

ESTIMATING HOUSEHOLD EXPENDITURE FUNCTIONS

Contribution to the lifestyle-oriented
energy & emission models.

W. PELLEKAAN
A.H. PERRELS

Framework of the study

This report covers the consumption function estimation activities carried out in the framework of the EU project 'Consumers' lifestyles and pollutant emissions', which has been co-financed by the EU DG XII Environment programme (EU contract number EV5V-CT94-0373 and ECN project number 1.7169).

Abstract

This report describes the estimation procedure and results of expenditure functions for the Netherlands, France and Germany. In the project 'EU lifestyle and emissions' relations between lifestyle changes of the population of the three countries and the effects on energy use and emissions are analysed, based on an input-output approach. Consumption by households is translated into production requirements of industrial sectors and imports, and together with transportation requirements this results in energy use and emissions attributed to household consumption. In this report the consumption by households is the central issue. For the three countries sets of consumption functions are estimated that include the influences of income, prices and, other household characteristics on the consumption pattern. In a scenario approach developments of these explanatory variables will result in changing consumption patterns and thus changing energy use and emissions.

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SUMMARY

In co-operation with IER (Stuttgart, G) and C3ED (Versailles, F) ECN-Policy studies has carried out a project named Consumer's Lifestyles and Pollutant Emissions. The study was commissioned by EU DGXII in the framework of the Environment Programme. Among other things the study required a mechanism that is able to describe changes in consumption expenditures induced by changes in household characteristics such as income, education level, etc.

This report describes the analysis of the influences of household size, income and other socio-demographic factors on the consumption structure of households. The final products of the analysis are sets of consumption functions estimated by means of econometric methods and based on large household surveys for France, Germany and, the Netherlands. The sets of consumption functions are estimated for ten different household types. The sets of consumption functions consist of two layers. One 'upper' layer of six main expenditure categories and a more disaggregate layer of 16 categories. Explanatory variables are disposable household income, number of household members, age of head, education level, and relative prices.

For the Netherlands also the application of the sets of consumption functions in the framework of the ELSA model is demonstrated using different scenarios for income growth and distribution over households. Sub-categories that are expected to grow more than average in most scenarios are housing (rent), restaurants&holidays and garden&interior.

1. INTRODUCTION

Whereas environmental policies and research efforts have been focusing on the production side of economies for a long time, and for good reasons, more recently the demand side receives more attention. The demand side, notably demand for goods and services by private consumers, the government and by other countries through export, is the eventual economic driving force for producing all goods and services. In this respect private consumption is the most important category, particularly if one reckons that a major part of the exports is, though abroad, eventually also caused by private consumption. Bearing this in mind a project has been carried out that aims at analysing and illustrating the influence of changing consumption patterns on energy use and emissions. The project was named Consumer's Lifestyles and Pollutant Emissions. The project involved a co-operation between IER (Stuttgart, G), C3ED (Versailles, F) and ECN-BS (Petten, NL). Among other things the study required a mechanism that is able to describe changes in consumption expenditures induced by changes in household characteristics such as income, education level, etc.

Objective of this part of the study is to analyse the influence of household size, income and other socio-demographic factors on the consumption structure of households. What will be the effect of an increasing number of one and two person households on total consumption? Will the ageing of the population result in a changing consumption pattern? What is a 'sustainable' consumption pattern and how could this be achieved? To try to find answers on these and other questions, household expenditure functions will be defined, including explicitly the influence of household characteristics. In other words the product of this segment of the study is a set of consumption functions for each of the countries France, Germany and the Netherlands.

In this report the methodology is described, and carried out completely for the Netherlands. Because of limited availability of French data, for France only part of the results can be presented here. For Germany estimations have been carried out by IER Stuttgart (Christoph Weber and Beate Gebhardt) according to the same methodology, and results will be presented here to be able to make comparisons for the three countries.

In chapter two a few important factors are described and defined, viz. a definition of household types to be distinguished, and a categorization of consumer goods in main and subcategories. Furthermore the estimation methodology is described in chapter two.

Estimation results for the Netherlands, France and Germany are summarized in chapters 3, 4 and 5 respectively. Each chapter starts with results on income, expenditures and savings, to be able to determine expenditure forecasts for scenarios based on an income projection. Next part of the chapters contains results of the estimation (cross section as well as time series) for the main and subcategories of goods. In the chapters only results for the whole sample are described, and results per household are given in the appendices.

Main similarities and differences between the country results on estimated expenditure functions are given in chapter six on comparison of the country results. Based on this comparison conclusions with respect to the methodology and the results will be drawn, together with recommendations for further research.

In the last chapter results from scenario analysis in the framework of the project 'Consumers' lifestyle and pollutant emissions' are presented. In these scenario analysis the effects of changing consumption patterns due to changes in household characteristics are illustrated.

This report has been published both as an Annex to the main final report of the project (Weber et al, 1996) and as a separate ECN report. Related ECN reports subsequently deal with the description of the energy model ELSA (Perrels et al, 1996) and with the simulation results of four scenarios formulated in this project (Perrels and van Arkel, 1996).

2. METHODOLOGY

Before a description of the estimation procedure for expenditure functions is given, household types and categories of consumption goods have to be defined. Household types are distinguished by age, one or two adults, and presence of children (2.1). With respect to categorization of consumption goods we consider a two-level decision procedure, which means first a decision on budget shares for main groups of goods like food and home, followed by a second decision on how to spend the budget share for food to different categories of food products (2.2). In 2.3 the step-wise procedure on estimation of expenditure functions is described.

2.1 Definition of household types

When forecasting scenario variables at least the following two considerations are important:

- It should be possible to specify a meaningful development of the (exogenous) scenario variables; this could be a reason to keep the number of scenario variables rather limited.
- The specified development of the scenario variables should preferably result in interesting, i.e. evidently contrasting developments of dependent variables; this is a reason to set the number of scenario variables not too limited.

In the present model framework there are two options to model the expenditure functions, viz.

1. one expenditure function for the whole population for each product group;
2. an expenditure function for each product group for each type of household.

The advantage of the first option is the small amount of equations to be estimated, and the large number of observations on which the estimations can be based. Disadvantage is the (almost) complete levelling out of different developments in separate groups of consumers. Moreover, it may misrepresent various non-linearities with respect to household size and age. Conversely, the advantage of the second option is the possibility to allow for more differentiation in developments of the scenario assumptions. A disadvantage is the larger amount of equations to be estimated based on a limited number of observations, possibly too limited for specific household types.

Because of the better possibilities to allow for more differentiated consumption patterns in the second option it has been decided to estimate expenditure functions for each product group and each household type. Therefore, ten household types have been defined by considering the number of adults, the presence of children and the age of the head of the household. The number given in the table cells is the household type number referred to later in this report.

We do not include households for which the head of the family is older than 65, and with children, because this is only a very small group.

Table 2.1 Definition of household types

Age head of family	1 adult	2 adults	1 adult + child(ren)	2 adults + child(ren)
To 35 years	1	2	3	4
35 to 60 years	5	6	7	8
Older than 60	9	10	-	-

Some groups are represented more in the surveys than other, because their share is larger in reality too. It is possible that for a few groups the number of observations is too limited to carry out good estimations. Therefore, in some cases for example groups 1 and 5 are combined, and group 3 and 7.

2.2 Categories of household consumption

In general it is considered that households spend their income by a two-level decision approach. First step is to decide on how to spend income to main categories of expenditures like food and home. If the budget shares to these main groups are clear, a more specific decision has to be made on how to spend the budget share for food to different categories of goods. In our methodology we will follow this two-step approach by defining six main categories of goods, and 16 sub-categories of goods, as summarized in figure 2.1.

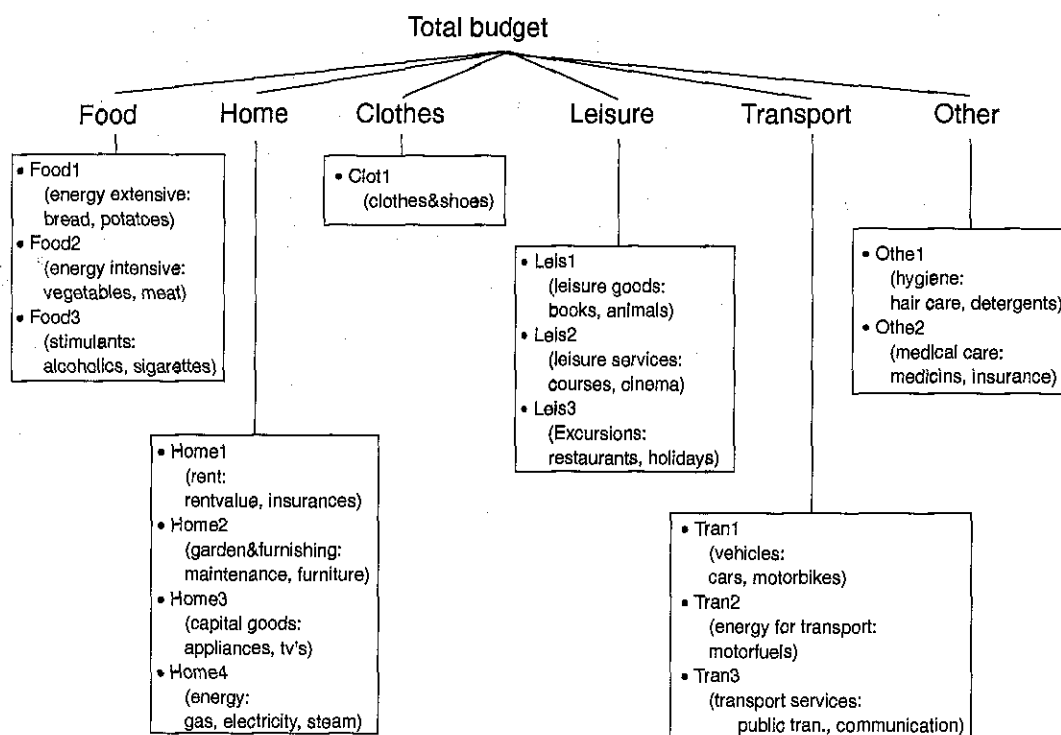


Figure 2.1 Definition of categories of household consumption

Because level of detail and definitions are different for the three country's Budget Surveys, a more detailed description of the sixteen categories of goods has been prepared to reach as much similarity as possible. This description is given in Appendix 1.

