A MODEL OF CHOOSING A CAR WITH OR WITHOUT THE USE OF CREDIT *)

drs. A.J. Mathot

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CONTENTS

1. Introduction

To co-ordinate our search we first ask what function credit facilities may have for consumers and what characteristics the user of credit may have.
According to Thurow (1) the actual lifetime pattern of income is a severe constraint on the desired lifetime distribution of consumer expenditures; lifetime welfare might be substantially increased if the constraints on lifetime income redistribution could be lifted. In this view the use of credit is a way of helping to optimize the distribution of consumer expenditures over the different stages of life. Credit facilities relax the relation between current income and current consumption expenditures and make it possible to transfer consumption from the future to the present.
We also want to investigate how much, if at all, inflation is an extra stimulus to use credit. Springer (2) states that consumers do reallocate expenditures in response to the expected rate of inflation. Credit facilities could be a help in this respect.

At the same time accumulation of debts has unmistakable implications for future expenditure. For this reason it may be worthwile to know the expectations of consumers as to their own financial situation or that of the whole economy.
It was only in the nineteen fifties that empirical research commenced to investigate how much, if at all, psychological variables contribute to the explanation of consumer behaviour. In most psychological economic studies, of which George Katona is the pioneer, broadly defined indices of consumer sentiment are preferred as explanatory variables over single-faceted approaches to consumer sentiment. In this view, no single question can be relied on to be an equally effective indicator of general attitudes and expectations for all consumers. Thus, the sentiment measure should be reasonably broad based, encompassing the responses to questions of different dimensions, to represent the multi-faceted attitude complex of consumer sentiment. An exemple of an index of consumer sentiment is the ICS developed by George Katona. The ICS, as it is in use today, is based on the responses to five questions which reveal how people feel about their personal situation, business conditions and the market conditions for major durables (see Pais (3), appendix A, for a listing

of those five questions).
At the micro-level, construction of this index has been to allot two points to each positive answer to a question, one point to "no change" or "the same" answers (plus, "don't know"), whereas no points are given for a negative answer. Thus each respondent can score as high as ten points or as low as zero. As however, one of the five sentiment questions was not yet included in the May 1974 questionnaire the individual ICS can only take on values from zero to eight. However, the assertion that single-faceted approaches to consumer sentiment are bound to fail as explanatory variables, is not always confirmed by other econometric studies. Juster and Wachtel (4), for example, in their study "Inflation and the Consumer" came to the conclusion, that in the United States expected price increases had influenced the real expenditure on durable goods in the years 1960-1971.
Despite disagreements over the manner in which attitudinal variables should be constructed, their relevance in understanding the processes involved in the behaviour of persons in their role as consumers no longer constitutes a source of major controversy.

2. The Data

We use data from Dutch consumer surveys held in the series "Consumer attitudes and the demand for durable goods in the E.C. countries". Since 1972 these consumer surveys are being conducted on a regular basis in most member countries of the European Community. Their purpose is twofold: first, by obtaining information about buying intentions and attitudes of consumers, it is hoped to get more insight in the determinants of the consumption pattern, and secondly, it is intended to construct new instruments like the index of consumer sentiment in order to improve short-term forecasts of consumer durable expenditure. More information on these surveys is provided in the Monthly Bulletin of Social Statistics (5).
In this connection the respondents were, in addition to the usual demographic data, asked about their attitudes to the state of the nation's economy as well as to their own personal economic situation, and about their expenditures on consumer durables. It is however only in the case of family car purchases that the question is put whether or not they used credit. In order to assess the relative importance of factors for the use of credit, it was decided to concentrate on those respondents who bought a family car, leaving aside the question of why they did so in the first place.
The data refer to the year 1974, i.e. we use the surveys of May 1974, October 1974 and January 1975.

Before the data can be tested, certain manipulations are necessary to make them suitable for investigation. In the questionnaire, no direct question was asked about the price of the motor-car purchased; only in the case of the family car the respondent was asked to indicate in which of seven price classes this car must be put. To each of the seven classes the following central values have been assigned (see Pais, (3)).

Price class (in guilders)	Central value
- 4,500	3,036
4,500 - 5,500	5,000
5,500 - 6,500	6,000
6,500 - 7,500	7,000
7,500 - 9,000	8,250
9,000 -11,000	10,000
11,000 and over	14,100.

