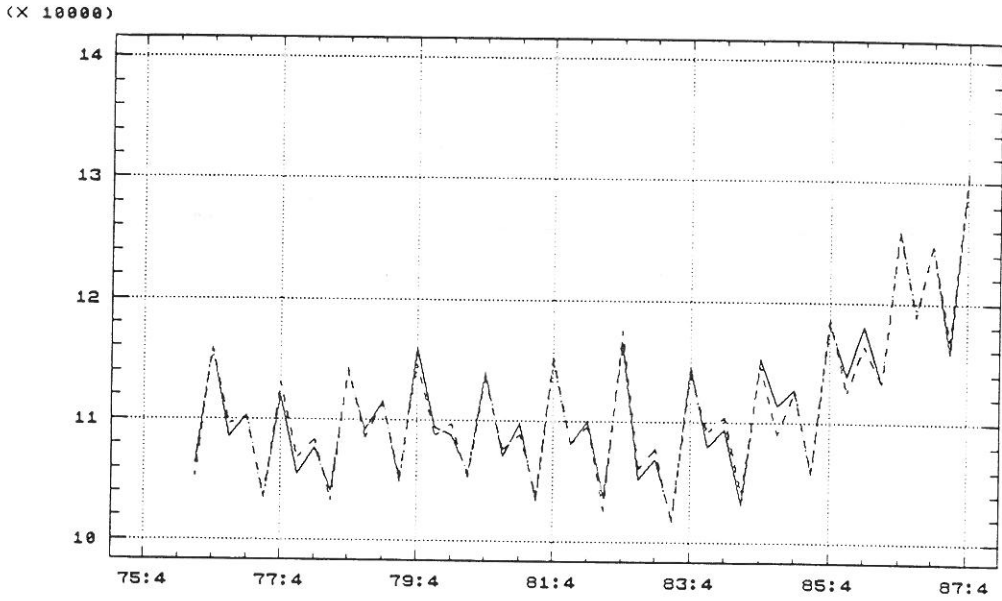of cars:

AC86   = 1 86:3-4   Increase of tax 1/7 1986.
AC87   = 1 87:2   Increase of tax 15/6 1987.

Two dummy variables were introduced to take into account changes in the
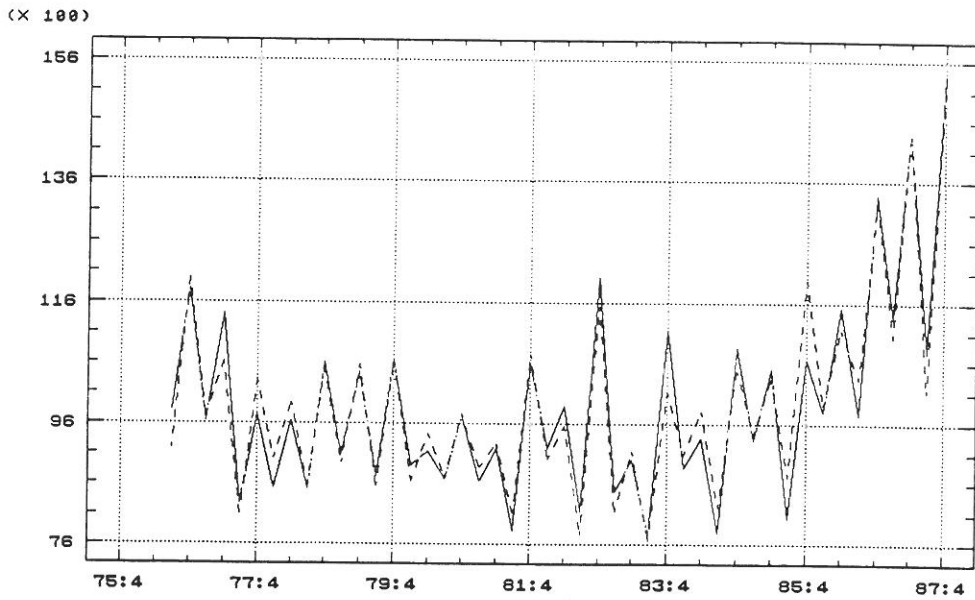rules for payments by instalments.

AVB76   = 1 76:3-4
AVB85   = 1 85:2

APPENDIX C

Total Private Consumption. Actual(——) and fitted (- - - -) values (Model B2). 1976:3-1987:4.

(× 10000)

Durable Expenditures. Actual and fitted values (Model IV). 1976:3-1987:4.

(× 100)

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