2.3 Methodology of estimation

Main part of this document is devoted to estimation of expenditure functions. In these functions one of the explanatory variables is an 'income' variable. It can be questioned which income measure should be used, viz. gross income, net income or total expenditures. Because in expenditure functions budget shares are considered, with budget share defined as the share of consumption (in money terms) of a good or group of goods relative to total expenditures, it is desirable to include total expenditures as explanatory variable. However, as part of scenario preparation a growth path of net income will be defined. Therefore the difference between net income and total expenditures, i.e. (free) savings, has to be defined.

After determination of total expenditures, first step in estimation of expenditure functions is to analyse relations between expenditures to a category of goods and household characteristics like income, size of household (number of members), age of head of family, and education level. These household characteristics are mainly concerned for budget shares on higher level, thus for the six main groups of goods.

Based on these results 'residual' time series are constructed, from which household influence is subtracted. These residual series could be explained by prices and trend. For the subgroups of goods, time series analysis is carried out to find estimates for its share of the main group.

Because it is considered that each household type has a specific consumption behaviour, these estimations are carried out for each household type, as far as sufficient data are available. Mainly with respect to time series estimation for the 16 subgroups of goods, data limitations will force to consider only three main groups of households. However, the method is first tested and illustrated for the whole population as one group.

The complete estimation procedure consists of the next steps¹.

Step 1	Cross-section estimation (with micro-data) of budget shares for 6 main categories: $sfood_{cs} = \text{food}/\text{expend} = F(\text{income, hsize, age, educ, educpart})$
Step 2	(Use time series data on explanatory variables (meso-data) to construct 'forecasts' for budget shares $sfood_{cs}(t)$; construct 'residual' series by subtracting estimated value ($sfood_{cs}(t)$) from realized budget share ($sfood(t)$): $sfoodr(t) = sfood(t) - sfood_{cs}(t)$
Step 3	Time-series estimation of 'residual' time-series $sfoodr_{ts} = F(\text{pfood, time})$
Total result	$sfood_{est}(t) = sfood_{cs}(t) + sfoodr_{ts}(t)$

¹ Food is mentioned in this example, but the same equations can be written for the other five main groups and sixteen subgroups of consumption.

This procedure will be carried out for the six main groups as well as for the sixteen subgroups of consumption goods. In figure 2.2 the methodology is given schematically.

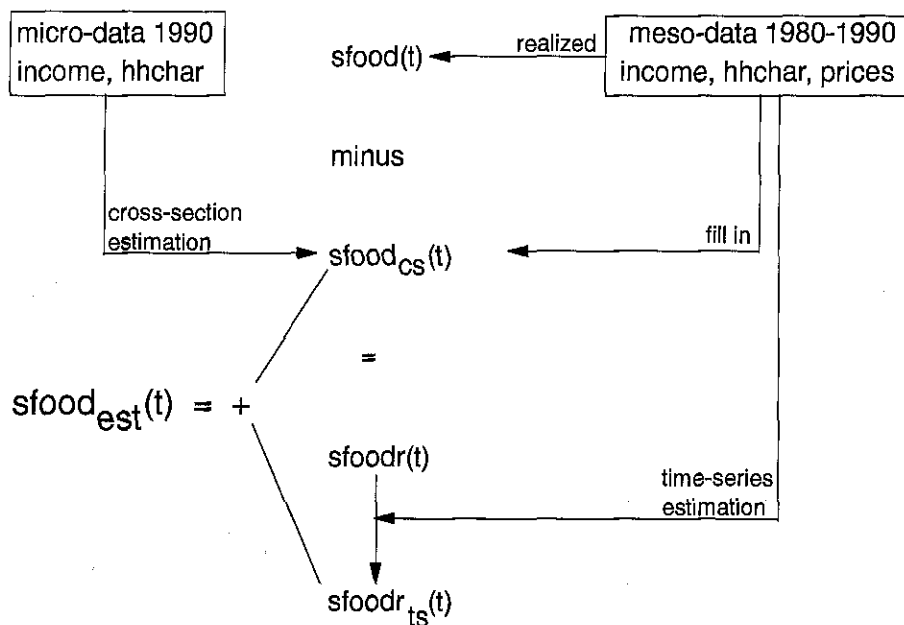


Figure 2.2 Schematic overview of methodology for estimation of expenditure functions for main expenditure categories

3. THE NETHERLANDS

In the Netherlands the Statistical Office has carried out a yearly Budget Survey since 1978. In this survey information is collected on expenditures, income and household characteristics of a sample of Dutch households. Objective of this Budget Survey is to describe, as complete as possible, the expenditure pattern of different types of households. For this study we used the complete Budget Survey data set for 1990, and time series with summarized data per household type for the years 1980 to 1990. Based on these data, estimations were carried out, of which main results are summarized in this chapter. First the 'income-variable', to be used in expenditure functions, has to be constructed by estimation of savings as a function of income (3.1). Next step is to estimate the expenditure functions for the six main groups of goods by cross section analysis of the 1990 Budget Survey and by time series analysis on the (meso-)data for 1980 to 1990, for the whole population as well as per household type (3.2.1). Based on these results the budget shares of the sixteen subcategories of goods can be determined, as described in 3.2.2.

3.1 Income, expenditures and savings

For the Dutch situation the following variables are available:

- . Gross income
 - = gross salaries for all household members
 - + fiscal benefits
 - + income from property
 - + subsidies (house rent and ownership, study, children)
 - + social payments
 - + pension
- . Net income
 - = Gross income
 - social insurance contributions
 - income tax
- . Total expenditures
 - = Sum of expenditures to all categories
- . Net income - Total expenditures
 - = free savings
 - + non-use expenditures (house tax, subscription for sport and school, passport, etc.)

Non-use expenditures are in general transfers from one consumer to another consumer, that means they stay within the same sector of the National Accounts, viz. the private sector. An example is subscription for sport and school. Another kind of non-use expenditures are non-tax payments, to public agencies, e.g. for licences. On a macro level these values are spent by for example the sport club again, so this can be measured in the consumption of the club. In our budget survey however this type of 'households' is not included. The payments to the government are measured in another 'column' at macro level.

On the other hand it can be expected that a large part of these expenditures are income dependent, and thus will only influence the level of savings and not the distribution. Furthermore the data set is not sufficient to separate these expenditures. Therefore the intercept of the savings equation can be adjusted with a 'non-use expenditures factor'.

3.1.1 Time series estimation

Based on a time series from 1980 to 1990 the following mean and variance values can be found

Table 3.1 *Main statistics for time series data on income and savings for the Netherlands*

Variable	Mean	Std Dev	Std dev/ \sqrt{N}	Minimum	Maximum
Net income	38988	11125	1194	20291	60638
Real income	42227	11942	1113	22731	64276
Total expenditures	35644	9817	982	17613	54358
Real expenditures	28550	10310	1031	21831	57904
Savings	3344	2311	231	-4020	12056
Real savings	3677	2644	264	-4174	15380
Savings share	0.08	0.05	0.0005	-0.11	0.25

Real income(t) = income(t) \times price(90) / price(t)

Real expend(t) = expend(t) \times price(90) / price(t)

Real savings(t) = savings(t) \times price(90) / price(t)

Savings share = real savings / real expenditures

From earlier estimations on Dutch consumption data the following conclusions (among others) were drawn:

- older people are saving more than younger people, considering the same income;
- presence of children will influence the share of income saved;
- saving behaviour depends on the income level.

Therefore the variables:

- age
- presence of children (Dummy Child =1 if children, Child =0 if no children) ,
- one or more person household (Dummy Onepers =1 if one person household, Onepers = 0 if more person household) and
- income

are included in estimations for savings of households.

Main results can be summarized as follows².