In order to ascertain whether the car purchased (regarding which it is only known when it was bought, with or without the use of credit and whether it was a new or used car) is, to all intents and purposes, the family car, where more information is available such as the time of purchase, when the car was built, whether it was bought new or second hand, certain answers were tested on their consistency. For example, where it was stated that the car in question was bought new, while the family car was constructed before the year 1973, simple logic tells us that the car bought in 1974 cannot be regarded as the family car and, for that reason, this respondent is not included in the sample.
Net disposable household income has not been asked directly either, but, again, the interviewee was requested to indicate to which of seven income classes his/her household belonged. Assuming a Pareto distribution, a central value was computed for each of these seven classes (see Pais (3)).

Income (in guilders)	Central value
- 10,000	5,758
10,000 - 13,000	11,350
13,000 - 17,000	14,652
17,000 - 21,000	18,725
21,000 - 25,000	22,772
25,000 - 35,000	28,917
35,000 and over	52,850

In the interviews the age of the head of the household is also taken down in classes. To the seven classes the following central values were given.

Age	Central value
under 30	25
30 - 40	35
40 - 50	45
50 - 60	55
60 - 65	62
65 - 75	70
over 75	80

After deleting also those questionnaires in which no answer was given to the questions related to net disposable income, the price of the motor car or how the car was financed, 627 complete questionnaires remained.

In exploring these data, crosstabulations were examined before making a final choice on the variables to be included and on their form. As can be seen from table 1, credit purchasers do on average spend more money on a motor-car than do cash purchasers, and have nevertheless less net disposable income. It seems that credit purchasers are slightly more prevalent among the younger age group and have larger families. These findings correspond with those of Janet A. Fisher (6). Comparing the different attitudinal variables it is seen that among the credit buyers a greater percentage expect that prices will rise more next year than they have in the year before (Eprice) and that their own financial situation (Efin) will improve. It is remarkable that both types of consumer have about the same index of consumer sentiment (ICS). In another cross-section analysis on similar data of Dutch households, it was found that the ICS played a predictive role with respect to gross outlay on motor cars (see Pais (3)).
As an introduction to the data, crosstabulations are made also between three price classes and several subdivisions of income, age and the size of the household. In table 2 the numbers in parenthesis are the 'expected' frequencies under the null hypothesis that the price of the car is independent of the other factor under consideration. In all three

Table 1. Means and their standard deviations for the two sub-groups

	Cash purchasers	Credit purchasers
Income (guilders)	23,319 (12,287)	20,721 (9,407)
Price of the family car (guilders)	6,679 (3,778)	8,144 (3,971)
Number of children	1.63 (1.41)	1.76 (1.34)
Size of the household	3.58 (1.49)	3.76 (1.37)
Age of the head of the household	42.46 (14.37)	41.35 (12.19)
Liberal profession	0.19 (0.39)	0.18 (0.39)
Employees	0.44 (0.50)	0.42 (0.50)
City	0.50 (0.50)	0.60 (0.50)
Eprice	0.25 (0.44)	0.39 (0.49)
Efin	0.22 (0.42)	0.25 (0.44)
ICS	4.09 (1.73)	4.03 (1.57)
Total	532	95

cases this null hypothesis can be rejected. This is due to the observed discrepancies in the extremes of the classifications.
As can be noticed the chance that a young person buys an expensive car is relatively small. The same can be said if a person earns a small income. This result is not accidental. Crosstabulation of income and age (see appendix B) shows that 45 procent of the people under the age of thirthy fall in the lowest income group. The null hypothesis that these two variables are unrelated must be rejected (chi square = 82.7 with 8 degrees of freedom).
When we consider the size of the household in relation to the price of the car we must reject also the hypothesis that these two are unrelated, although now the relation is not monotonic as it was in the case of age. Nevertheless the tendency to buy an expensive car is more prevalent in smaller families.Like age, household size is not independent of income as can be seen in appendix B, yet we feel that it does make a contribution of its own to the choice of the family car. Of course the income of the household is of extreme importance when one decides to buy a car - without it the chance of buying even the cheapest car becomes extremely small - but with the help of the age and the size of the household we will make an effort to measure the need of a certain household for a certain kind of car. At the same time we want to investigate whether those people who most feel the need for an expensive car are more tempted to use credit facilities to finance this car.