Table 3.2 *Estimation results of time series estimation on savings (real guilders 'not spent'): Real savings /1000 = F (Real income / 1000, Onepers, Child, Age)*

(Sub-)group	Const	Income	Onepers	Child	R ²
Population	-8.6	0.28	3.13	-1.11	0.60
Low incomes	-8.1	0.28	2.68	-1.90	0.38
High incomes	-8.1	0.26			0.33
One-person	-5.0	0.26			0.51
More-persons	-8.7	0.28		-1.11	0.54
More-pers, low income	no signi- ficant var				
More-pers, high income	-8.1	0.26			0.33

Table 3.3 *Estimation results of time series estimation on savings share (share of income 'not spent'): Savings/income x 100 = F (Real income / 1000, Onepers, Child, Age)*

(Sub-)group	Const	Income	Onepers	Child	R ²
Population	-11.2	0.44	6.78	-2.74	0.36
Low incomes	7.3			-4.86	0.16
High incomes	-5.6	0.30			0.16
One-person	-10.0	0.64			0.31
More-persons	-10.1	0.41		-2.64	0.39
More-pers, low income	6.8			-4.37	0.20
More-pers, high inc	-5.6	0.30			0.16

From analysis of the standardized regression coefficients it can be concluded that the influence of income is largest, followed by the dummy 'one or more person households'. In these estimations the presence of children has the lowest impact.

² Age was not significant in any of the estimations.

3.1.2 Cross section estimation

Based on the budget survey of 1990, with 2767 observations, the following table can be constructed:

Table 3.4 *Main statistics for cross section data on income and savings*

Variable	Mean	Std Dev	Std dev/ \sqrt{N}	Minimum	Maximum
Net income	46566	20292	406	2222	150000
Total expenditures	42093	16599	332	9650	147655
Savings	4473	13430	287	-72993	105574
Savings share	0.04	0.65	1.3	-26	0.77

Comparing table 3.2 and table 3.4 the following remarks can be made:

- both mean income and expenditures are higher in cross section data than in time series data;
- saving share of budget in time series is twice as high as cross section data (mainly begin of eighties the saving quote was very high);
- variation in income is much larger in time series than in cross section.

Main results on estimating influence of income, household size, children and age can be summarized as follows.

Table 3.5 *Estimation results of cross section estimation on savings (real guilders 'not spent'): Real savings/1000 = F (Real income/1000, Onepers, Child, Age)*

(Sub-)group	Const	Income	Onepers	Child	Age	R ²
Population	-11.4	0.42	6.68	-4.14	-0.31	0.37
Low incomes	-8.8	0.33	5.20	-3.41	-0.20	0.09
High incomes	-14.7	0.48		-3.77	-0.44	0.34
One-person	-24.3	0.45			1.31	0.28
More-persons	-11.3	0.42		-4.17	-0.33	0.38
More-pers, low income	-8.7	0.33		-3.44	-0.22	0.08
More-pers, high income	-14.4	0.48		-3.61	-0.53	0.35

Table 3.6 *Estimation results of cross section estimation on savings share (share of income 'not spent'): Savings/income \times 100 = G (Real income/1000, Onepers, Child, Age)*

(Sub-)group	Const	Income	Onepers	Child	Age	R ²
Population	-25.7	0.72	12.77	-8.06		0.05
Low incomes	-106.4	3.39	30.75	-28.00		0.07
High incomes		0.35		-6.40	-0.71	0.11
One-person	-16.2	0.84				0.08
More-persons	-25.6	0.71		-8.04		0.04
More-pers, low income	-115.1	3.68		-29.70		0.07
More-pers, high income		0.35		-6.18	-0.82	0.12

Analysis of standardized regression coefficients learns that in cross section estimation again income is the most important explaining variable, followed by the presence of children. The dummy one or more person household is less important, contrary to the time series estimation. Age is a significant explaining variable in some cases, but is explaining least.

3.1.3 Comparison of time series and cross section estimation results

Summarizing the results of 3.1.1 and 3.1.2, the following similarities and differences are detected.

Similarities:

- The share of savings (share of income) is more difficult to explain than the absolute level of savings.
- Estimation results seem to be more robust for absolute savings than for savings share.
- Income is the most important explaining variable.

Differences:

- In time-series estimation the number of household members is a more important explaining variable than presence of children, while in cross-section estimation presence of children is more important.
- Age is a significant explaining variable in the cross-section estimations, but is not significant in any of the time-series estimations.
- In time-series estimation the income effect is larger for low-income households than for high-income households, while this is opposite in cross-section estimation results.

3.1.4 Conclusions

In our scenarios we can choose to consider the whole population as one group or distinguish 3 groups:

1. one person households (household types 1, 5 and 9)
2. more person households with low incomes (lower 50 %)
3. more person households with high incomes (higher 50%).

A problem with these groups is the 50% income level. Question is whether saving behaviour depends on an absolute income level, or on a relative level. The following solutions can be considered to distinguish groups 2 and 3:

- a. a constant level of income, based on base-year or average 50% level;
- b. median level of income;
- c. the 50% level of 1990 adjusted for price changes.

A difficulty with the second option is that an income distribution is used to determine the median level. Because this will not be part of the scenarios, this option is skipped. Option c. seems preferable because this option takes into account that due to price changes the budget spent on a certain package of goods will change. Therefore it is proposed to consider 3 groups of households, as mentioned above, with 50% income level of 1990 adjusted for price changes.

If availability of data on income and price developments gives problems, it can be decided to consider only 2 groups, viz. one and more person households. Because improvement of estimation results when including these 2 groups compared with the whole population is large, this distinction should be made anyhow. Of course it is possible that other variables (like education) can improve the explanation, but because of comparison of the Dutch, German and French situation it is decided not to include these variables in the estimation sofar.

Based on comparison with other studies on savings in the Netherlands, the time series results seem to be more acceptable. In Appendix 2 the results for the Netherlands are summarized, and compared with results for other countries.

3.2 Expenditure functions

Based on budget survey data at household level for 1990 (cross section) and aggregated data for 1980 to 1990 (time series), expenditure functions for households in the Netherlands are estimated. From figure 3.1 the usefulness of estimating per household type is clear. The way households spend their budget differs from household type to household type. For example the budget share of food is in general larger for households with children, while the share of home expenditures for household type 9 is significantly larger. This could be explained by people getting retired, and thus decreasing incomes, while they stay in the same house.

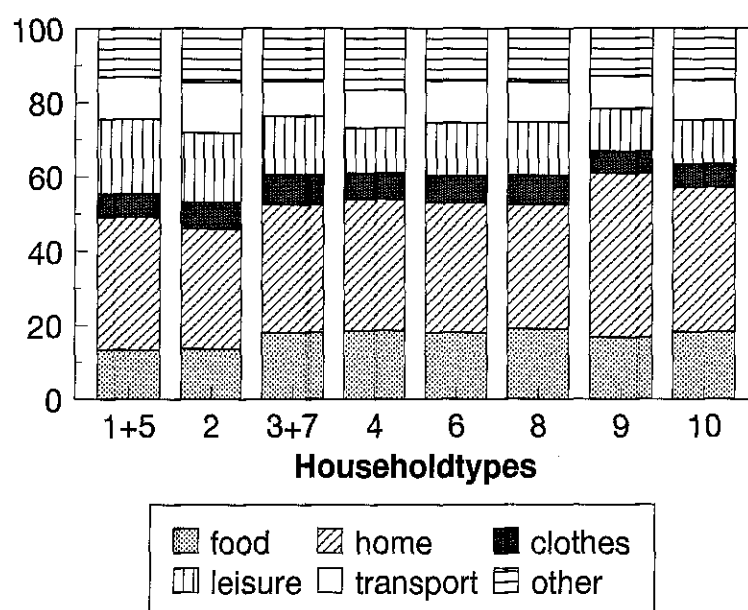


Figure 3.1 Average budget shares in 1990 per household type for the six main categories of goods

3.2.1 Main categories of goods

Estimation for whole population

For the whole population expenditure functions are estimated for the 6 main groups, based on the micro data for 1990. Results of these **cross-section analysis** are as follows.

Table 3.7 Estimation results for the Netherlands of cross section estimation of expenditures on main groups ($\ln(\text{income}/\text{prtot})$)

(Pop)	Const	Income	Size	Age	Educ	Educ-partner	R ²
Food	77.9	-6.4	2.0	0.35	-1.0	0.40	0.25
Home	86.7	-5.5		0.58	0.48		0.09
Clothes	-12.9	1.9					0.02
Leisure	-29.5	4.6	-1.27	-0.53	1.32	-0.51	0.11
Transport	-73.3	8.9	-1.24	-0.2	-0.53	-0.42	0.10
Other	50.2	-3.65	0.48	-0.14		0.53	0.09

In general income is the most important explanatory variable for expenditures to these main groups. Also size is explaining large part of variation, in particular for food expenditures. The relative importance of age and education levels is about the same, and varies little by expenditure group.

Cross-section estimation results are used to create 'forecasts' for the period 1980 to 1990. These series are subtracted from realized expenditure data:

sfood = realized share of food in total expenditures

sfood_{cs} = forecast based on cross-section estimations

sfoodr = residual (sfood - sfood_{cs})

When analysing these new series, mean values can give a good approximation of the quality of the estimations. For the residual shares (sfoodr, etc.) a mean value of 0 is optimal. From the following table it is clear that mean of 'r' series lies in between -0.84 and 0.95.

Table 3.8 Mean values for the Netherlands of 'residual' series (sfoodr = sfood-sfood_{cs})

(Pop)	Mean r optimal=0
Food	-0.84
Home	0.21
Clothe	0.62
Leisure	0.95
Trans	0.12
Other	0.29

The time series of sfoodr, representing part of variation which is not explained by the cross-section variables, can be explained by a trend variable and by prices. Also income can be considered as explaining variable again, because the time-series influence can be different from cross-section influence.

Results of the time-series estimation with relative prices included³.

Table 3.9 Estimation results for the Netherlands of time series estimation on main groups (sfoodr=sfood-sfood_{cs})

(Pop)	Const	Inc	Pfood	Phome	Pother	Time	R ²
Sfoodr	-40.74	4.04	36.7		18.0		0.71
Shomer	-1.07			26.4			0.04
Sclother	1.53			-18.8			0.17
Sleisr	22.19	-2.07					0.10
Stransr	15.54	-1.50					0.07
Sotherr	-9.17	0.85	-17.5				0.14

It is clear that it is not easy to find good estimation for the constructed time series. Because of the way they are constructed these series contain a large part of variation that could not be explained by the cross section variables. This variation partly results from income, price and trend reactions, but also partly from 'normal variation' between individual households. Mainly for home, leisure and transport it is hard to find

³ Only prices of food, home and other appeared to be significant.

good estimations for the residual time series, for the other groups results are acceptable.

Estimation per household type

The Budget Survey for 1990 gives a lot of information on behaviour by household type. Therefore the methodology described in the previous paragraph can also be executed for each household type separately. In the next table the number of observations per household type are given for the Budget Survey 1990.

Table 3.10 *Number of observations per household type*

Age head of family	1 Adult	2 Adults	1 Adult + child(ren)	2 Adults + child(ren)
To 35 years	116	240	21	583
35 to 60 years	98	212	63	917
Older than 60	166	298	-	-

Results of these cross-section estimations by household type are collected in appendix C. In general for food the largest part of variation can be explained by the selected variables. Clothes is the most difficult group to find good estimates on. For virtually all household types and groups of goods income is an explanatory variable, while size is only significant for very few cases. Of course size can be an explanatory variable for a limited number of households (3, 4, 7 and 8). Age is significant for household type 15, being a combination of 1 and 5, so there is also larger variation of ages in this group. The education level of the head of the family has in general a negative impact on expenditures on food and transport, a positive impact on leisure, while impact on home, clothes and other expenditures is varying positive and negative.

Education level of the partner is also introduced in a few household types, and for these household types it is a significant explanatory variable for only a few expenditure groups. If both education level of head of the family and of the partner are significant, they have opposite signs. This seems not very easy to explain.

Next step after these cross-section estimations by household type could be a time-series estimation also by household type. However, because of very limited information (time-series of only 10 or 11 observations), it is decided to estimate the 'residual variation' at population level. Because the household cross-section estimation resulted in other forecasted series, also the time-series estimation on population level will give other results.

Next table compares mean values of the 'residual' series sfoodr, resulting from cross-section on the whole population and cross-section by household type.

Table 3.11 Mean values for the Netherlands of 'residual' series for cross-section for whole population and per household type

MEAN	Cross-section Population	Cross-section Household type
Food	-0.84	1.38
Home	0.21	-0.05
Clothes	0.62	-1.13
Leisure	0.95	0.50
Trans	0.12	1.20
Other	0.29	-0.48

From this table it can be concluded that estimation of budget shares for food, home and leisure are improved by estimating by household type. This suggest that mainly for these categories behaviour per household type can be very varying. On the other hand, the estimation results from the whole population for transport seem to describe behaviour better than the results by household type.

Time-series estimation based on 'residual' series from by-household cross-section estimation results in the following estimated parameters.

Table 3.12 Estimation results for the Netherlands of time series estimation on main groups (time series constructed based on by household cross section; $sfoodr = sfood - sfood_{cs}$)

	Const	Inc	Pfood	Phome	Pclot	Pleis	Ptran	Pothe	Time	R ²
Sfoodr	1.6		46.5			28.3				0.54
Shomer	-21.5	3.6		27.9						0.44
Sclother										-
Sleisr	8.6	-1.5			-6.3					0.13
Stransr	38.7	-6.6								0.50
Sotherr	9.0	-1.8	-17.8							0.29

Mainly for food and home, estimation results based on by-household cross-section estimation seem to be improved relative to cross-section on population level. For clothes, leisure and transport it was not possible to find significant explanatory relations.

3.2.2 Subcategories of goods

Estimation for whole population

After it is decided how to spend income on 6 main groups, these budget shares have to be subdivided to several subgroups. For example, the budget decided to spend on food must be divided over energy extensive food products (food1), energy intensive food products (food2) and alcohol and tobacco (food3).

Possible explanatory variables for expenditure shares of the subgroups are:

- households income
- budget share of main group
- other household characteristics like age, size, education
- prices of main groups and subgroups.

The methodology used for estimating budget shares on the upper level can also be used for the subdivision at lower level. So the first step is to find which part of variation can be explained by household types, using 1990 micro data and cross section analysis. Based on these results price influences are tested on constructed 'residual' series. Shares are now defined as shares of total expenditures to corresponding main group, thus $w_{food1} = food1/food$.

Table 3.12 *Estimation results for the Netherlands of cross section estimation on sub groups for population*

	Const	Share main	Inc	Size	Age	Educ	Educ- part	R ²
Food1	127.1	-0.55	-9.0	2.76		0.57	0.60	0.17
Food2	51.5	-0.13		0.46	0.54	-0.97		0.03
Food3	-88.6		10.2	-3.50	-0.67		-0.55	0.14
Home1	169.4	-0.16	-11.4	1.12	0.55			0.09
Home2	-124.9	0.41	13.4	-1.29	-0.50	2.20		0.19
Home3	-40.5		5.5	-0.66	-0.37	-1.37		0.06
Home4	93.6	-0.22		0.84	0.30	-0.75		0.35
Leis1	101.0	-0.56	-5.6	0.88				0.07
Leis2	67.3	-0.26	-5.3	2.17			-0.70	0.11
Leis3	-78.4	0.81	12.0	-2.80				0.14
Tran1	-153.7	1.40	15.7					0.12
Tran2	-15.4		3.9		-0.54	-1.03	1.57	0.03
Tran3	250.8	-1.45	-17.8		0.60	1.79	-2.50	0.21
Othe1	27.4	-0.14				0.88	-0.75	0.01
Othe2	72.6	0.14				-0.88	0.75	0.01

Again based on time series of income and other household characteristics, a time series of estimated shares for each subcategory can be constructed. For the series constructed by taking the difference between these estimated shares and realized shares (for example $w_{food1t} = w_{food1t} - w_{food1_{cs}}$) the significant variables and their parameters can be estimated. First the mean values for these constructed time series are given in table 3.11.

Table 3.13 Mean values for the Netherlands of 'residual' series
($wfood1r = wfood1 - wfood1_{cs}$)

(Pop)	mean r optimal=0
Food1	-1.10
Food2	-2.30
Food3	14.84
Home1	0.46
Home2	-7.67
Home3	3.44
Home4	-72.07
Leis1	-5.49
Leis2	-0.98
Leis3	5.80
Tran1	16.53
Tran2	0.94
Tran3	-18.26
Othe1	-1.40
Othe2	1.40

The constructed time series are now estimated, with income, time, price of the corresponding main group and prices of the subgroups (compare with table 3.6 for 6 main expenditure categories).

Table 3.14 *Estimation results for the Netherlands of time series estimation of expenditures on sub groups ($wfood1r = wfood1_{cs} - wfood1$)*

(Pop)	Const	Inc	Price group	Price1	Price2	Price3	Price4	Time	R ²
Food1	39.3	2.1	-11.4		-26.1				0.24
Food2	-24.3	4.0			12.0				0.40
Food3	35.7	-3.5			17.6				0.21
Home1	-20.4	2.3						1.3	0.74
Home2	140.5	-1.5	-29.0						0.58
Home3	15.9	-1.3		58.3		-119.6	-8.5	-4.3	0.26
Home4	-101.3	-6.8	14.8			29.6	9.6		0.93
Leis1	-5.8				34.2				0.04
Leis2	-18.7	2.8		-47.1					0.11
Leis3	99.0	-4.0	-14.9						0.08
Tran1	15.9				-16.5				0.08
Tran2	25.3	-4.1			24.7				0.42
Tran3	-47.8	5.5				58.0			0.14
Othe1	31.0	-5.7							0.11
Othe2	-31.0	5.7							0.11

Price1 is the relative price development of the price of the first subcategory in the corresponding main group, etc.. So for food, price1 is $\log(\text{price}(\text{food1}) / \text{price}(\text{tot}))$. From table 3.14 it can be concluded that price influences are more important on the lower level, thus for sixteen groups of good, than for the first decision level. In general the price of one sub-group is a significant explanatory variable for about all subgroups in this main group.