Table 2. Classificatory groups and marginal totals *)

	households	the price of the car in guilders under 5 500	5,500- 9,000	9,000 and over
Income in guilders				
under 17,000	210	125 (VIII) (95)	50 (XV) (54)	35 (XI) (61)
17,000-25,000	257	117 (XIV) (116)	81 (XVII) (66)	59 (XIII) (74)
25,000 and over	160	42 (IV) (72)	31 (II) (41)	87 (XI) (46)

chi square = 78.3 with 4 degrees of freedom

	households	the price of the car in guilders under 5,500	5,500- 9,000	9,000 and over
Age in years				
under 30	139	95 (VI) (63)	29 (VIII) (36)	15 (II) (40)
30 - 40	169	72 (IX) (77)	43 (XI) (44)	54 (XV) (49)
40 - 50	143	56 (IV) (65)	40 (V) (37)	47 (XI) (41)
50 - 60	104	39 (VII) (47)	29 (VI) (27)	36 (IV) (30)
60 and over	72	22 (0) (33)	21 (IV) (19)	29 (III) (21)

chi square = 46.3 with 8 degrees of freedom

	households	the price of the car in guilders under 5,500	5,500- 9,000	9,000 and over
Size of the household				
one or two persons	162	61 (I) (73)	44 (VI) (42)	57 (IX) (47)
three persons	142	63 (VII) (64)	47 (VIII) (37)	32 (VII) (41)
four persons	185	84 (IX) (84)	43 (XVI) (48)	58 (XII) (53)
five or more	138	76 (IX) (63)	28 (IV) (36)	34 (VII) (40)

chi square = 15.6 with 6 degrees of freedom

*) The Roman numerals in parenthesis indicate the number of credit users within the cell frequencies. The other numbers in parenthesis are the "expected" frequencies of the chi-square test.

3. The model of choosing a car with or without the use of credit

In order to describe individual consumer behaviour we will make the following assumptions.
First,we assume that the consumer can choose between cars of different prices, given that his financial situation allows him to buy a car. As we restrict ourselves to those interviewees who actually bought a family car, we do not have to bother with those people who decided not to buy a car, which would have made the analysis more complicated. Let S_i be the set of possible choices of consumer i given his budget constraint. Secondly, there exists for all individuals and for all prices a choice-function $F_i(p_j | x_i)$ in which p_j is price j and x_i is a vector of (observed) elements that consumer i will take into account before he makes a decision. Thirdly, we assume that in the case of consumer i choosing price j the following condition is fulfilled:

$$F_i(p_j | x_i) \geq F_i(p_i | x_i) \quad \forall\, p_i \in S$$

Having set up a framework within which a consumer makes his decision, we now go on making generalizations in order to work out testable hypotheses.
To do so,we assume that $F_i(p_j | x_i)$ can be written in the form

$$F_i(p_j | x_i) = F(p_j | x_i) + \varepsilon_i(p_j | x_i) \qquad (1)$$

where $F(p_j | x_i)$ is non-stochastic and reflects the "average" choice-function of the population and where $\varepsilon_i(p_j | x_i)$ is a random variable.

Next we define the probability $P_{l,i}$ that consumer i will choose p_l,

$$P_{l,i} = P((F_i(p_l | x_i) \geq F_i(p_j | x_i), \forall\, p_j \in S))$$

or using (1)

$$P_{l,i} = P((\varepsilon_i(p_j | x_i) \leq \varepsilon_i(p_l | x_i) + F(p_l | x_i) - F(p_j | x_i), \forall\, p_j \in S))$$

Let $g\ (\varepsilon(p|\ x_i))$ be the joint density function of $\varepsilon(p|\ x_i)$ where $\varepsilon(p|\ x_i) = (\varepsilon_i\ (p_1|\ x_i), \ldots,\ \varepsilon_i\ (p_m|\ x_i))$ with m the number of different prices, and let $G\ (\varepsilon\ \ (p|\ x_i))$ be the corresponding distribution function.