Estimation per household type

In Appendix C the results of cross section estimation results by household type are given. One important remark concerns high R² values for home4 and tran1 for a large number of household types. Home4 includes energy related to the house, thus for heating, cooking, etc. If the budget share for home increases, the share home4 decreases. This decreasing share is related to a decreasing share of home1, rent or value of the house. This means that an increasing share of home is caused by increasing expenditures to furniture and appliances, while relative share of rent and energy decreases. Luxury goods (furniture/appliances) are increasing with increasing income and increasing budget share spent to home total. For transport, budget share for transport total is positively related with income. And tran1, purchase of cars and other vehicles, is again positively related with income and share of transport total. Summarizing, with increasing income households will spend more to private transport than to public transport. Based on these results again time series are constructed, representing variation not explained by cross section variables.

Mean values of these time-series are compared with means from estimation on the whole population.

Table 3.15 Mean values for the Netherlands of 'residual' series
($wfood1r = wfood1 - wfood1_{cs}$)

MEAN	Cross-section Population	Cross-section Households
Food1	-1.10	1.19
Food2	-2.30	12.90
Food3	14.84	5.98
Home1	0.46	5.58
Home2	-7.67	3.27
Home3	3.44	3.15
Home4	-72.07	4.52
Leis1	-5.49	1.46
Leis2	-0.98	1.50
Leis3	5.80	11.70
Tran1	16.53	-38.50
Tran2	0.94	11.90
Tran3	-18.26	-9.80
Othe1	-1.40	1.26
Othe2	1.40	6.90

Comparable to the time-series estimation for the main groups of consumption goods, also for the sub-groups estimations are carried out for three groups of households, viz. one person households, more person households with low incomes and more person households with high incomes. The results for these groups are given in appendix C, while in the next table the results for the whole population are given.

Table 3.16 *Estimation results for the Netherlands of time series estimation of expenditures on sub groups ($w_{food1r} = w_{food1_{cs}} - w_{food1}$) based on cross-section by hh for the whole population*

	Const	Inc	Price group	Price1	Price2	Price3	Price4	Time	R ²
Food1	-76.6	13.7							0.13
Food2	-179.8	34.0							0.17
Food3									
Home1									
Home2	94.6	4.1	-23.8						0.18
Home3	23.9	-3.7							0.06
Home4	-12.4	3.0				12.4	15.5		0.37
Leis1	-78.9	14.2							0.08
Leis2	-71.6	12.9							0.39
Leis3									
Tran1									
Tran2	-57.9	12.5			26.3				0.18
Tran3	-224.4	37.9							0.28
Othe1	-56.2	10.1							0.21
Othe2	-93.4	17.7							0.05

From this table it is clear that, if cross section results per household type are used to create time series, the price effects in these time series are less clear than they are when considering cross section results for the whole population (see table 3.14). The 'residual' or not explained variance is much more diverse or varying when looking per household type, and thus very difficult to describe by means of relations between shares and income and prices.

4. FRANCE

In France the Statistical Office INSEE carries out the 'Budget de Famille', which is a survey covering more than 9000 households, to collect information on expenditures, household equipment and household expenditures. A complete survey is carried out every five years, but restricted information is available for each year. Based on the 1989 Budget de Famille cross section estimations on budget shares were carried out, while a time series from 1980 to 1990 was basis for time series estimation of income and price influences.

4.1 Income, expenditures and savings

The French survey 'Budget de Famille' consists of 9038 cases for the year 1989, and gives, among others, information about:

- expenditures to the 16 categories
- age (7 classes)
- income (13 classes)
- job (8 classes)
- household type (11 classes).

With respect to the income variable information is limited, because only classes of income are included. This mainly gives problems with respect to estimation of savings as function of income.

Some of the variables have been recoded, for example the income variable is recoded to reach more homogeneous income classes.

Household types are defined according to the Dutch definition, making use of information on age, size and household type.

4.1.1 Cross section estimation

Based on the 1989 Budget de Famille statistics on income, expenditures and savings can be summarized as in table 4.1. With respect to income the median value is used for these calculations, because no levels were available in this survey.

Table 4.1 *Main statistics for cross section data on income and savings for France*

Variable	Mean	Std Dev	Minimum	Maximum
Net income	146211	88447	24500	315000
Total expenditures	145415	95967	2479	1237605
Savings	658	71098	-922605	275193
Savings share	-0.12	0.76	-21.6	0.96

A negative mean for the savings share seems surprising. Also after exclusion of some extreme groups this mean value remains to be negative. An explanation can be the classes of income, for which median income levels were used for calculation of savings, because this were the only data available. Because of this negative mean savings share, only estimations have been carried out on the level of savings, not on the savings share.

Table 4.2 *Estimation results for France of cross section estimation on savings (real guilders 'not spent'): Real savings/1000 = F(Real income/1000, onepers, child, age)*

(Sub-)group	Const	Income	Onepers	Child	Age	R ²
Population	-85.9	14.5	23.4	-20.1	3.6	0.12
Low incomes	-72.3	11.7	20.2	-24.6	3.9	0.18
High incomes	-125.6	21.3	16.6	-21.0	2.3	0.10
One-person	-51.2	10.4			4.1	0.15
More-persons	-90.0	15.8		-22.1	3.0	0.12
More-pers, low income	-86.1	16.6		-26.1	3.5	0.17
More-pers, high inc	-121.5	20.7		-21.0	2.1	0.10

Because no time series are available for income data, it is not possible to compare time series and cross section estimation results. Therefore these cross section results are the best available results, and will be used in scenario analysis.

4.1.2 Conclusions

Following the conclusions on the Dutch estimations on savings as a function of income and other household characteristics, also for France three groups of consumers are considered, viz.:

1. one person households (household types 1, 5 and 9).
2. more person households with low incomes (lower 50 %)
3. more person households with high incomes (higher 50%).

Because only cross section estimation results are available, these results will be used for estimating savings for these three groups. The results are summarized in appendix B.

4.2 Expenditure functions

Based on the data from the French 'Budget de Famille' for 1989 (micro-data) cross section estimations on budget shares were carried out. Furthermore meso-data were available for a time series of 1980 to 1990, to use time series analysis for the residual series, as explained in chapter 2 on methodology.

In figure 4.1 the average budget shares of the six main groups of consumer goods are given for each household type.

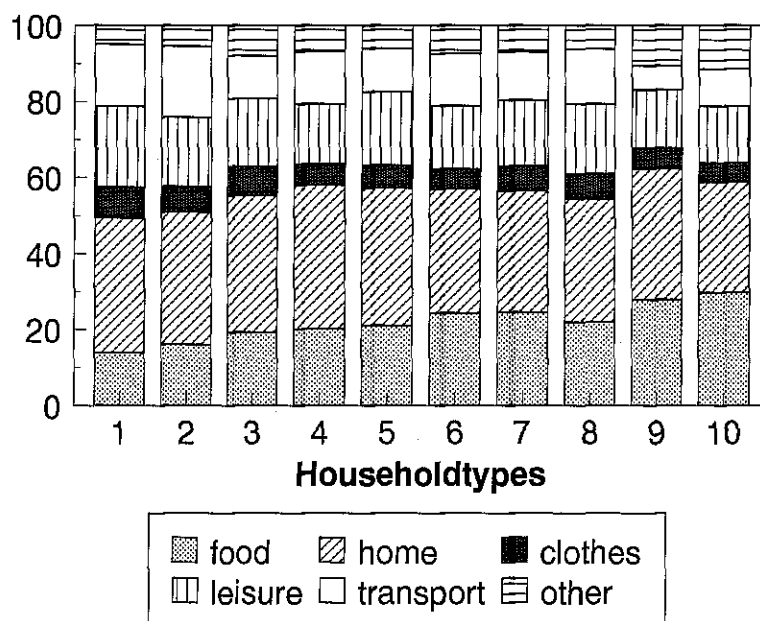


Figure 4.1 *Budget shares per household type for the six main groups of consumption*

Mainly for food an increasing trend in budget share is clear from this picture. This is not exactly what should be expected. In general households with children will spend relatively more to food, this can explain the small shares for household type 1 and 2, but it is contrary for household types 5 and 6. The lower share for household type 8 could be explained from a higher average income in this group compared to other household types, thus higher expenditures to food will not lead to higher shares in other household types. Furthermore the larger share of other for older persons is evident from this picture. This can be explained by a worsening of health, and thus more expenditures to medicines.

4.2.1 Main categories of goods

Estimation for whole population

First step is the cross section estimation for the budget shares of the six main categories of goods (food, home, etc.) for the whole population, which results are given in table 4.3.

Table 4.3 *Estimation results for France of cross section estimation of expenditures on main groups*

France	Const	Income	Size	Age	Educ	R ²
Food	19.4	-7.3	2.4	2.3	-0.5	0.22
Home	40.9		-0.7	-1.4		0.03
Clothes	6.5	0.9	-0.3	-0.3	0.07	0.01
Leisure	16.2	3.2	-1.0	-0.5	0.3	0.04
Trans	12.3	4.2	-0.7	-1.1	0.18	0.06
Other	4.3	-0.6		1.0		0.04

The time series data do not contain information on age and education developments. Therefore, to be able to use these time series data in the estimated functions, only income and household size can be included in the final estimations, see next table.

Table 4.4 *Estimation results for France of cross-section estimation of expenditures on main groups with only income and size as explanatory variables*

France	Const	Income	Size	R ²
Sfood	91.64	-11.88	3.06	0.31
Shome				
Sclothes	-2.55	1.47	-0.33	0.02
Sleisure	3.65	2.38	-0.65	0.02
Strans	-30.2	7.16	-1.21	0.11
Sother	3.68	0.93	-0.84	0.01

It is clear that if income will increase, expenditures on food will decline relative to the other expenditures, illustrating the effect of necessity of food products. Furthermore, the size of a family will influence expenditures on food significantly. The explanatory value of the other good categories is not very large, but the signs of all parameters for income are positive, and for size are negative.

Based on cross-section estimates for parameters and time-series values for explanatory variables, $sfood_{cs}$ is constructed. The difference between the constructed shares $sfood_{cs}$ and the realized shares in the time series $sfood$, is called $sfoodr$. This $sfoodr$ is an indication for the part of variation not explained by the cross-section results. In the next table the mean values for the constructed variable $sfoodr$ are given.

Table 4.5 Mean values for France of 'residual' series ($sfoodr = sfood - sfood_{cs}$)

	Mean
Sfoodr	1.93
Shomer	-2.60
Sclothesr	0.85
Sleisurer	-7.03
Stransr	2.79
Sotherr	4.05

The optimal value for the mean values of sfoodr series is 0, which is far from the mean values found for these series. The sum of the mean values for the six categories is 0, but the variation between the types of goods is rather large. Mainly 'leisure' and 'other' show a large difference from the optimal value. This could be explained by the limited number of data for time series. For each year only average values are available, this means 11 values in total. Of course the smaller the number of cases, the larger the variation. Therefore it can not be concluded that the cross-section estimations are very poor, nor very good.

With respect to time series estimation the limited set of data will influence these estimation results heavily, too. In the next table the explanatory power of income and prices are given for the six categories of goods.⁴

Table 4.6 Estimation results for France of time series estimation on main groups

	Const	Inc	Pfood	Phome	Pclot	Pleis	Pothe	Time	R ²
Sfoodr	1.88		13.63	7.84					0.89
Shomer	-2.52			22.53	7.32				0.93
Sclother	1.38				3.09	-6.43			0.95
Sleisr	-56.72	7.43						-0.08	0.94
Stransr	3.17				-6.64		7.42		0.92
Sotherr	2.93							0.19	0.98

The high R² values are a result of the limited number of only 11 cases in the estimation. For food, home and clothes the own relative price will influence budget shares positively. However, also other prices have a positive sign, which is hard to explain. It could be explained by correlation between both prices, for example price of food and price of home.

Based on mainly the signs of the price effects an ordering of importance could be considered: budget shares for food and home will increase in any case, not only due to own price increases but also due to other price increases. For clothes the an increasing own price results in larger budget share, but when leisure becomes more expensive, this category is more important and will result in lowering shares of clothes. Transport on the other hand seems less important than clothes because of the

⁴ Price of transport was not significant in any of the estimated functions.

negative parameter, but more important than other. For leisure and other no price influences are found, so conclusions for these categories are not possible to be made.

Estimation per household type

Table 4.7 *Number of observations per household type in the French survey*

Age head of family	1 Adult	2 Adults	1 Adult + child(ren)	2 Adults + child(ren)
To 35 years	410	441	197	1019
35 to 60 years	677	1005	588	2671
Older than 60	839	874	185	132

In Appendix D the cross section estimation results per household type are given for France. Summarizing it can be concluded that for food the best relation can be estimated, followed by transport, resulting in large R^2 compared to the other goods. Income explains large part of variation in budget shares of food, with a negative sign. This means when income is increasing, the share spent to food will decrease. The same can be mentioned for home, the other non-luxury good. For clothes this distinction is not very clear, of course a basic collection of clothes is necessary, but you can spend as much as you want on clothes, in general increasing by increasing income. The effect of household size and age are not very clear through the different household types. For food the correlation between budget share on the one hand and size and age on the other are both positive, while for the other groups of goods both size and age are not significant explanatory variables in most cases.

Because no time series information was available at a household level, no residual series could be constructed, nor time series analysis could be carried out.

4.2.2 Subcategories of goods

Estimation for whole population

After deciding how to spend budget to the six main categories of goods, a subdivision of each main category has to be decided on. For these subcategories the expenditures of for example food1 relative to expenditures of food are considered as variable to be explained. The share of the corresponding main group, income and size of the family are possible explanatory variables.

Table 4.8 *Estimation results for France of cross section estimation on subgroups of goods*

France	Const	S main	Income	Size	Age	Educ	R ²
Food1	33.7	-0.2	-4.5	1.1	0.2		0.06
Food2	48.7	0.1	1.9	0.9	1.8		0.06
Food3	17.6	0.1	2.6	-2.0	-2.0		0.07
Home1	53.6	0.2	1.7	-1.1	-4.1		0.10
Home2		0.2	4.1	0.6	2.1		0.04
Home3	15.6	-0.04	3.4		-1.0		0.03
Home4	31.2	-0.4	-8.9	0.6	3.0	0.3	0.30
Leis1	10.8	-0.1	-1.8		1.0		0.03
Leis2	63.1	-0.6	-5.6	2.2	2.2		0.11
Leis3	25.9	0.7	7.3	-2.1	3.2		0.18
Tran1	-18.3	1.7	2.4	2.2	0.3	0.2	0.55
Tran2	37.5	-0.7	8.0	2.5	-3.3		0.13
Tran3	80.8	-1.1	-10.2	-4.7	3.0	-0.3	0.31
Othe1	73.8	-2.0		-2.4	-0.8		0.23
Othe2	26.3		2.0	2.4	0.8		0.23

Again also results of estimation without including age and education are presented here, because age and education are not included in the time series.

Table 4.9 *Estimation results for France of cross section estimation on subgroups of goods (without age and education level)*

France	Const	Smain	Income	Size	R ²
Food1	71.20	-0.32	-6.68	1.93	0.12
Food2	39.63	0.23	2.99	-0.35	0.03
Food3	-10.84	0.08	3.69	-1.58	0.02
Home1	30.85	0.31		1.23	0.03
Home2	-23.78	0.13	6.96	-1.56	0.05
Home3	-16.50	-0.02	5.20	-0.35	0.04
Home4	106.72	-0.42	-11.69	0.55	0.29
Leis1	21.30	-0.11	-1.17	-0.53	0.02
Leis2	118.81	-0.65	-8.63	2.45	0.12
Leis3	-40.10	0.76	9.79	-1.92	0.16
Tran1	-47.62	1.64	5.93	1.06	0.56
Tran2	(2.5)	-0.61	4.49	4.31	0.09
Tran3	145.12	-1.04	-10.42	-5.36	0.29
Othe1	83.70	-2.05	-2.34	-1.46	0.23
Othe2	16.30	2.05	2.34	1.46	0.23

In general the R² figures are not very large for estimation of budget share of subgroups of goods in France. Exceptions are home4 (energy for heating, cooking, etc.) and transport (mainly tran1 including purchase of cars). The negative signs at share main and income for food1 confirms the idea of necessary goods. An increasing income will result to decreasing expenditures to food1 related to total food expenditures. At the same time the effect of size is still positive, thus with increasing household size the share of food1 in food will increase. Increasing total expenditures (related to income) will decrease the share of energy relative to total home expenditures. The increasing income will mainly be spent to furniture and appliances.

With respect to transport extra income will be spent to energy, by mean of more kilometres, more than to purchase of cars. However, this effect is partially levelled out by the negative influence of the total share of transport. The loss of explanatory power due to exclusion of age and education is very limited, compare table 4.8 and 4.9.

Constructed time-series based on cross-section estimation results and time series of explanatory variables show the following average values (see table 4.10).

Table 4.10 Mean values for France of 'residual' series ($wfoodr=wfood-wfood_{cs}$)

France	Mean
Food1	-0.66
Food2	-3.71
Food3	4.35
Home1	0.88
Home2	6.53
Home3	-6.48
Home4	2.21
Leis1	6.83
Leis2	-41.69
Leis3	54.53
Tran1	0.28
Tran2	-9.26
Tran3	-12.69
Othe1	-16.19
Othe2	16.18

Again the limited number of observations leads to rather bad results for the 'residual' series. Therefore, no time series analysis results are presented here, because for useful results a larger data set is necessary.

5. GERMANY

5.1 Income, expenditures and savings

Estimations for Germany have been carried out by IER, Christoph Weber and Beate Gebhardt. Results are presented here to be able to make comparisons between the country results. A micro data base from the statistical office on households expenditures and households characteristics, containing 2346 observations, is used for cross section estimation. For the time series estimation meso data for about ten years were used.