Then the probability that consumer i chooses price 1 is:

$$P_{1,i} = \int_{-\infty}^{\infty} G_1\ (\varepsilon_i(p_1|\ x_i) + F\ (p_1|\ x_i) - F\ (p_1|\ x_i),\ \ldots, \varepsilon_i(p_1|\ x_i),$$

$$, \ \ldots\ , \varepsilon_i(p_1|\ x_i) + F\ (p_1|\ x_i) - F\ (p_m|\ x_i))\ d\varepsilon_i\ (p_1|\ x_i)$$

$$\text{where } G_1 = \frac{\delta G}{\delta \varepsilon_i (p_1|\ x_i)}$$

The specification of the density function $g\ (\varepsilon\ (p\ |\ x_i))$ and the choice-function $F\ (p_j|\ x_i)$ will complete the formulation of this model of individual choice.

For the choice-function we will assume additivity between the different elements of x

$$F\ (p_j|\ x_i) = \alpha_{jl}\ x_{il} + \ldots + \alpha_{jk}\ x_{ik}.$$

This implies that individual i measures independently the importance of each element under consideration. For example, when he evaluates the importance of his income in relation to price j, he will at that time not be bothered by the fact that he has four children nor the other way around.

Another possibility in formulating the choice-function would have been to divide the sample into different strata.

In our view the next assumption on the disturbance is more crucial. In our case we will assume that $\varepsilon_i(p_j|\ x_i)$ will be independent for all prices and all individuals and will have the same Weibull distribution.

$$P\ (\varepsilon_i(p_j|\ x_i) \leq \varepsilon) = \exp\ (-\exp(-\varepsilon)).$$

Domencich and McFadden (7) have shown that in that case $P_{1,i}$ can be written as

$$P_{l,i} = \frac{\exp(F\ (P_l \mid x_i))}{\sum_{P_j \in S} \exp(F\ (p_j \mid x_i))}$$

This is called the multinominal logit model.

To get a better understanding of formula (2), we will rewrite it in the following form:

$$\ln \{\frac{P_{l,i}}{P_{n,i}}\} = F\ (p_l \mid x_i) - F\ (p_n \mid x_i)$$

$$= (\alpha_{ll} - \alpha_{nl})\ x_{il} + \ldots + (\alpha_{lk} - \alpha_{nk})\ x_{ik}$$

From this specification it becomes clear that this logit model is based on binary comparisons only in the absence of the other alternatives. Also it can be seen that $(\alpha_{li} - \alpha_{ni})$ measures the relative importance of x_i in relation to the two different price levels p_l and p_n. In fact, one cannot measure more than his relative importance because of the fact that the sum of all $p_{j,i}$ adds up to one.
At this stage we will not make further assumptions on the development of α_{ji} in relation to p_j although we will expect that if the price level increases, the absolute value of $\alpha_{l,i}$ increases also.
For this reason we will restrict ourselves to a limited number of price levels only.

So far we have developed a choice model for the different price levels of a car. According to the same line of reasoning we can construct a choice model for use of credit.
So we would get two separate models. But in our opinion, these two choices will not be taken independently, because after the consumer has made up his mind to buy a car, he will have to decide how much he can afford to spend and how much he thinks is worth spending on a car.
For this reason, we believe that the final choice for a certain car financed in a certain way is made simultaneously.

We get thus the following simultaneous model:

$$\ln \frac{P(C = 1 \mid P)}{P(C = 0 \mid P)}_i = r_i b + \sum_{k=2}^{m} a_k P^*_{ki}$$

$$\ln \frac{P(P = k \mid C)}{P(P = 1 \mid C)}_i = q_j C_k + d_k C_i \qquad k = 2, \ldots m$$

where r_i is a vector of exogeneous variables that affect C, q_i a vector of exogeneous variables that affect p_j and b and C unknown parameters. The $P^*_{k,i}$ and C are dummy variables, defined by

$P^*_{k,i}$: = 1 if respondent i bought a car of price k
0 if not

C_i : = 1 if respondent i bought a car on credit
0 if not.

In an article of P. Schmidt and R.P. Strauss (8) it is proved that from this specification it necessarily follows that $a_k = d_k$.

The model will be estimated by the maximum likelihood principle. To develop this, we calculate firstly the joint probabilities $P(C = i \text{ and } P = p_j)$. They turn out to be

$$P(C_i = 0 \text{ and } P_i = p_1) = A_i$$

$$P(C_i = 0 \text{ and } P_i = p_j) = \exp(q_i c_j).A_i \qquad j = 2, \ldots, m$$

$$P(C_i = 1 \text{ and } P_i = p_1) = \exp(r_i b).A_i$$

$$P(C_i = 1 \text{ and } P_i = p_j) = \exp(r_i b + q_i c_j + d_j).A_i \qquad j = 2, \ldots, m$$

where $A_i^{-1} = 1 + \exp(r_i b) + \sum_{j=2}^{m} \exp(q_i c_j) + \sum_{j=2}^{m} \exp(r_i b + q_i c_j + d_j)$

The likelihood function is

$$\prod_i \prod_k \prod_j P(C_i = k \text{ and } P_i = p_j)^{y_{kj,i}}$$

where $y_{kj,i} = 1$ if $C_i = k$ and $P_i = p_j$ else 0.

Maximum likelihood estimates will be calculated by an iterative method, since no direct way of solving the highly non-linear equations for the first-order conditions is available. The asymptotic variance-covariance matrix of the estimates is obtained by evaluating the information matrix at the maximum likelihood estimates.

4. The results

Before we can begin to discuss the results we must first decide how many different price classes will be distinguished. In the questionnaire there are seven in total, but taking all seven price classes into consideration risks clouding the issue because,as can be seen in table 3, the frequencies in certain cells are, relatively speaking, rather small. To avoid this problem,we will restrict ourselves at first to two broad price classes and later on to only three. In the case of two price classes,we define the first by taking the lower three price classes together and the second by the other four.

Table 3. Tabulation of the price classes for the two sub-groups

Price class	Cash purchasers	Credit purchasers	Total
-4,500	204	24	228
4,500 - 5,500	54	2	56
5,500 - 6,500	37	7	44
6,500 - 7,500	35	8	43
7,500 - 9,000	56	19	75
9,000 -11,000	79	14	93
11,000 and over	67	21	88
total	532	95	627

The results of this model can be found in table 4, where five possible combinations of explanatory variables were tested. The definition of the variables is given in appendix A.

Concentrating first on the income variable, two movements can be noticed. Having a small income makes one more likely to buy an inexpensive car, while buying such a car diminishes the chance of buying on credit. On the other hand, the consumer is more willing to buy on credit when his income is small. Besides income,other characteristics like the age of the age of the household and the household size are taken into account in order to describe more fully the stage of the life-cycle the household is in. As can be noticed, older people are more willing to buy an expensive car and less willing to buy on credit, although this last correlation is not very strong and what is in a way more

remarkable is the revelation that a large family generally does not buy an expensive car. Their need to have a big car possibly could be the same as their need to buy an expensive one, but, as the negative sign in the price equation indicates, together with the positive sign in the credit equation, the cost of living for a large family prevents them from doing so. In fact it is for that same reason that large families are more likely to use credit. In other words, when the need is felt to have a car, even when it is harder to afford as may be assumed in the case of a big family, the tendency is to buy it anyway regardless of whether one can pay the total amount at once. Another determining factor in deciding how much money to spend on a car is the social background of the head of the household. As the results show, the higher one's social status is, the more willing one becomes to buy an expensive car. Also it became clear that in no one of the three social classes are credit users more prevalent than in another (see table 1).
An explanation for the fact that users of credit are more to be found in big cities; may be that in cities more institutions are available and willing to give credit.

Concentrating on the aspects of attitudes of the consumer, the first conclusion that can be drawn is that expected price-movements influence consumer decisions relating to the use of credit. The feeling that the prices will go up higher than before is an incentive to buy now, if necessary on credit. Waiting and saving to puchase a car while meantime the price of the car rises substantially seems to those people to be an unattractive alternative, the more so when the cost of a loan is less than the increase of the car price, for this may become the case in a period of high inflation. On the other hand, the index of consumer sentiment did not give us relevant information on the use of credit, nor on the outlay on motor-cars. Also, the results do not show that people who hope to be financially better off in the future anticipate this improvement by asking for credit.