5.1.1 Time series estimation

Table 5.1 *Main statistics for time series data on income and savings for Germany*

Variable	Mean	Std Dev	Minimum	Maximum
Net income	47937	23508	15964	93808
Real income	47060	21734	19452	80869
Total expenditures	39216	17190	14222	71558
Real expenditures	38441	16170	17794	69957
Savings	8722	6528	1658	23332
Real savings	8483	6036	1681	19792
Savings share	0.161	0.048	0.084	0.249

Real income(t) = income(t) × price(88) / price(t)

Real expend(t) = expend(t) × price(88) / price(t)

Real savings(t) = savings(t) × price(88) / price(t)

Savings share = savings / net income

Main statistics show rather large figures for savings, mainly the savings share seems to be very large.

Table 5.2 Results for Germany of time series estimation of savings

HH-type	Const	Dumhh1	Dumhh3	Income	R ²
Total	-7.43	3.35	0.97	0.31	0.99
1	-1.77			0.21	0.88
2	-4.84			0.25	0.90
3	-9.53			0.35	0.97

For this purpose total population is divided into three groups, viz.:

1. 2-persons households with no wage earner (mostly pensioners);
2. 4-persons households (incl. 2 children) with average income;
3. 4-persons households (incl. 2 children) with income higher than average.

It is clear that household type 1 will save smaller part of income than the other household types, and household type 3 with highest average income, will save largest part.

5.1.2 Cross section estimation

Table 5.3 Main statistics for cross section data on income and savings for Germany

Variable	Mean	Std Dev	Minimum	Maximum
Net income	55344	28727	7000	282000
Total expenditures	43941	21260	6250	172450
Savings	11403	17985	-65750	160900
Savings share	0.158	0.262	-1.669	0.726

Savings share for both time series and cross section data are about 0.16, so this seems to be a rather stable percentage. Cross section estimation has been carried out on the same groups as for the Netherlands and France, because the cross section data included enough information to distinguish these groups.

Table 5.4 Estimation results of cross section estimation on savings (real guilders 'not spent'): $Real\ savings/1000 = F(Real\ income/1000, Onepers, Child, Age)$

(Sub-)group	Const	Inc	Onepers	Child	Age	Age ²	R ²
Population	-12521.3	0.47	5169.3	-1619.6	-804.2	55.1	0.47
Low incomes	-9955.9	0.33	3610.6			13.3	0.11
High incomes	-15120.4	0.53		-3532.2	-656.5		0.39
One-person	-6971.4	0.39					0.26
More-persons	-14533.3	0.47		-1958.6			0.47
More-pers, low income	-9803.4	0.32				14.8	0.09
More-pers, high income	-15361.8			-3280.9	-583.1		0.40

For the total population, the parameter estimated for income is larger than the time series estimation. This can be explained by the influence of children and age (negative effects). But again a higher income parameter results for groups with higher incomes than for groups with lower incomes.

5.2 Expenditure functions

In figure 5.1 average budget shares per household type are given, resulting from the micro data for 1990. For food the budget share is larger for households with children (3+7, 4, 8), and also for older persons due to decreasing incomes. This lowering income is also an explanation for the relative large share for home mainly for household type 9. Household type 2 has relatively large share for transport, maybe partially explained by households owning two cars.

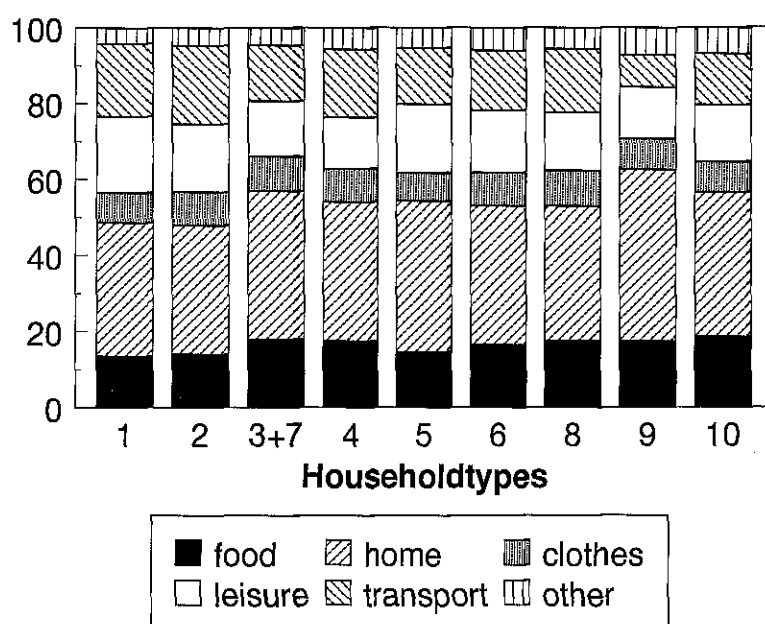


Figure 5.1 Average budgetshares in 1990 per householdtype for the six main categories of goods

5.2.1 Main categories of goods

Estimation for whole population

The micro data contain a large number of possibly explaining household characteristics, for example size, age, type of employment, type of municipality and social status. Furthermore the square of age is included as explanatory variable, simulating non-linearity between budget shares and age.

Table 5.5 Results for Germany of cross section estimation of expenditures on main categories

(Pop)	Const	Income	Size	Age	Age ²	Emp	Mun	Soc	R ²
Food	80.40	-7.20	2.41	1.22	-0.06	0.00	0.34	0.21	0.25
Home	120.82	-8.54	0.79	1.44	-0.07	0.00	-0.71	0.00	0.14
Clothes	-2.87	1.00	0.00	0.00	0.00	0.47	0.24	0.00	0.03
Leisure	-18.77	3.77	-1.44	-0.29	0.00	-0.57	1.18	-0.29	0.07
Trans	-72.21	9.48	-1.82	-1.78	0.07	0.61	-1.26	0.47	0.18
Other	-4.13	1.27	0.00	0.00	0.02	-1.16	0.00	-0.69	0.06

Food and transport are again the goods with the highest R². Food and home are negatively correlated with income, while the others are positively correlated. Size and age positively influence food and home, and negatively leisure and transport. Age² has in general the opposite sign of age.

Based on the cross section results, and time series for explanatory variables, the 'residual' series can be constructed. These residuals are considered to be not-explained by household characteristics, but could be explained by price developments. Table 5.6 gives the mean values of the residual series according to the estimation results from table 5.5. In table 5.7 the time series estimation results are summarized.

Table 5.6 Mean values for Germany of 'residual' series ($sfoodr = sfood - sfood_{cs}$)

	Mean
Sfoodr	1.48
Shomer	-2.72
Sclothesr	-1.05
Sleisurer	-1.05
Stransr	2.41
Sotherr	0.20

The mean values are rather different from 0, the optimal value if all variation was explained by household characteristics. Mainly home and transport are highly overestimated respectively underestimated. Both home and transport have also the lowest explained variation (R^2) in time series estimation, see table 5.7.

Table 5.7 Estimation results for Germany of time series estimation on main groups

(Pop)	Const	Time	Pfood	Phom	Pcloth	Pleis	Ptrans	Pothe	Dum1	Dum3	R^2
Foodr	0.6			-82.2		-43.0	-16.2		4.26	-1.60	0.93
Homer	-375.8	0.19		136.1				84.9		1.63	0.89
Clothr	0.3		8.2		11.9				-1.56		0.91
Leisr	127.3	-0.06			-14.0				-3.11	1.07	0.94
Transr	3.3		-12.7							-2.93	0.77
Otherr	-0.7			-42.7			6.7	-33.2	0.87	1.97	0.91

A large number of prices are significantly explanatory variables for the residual time series. If own prices are significant, they have in general a positive influence. This means that if the price of clothes increases relative to the average price level, the share of expenditures to clothes will increase. This is also what could be expected, because the (main) groups of consumption goods are defined in such a way that they are not substitutes for each other. Only for other, which could be considered as luxury goods, the own price effect is negative.

*Estimation per householdtype*Table 5.8 *Number of observations per householdtype in the German survey*

Age head of family	1 Adult	2 Adults	1 Adult + child(ren)	2 Adults + child(ren)
To 35 years	101	106	81 ⁵	253
35 to 60 years	135	274		821
Older than 60	187	308	-	-

Estimations of expenditure functions are also carried out by a household type level, in order to describe different behaviour from household to household. In appendix E results of estimations per householdtype are summarized. From the tables in Appendix E It can be concluded that in general income is a significant explanatory variable, and has a positive effect on budget share of food and home, and negative for the other groups of goods. There are only some exceptions on this general trend. The other household characteristics are significant for a small number of households and goods. It is surprising that even size of a household is not significant for most of the cases. With respect to the explained part of variation it can be mentioned that food and home are explained best, while clothes and other generally have smallest R². Transport and leisure are varying between the best and the worst.

⁵ Categories 3 and 7 together.