Table 4. Coefficients and standard errors

Dependent variable: $\ln \frac{P(P=1 \mid C)}{P(P=0 \mid C)}$

Explanatory variables:

Equation*)	Constant	Income	Age	Number of familymembers	Liberal profession	Employees	ICS	Credit	Likelihood
I	-2.205	0.465	0.031	-0.220	0.689	0.564		1.106	-639.243
	(0.399)	(.086)	(.007)	(0.062)	(.254)	(.197)		(.243)	
II	-2.200	0.463	0.031	-0.220	0.706	0.573		1.107	-635.985
	(0.399)	(.086)	(.007)	(0.062)	(.254)	(.198)		(.243)	
III	-2.278	0.465	0.032	-0.220	0.707	0.574		1.171	-635.055
	(0.406)	(.086)	(.007)	(0.062)	(.254)	(.198)		(.248)	
IV	-1.970	0.470	0.029	-0.224	0.681	0.590	-0.046	1.106	-635.605
	(0.477)	(.086)	(.007)	(0.063)	(.256)	(.199)	(0.053)	(.243)	
V	-2.195	0.464	0.031	-0.219	0.687	0.565		1.096	-639.696
	(0.399)	(.086)	(.007)	(0.062)	(.254)	(.197)		(.243)	

Dependent variable: $\ln \frac{P(C=1 \mid P)}{P(C=0 \mid P)}$

Explanatory variables :

Equation*)	Constant	Income	Age	Number of familymembers	City	Eprice	Efin	ICS	Price-dummy	Likelihood
I	-2.536	-0.360		0.186	0.461		0.254		1.106	-639.243
	(0.438)	(0.117)		(.078)	(.233)		(.263)		(.243)	
II	-2.684	-0.363		0.189	0.451	0.654			1.107	-635.985
	(0.438)	(0.117)		(.078)	(.233)	(.236)			(.243)	
III	-2.223	-0.361	-0.012	0.190	0.427	0.658			1.171	-635.055
	(0.547)	(0.118)	(.009)	(.118)	(.234)	(.236)			(.248)	
IV	-2.685	-0.363		0.189	0.452	0.652			1.106	-635.605
	(0.439)	(0.117)		(.078)	(.234)	(.236)			(.243)	
V	-2.482	-0.355		0.182	0.476			0.002	1.096	-639.696
	(0.510)	(0.117)		(.078)	(.233)			(.067)	(.243)	

*) Equations with the same number are estimated simultaneously

The next step will be to distinguish three different price classes instead of two in order to get a better understanding of the relative importance of the different price-levels on the use of credit as well as of the explanatory variables in the price equation. As we stated in the preceeding paragraph the coëfficients express the difference of importance between two different price classes for each variable in the equation.
In the lowest price class (P=L) fall those people who bought a car worth less than 5,500 guilders and in the highest price class those who bought a car worth more than 9,000 guilders (P=H), while the others fall in the middle class (P=M). Using the central values given to the seven price classes (paragraph 2), the average of P=L becomes 3,347 guilders, of P=M 7,258 guilders and of P=H 11,882 guilders.
In table 5 the results are given. As explanatory variable are used those of equation 3 of table 4 because we felt that this was the most relevant of the five.

From this specification it becomes clear that the age of the head of the household and the household size are especially important when the family decides between a cheap car and a middle class car, but these factors have little influence on the decision to buy an expensive car instead of a middle class one. When weighting these two last alternatives against each other, income almost solely plays the determining role together with the social background of the head of the household although this last factor only to the extent that he is an unskilled worker or not.
The fact that somebody purchases an expensive car instead of a middle class one does not increase much the urge to use credit facilities to finance it. Altogether it can be concluded that the decision to buy on credit is invoked when the need is felt to have a car at one's disposal which is a little more expensive than the household can afford.

Table 5. Coëfficients and errors

Explanatory variables:	$\ln\frac{P(P=M \mid C)}{P(P=L \mid C)}$	$\ln\frac{P(P=H \mid C)}{P(P=L \mid C)}$	$\ln\frac{P(P=H \mid C)}{P(P=M \mid C)}$	$\ln\frac{P(C=1 \mid P)}{P(C=0 \mid P)}$
Constant	-1.470 (0.459)	-3.455 (0.514)	-1.985 (0.552)	-2.836 (0.455)
Income	0.211 (0.112)	0.645 (0.100)	0.434 (0.100)	-0.373 (0.119)
Age	0.026 (0.008)	0.036 (0.008)	0.010 (0.008)	
Number of familymembers	-0.247 (0.074)	-0.270 (0.077)	-0.023 (0.083)	0.201 (0.079)
Liberal profession	0.207 (0.306)	1.224 (0.315)	1.017 (0.337)	
Employees	0.247 (0.227)	1.116 (0.259)	0.869 (0.278)	
City				0.451 (0.234)
Eprice				0.656 (0.236)
Credit	1.101 (0.288)	1.259 (0.298)	0.158 (0.282)	
Price-M				1.101 (0.288)
Price-H				1.259 (0.298)
Log-likelihood	-847.167			

5. Conclusion

Analysing the results on the use of credit in relation to the purchase of a family car, the conclusion seems justified that credit facilities relax the constraint on the desired lifetime distribution of consumer expenditures provoked by the actual lifetime pattern of income. Information on expected price movements of the consumer can be of help to understand more fully how consumer expenditures react to economic developments. For an understanding of the use of credit, a multi-faceted approach turned out to be less relevant.

Appendix A

Credit	: = 1 if the respondent bought the family car on credit 0 if not
Liberal profession	: = 1 if the respondent exercises a liberal profession or is a farmer 0 if not
Employee	: = 1 if the respondent is an employee or a civil worker 0 if not
City	: = 1 if the respondent lives in a city according to the definition of the Dutch Bureau of Statistics 0 if not
Eprice	: = 1 if the respondent thinks that the prices will go up the next twelve months more than they did before 0 if not
Efin	: = 1 if the respondent thinks that his/her financial situation will improve the next twelve months 0 if not
Income	: = net disposable income of the household measured in 10,000 of guilders
Price	: = the price of the family car bought in 1974 measured in guilders
Price dummy	: = 1 if the price of the family car is more than 6,500 guilders 0 otherwise
Price-M	: = 1 if the price of the family car is between 5,500 and 9,000 guilders 0 otherwise
Price-H	: = 1 if the price of the family car is more than 9,000 guilders 0 otherwise

Appendix B

		Income of the household (in guilders)		
	households	under 17,000	17,000-25,000	25,000 and over
Age				
under 30	139	62 (47)	57 (57)	20 (35)
30 - 40	169	41 (57)	86 (69)	42 (43)
40 - 50	143	41 (48)	46 (59)	56 (36)
50 - 60	104	31 (35)	48 (43)	25 (27)
60 and over	72	35 (24)	20 (30)	17 (18)

chi square = 43.6 with 8 degrees of freedom

		Income of the household (in guilders)		
	households	under 17,000	17,000-25,000	25,000 and over
Size of the household				
one or two persons	162	63 (54)	64 (66)	35 (41)
three persons	142	61 (48)	51 (58)	30 (36)
four persons	185	48 (62)	88 (76)	49 (47)
five or more	138	38 (46)	54 (57)	46 (35)

chi square = 18.3 with 6 degrees of freedom

The numbers in parentheses are the 'expected' frequencies under the null hypothesis that income is unrelated to the age of the head of the household and to the size of the household respectively.

(1) Lester C. Thurow, The Optimum lifetime distribution of consumer expenditures, American Economic Review, 1969

(2) William L. Springer, Consumer spending and the rate of inflation, The Review of Economics and Statistics, 1976

(3) A. Pais, On the relative strenght of sentiments and intentions, published in Relevance and Precision, Amsterdam, 1976

(4) F.T. Juster and P. Wachtel, Inflation and the consumer, Brookings Papers on Economic Activity, 1972

(5) Monthly Bulletin of Social Statistics in the Netherlands, November 1972 and September 1973

(6) Janet A. Fisher, An analysis of consumer goods expenditures in 1957, The Review of Economics and Statistics, 1962

(7) Thomas A. Domencich, Daniel McFadden, Urban travel demand, North Holland Publishing Company, 1975

(8) Peter Schmidt and Robert P. Strauss, Estimation of models with jointly dependent qualitative variables: a simultaneous logit model, Econometrica, 1975.