5.2.2 Subcategories of good

Estimation for whole population

Table 5.9 Results for Germany of cross section estimation for subcategories

HH=all	Const	Share main	Inc	Size	Age	Emp	Mun	Soc	R ²
Food1	157.84	-0.57	-8.11	4.23	1.08		-1.27	-0.64	0.13
Food2	8.84	-0.06		0.26	-0.79			0.17	0.07
Food3	-68.46	0.63	8.15	-4.52			1.41	0.54	0.14
Home1	234.77	-0.41	-15.62	1.50	1.60	-1.34		-1.23	0.22
Home2	-209.13	0.59	20.16	-2.43	-1.29			1.05	0.34
Home3	-38.32	0.06	4.19	-0.31	-1.18	1.26	0.45	0.41	0.07
Home4	111.15	-0.24	-8.67	1.32	0.85			-0.27	0.33
Leis1	40.45	-0.52		1.48	-0.63	-3.25			0.07
Leis2	115.26	-0.48	-8.62	2.41	-0.29	-1.80		-0.49	0.16
Leis3	-56.73	1.00	8.99	-4.02	0.99	4.56			0.20
Tran1	-160.65	1.54	16.19		1.11	-1.20	-0.78		0.70
Tran2	10.92	-0.38	2.13			1.43	-2.21		0.21
Tran3	218.15	-0.90	-17.18	-1.11	-1.18	-1.71	4.36		0.49
Tran4	21.87	-0.27		0.56	0.00	1.43	-1.48		0.12
Othe1	156.76	-2.23	-8.33	1.58	-1.05	2.26		2.87	0.20
Othe2	-56.76	2.23	8.33	-1.58	1.05	-2.26		-2.87	0.20

In general results of cross section estimations for subcategories are rather well for Germany, measured by means of R². Especially transport is explained well by these household characteristics. Furthermore it is remarkable that all included variables are significant for almost all groups of goods. For food1 the negative signs at main share and income illustrate the necessity of this group of goods, while food3 include more luxury goods. The relative share of rent (home1) is declining when income increases, put is positively effected by increasing household size and age. Home4 (energy) is comparable with home1, and is also expected to be related with the size or price of the house. Expenditures to goods and services related to leisure are relatively larger for younger people, while older people will spend more to holidays and having diner in restaurants. Purchase of cars and other motor vehicles is largely correlated with income developments, while also motor fuels expenditures will increase due to increasing income. For others medical goods (othe2) are bought more by older people than by younger people, these will spend more to other hygiene and personal care.

Table 5.10 Mean values for Germany of 'residual' series ($wfoodr=wfood-wfood_{cs}$)

	Mean
Food1	1.46
Food2	8.20
Food3	-5.10
Home1	-2.15
Home2	-8.51
Home3	11.27
Home4	-0.74
Leis1	0.69
Leis2	-1.16
Leis3	0.52
Tran1	14.36
Tran2	-0.99
Tran3	-8.36
Tran4	-4.51
Othe1	-6.95
Othe2	6.95

Mean values of residual series are heavily varying from the optimal value 0. This means that other developments in time are not completely explained by the cross section estimation results. Mainly home3 (11.27) and tran1 (14.36) are significantly underestimated, while home2 and tran3 are overestimated. Results from time series estimations on these residual series are given in table 5.11. Due to the limited number of cases, the R^2 figures are large, in some cases very close to 100%. A large number of prices of the subgroups are significant explanatory variables.

Table 5.11 *Estimation results for Germany of time series estimation of expenditures for sub categories*

(Pop)	Const	Time	Price group	Price1	Price2	Price3	Price4	Dum1	Dum3	R ²
Food1	0.5		-114.5	109.3		27.9		0.4	0.7	0.67
Food2	-412.4	0.21	62.8	-44.9		-16.8		10.7		0.99
Food3	716.7	-0.36		-35.3				-1.0		0.53
Home1	-7.2		-470.5	225.9			60.9	2.8	4.4	0.95
Home2	-5.7		379.7	-201.7		-22.4	-54.4	0.9	-5.9	0.96
Home3	1123.0	-0.56		-82.7	-142.0		-39.8	-4.4	1.1	0.92
Home4	1.8			100.2	122.3	12.6	41.0	0.8	0.5	0.91
Leis1	-1.3		5456.8	-2888		-946.9			1.4	0.57
					1570.8					
Leis2	-998.7	0.50		-25.7				-9.4	3.3	0.98
Leis3	1.9		-7344	3869.8	2144.6	1256.7		8.8	-5.5	0.95
Tran1	-3064	1.55		-99.2	-24.8			4.5	-4.6	0.84
Tran2	-1.0				12.4			6.6	-2.1	0.87
Tran3	1254.6	-0.63						-15.6	8.6	0.90
Tran4	-6.1						16.4	4.5	-2.4	0.90
Other1	1662.7	-0.84			112.6			-4.6	-19.7	0.95
Other2	-1662.7	0.84			-112.6			4.6	19.7	0.95

Estimation per householdtype

Cross section estimation results on subcategories of goods are given in Appendix E.

6. COMPARISON

In this chapter we will focus on comparison of the estimation results on expenditure functions for the three countries. We will not pay attention to the comparison of the savings estimation, which is almost impossible due to different data availability and definitions of explanatory variables. However, we do not think these problems will also influence the comparability of the expenditure functions heavily, because budget shares are defined as expenditures to a category of goods relative to total expenditures, so the differences in definition of expenditures is about to be levelled out.

We will focus on the cross section estimation results, because these explain largest part of variation in budget shares.

6.1 Cross section results

The 1990 micro data for the three countries are summarized in the next figure with respect to budget shares for the six main categories of goods. From this figure it is clear that the general structures are comparable, however there are significant differences. For food for example the French budget share is much larger than the food share in the other countries, while this is compensated by a smaller French share for home and clothes. In the Netherlands expenditures to leisure and transport are significantly smaller than for the other countries, while budget share of other is about twice as large as for France and Germany. For Germany the large share of transport is notable.

These differences could be partly explained by varying definitions of the categories, and partly by country specific circumstances influencing consumption patterns.

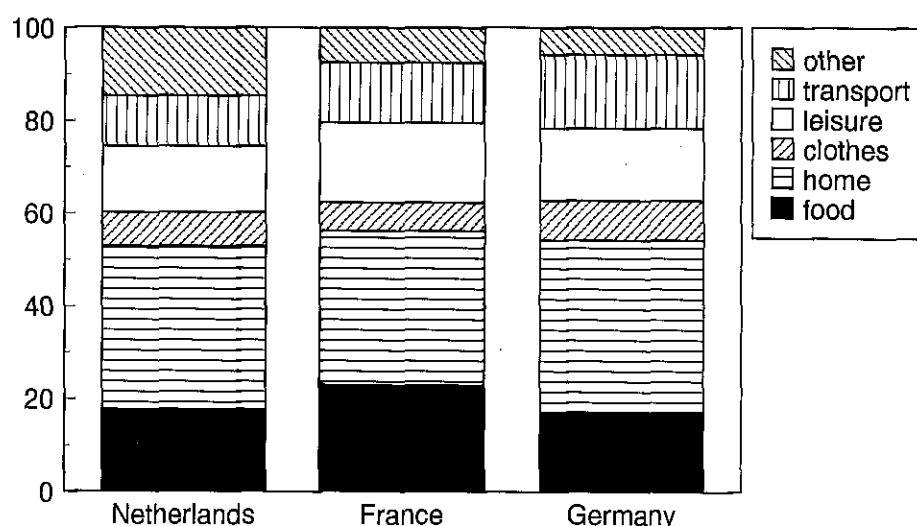


Figure 6.1 Comparison of budget shares of the six main categories of consumption goods for the Netherlands, France, and Germany

In general the signs of the estimation results are the same for the Netherlands, Germany and France for the variables included for all countries. Especially for the income variable a clear pattern can be seen, viz.:

- + Positive income effect on budget shares of clothes, leisure, and transport. These goods can be considered as luxury, or in any case more luxury than food and home expenditures. For clothes it is expected that also a minimum amount of expenditures is part of main expenditures, but in the cases considered this minimum amount is expected to be realized.
- Negative income effect on budget shares of food, home, and other⁶. For food and home this negative effect represents necessity of these goods, so for low incomes these shares are relatively large.

With respect to the number of household members, the conclusions can not be as strict as for income, but the following general trend can be detected:

- + A positive size effect on budget shares of food and home. Families with children will live in larger houses, and will spend relatively more to food than households without children.
- A negative size effect on leisure, transport, and other. In general households with children will spend less to theatre, but maybe more for sports (although reduction in member fees for children). Families with children are expected to travel less, and children will have their bike with only limited costs.
- ? Not a clear size effect on clothes. A positive effect would be expected from presence of children, although for example two-earners will buy in general more expensive clothes.

Also for the influence of age on household expenditures a general trend can be seen in the country results:

- + A positive age effect on budget share of food, home, and other.
- A negative age effect on budget share of clothes, leisure, and transport.

These trends are summarized in the following table.

Table 6.1 *Signs of estimated parameters for the effect of income, household size and age on budget shares of six main categories of goods*

	Income	Hh size	Age
Food	-	+	+
Home	-	+	+
Clothes	+	?	-
Leisure	+	-	-
Transport	+	-	-
Other	-	-	+

After having decided on budget shares for the six main categories of goods, a subdivision for each category has to be decided on. Besides household characteristics like income, household size and age of the head of the family, also the share of the

⁶ For Germany a positive income effect is found for the budget share of other, if income is significant.

corresponding main group is considered as explanatory variable. The main group Food for example consists of three subgroups food1, food2 and food3. Food1 and food2 are basic food products like bread, meat and vegetables, food3 consists of (luxury) goods like cigarettes and alcoholics. It can be considered that a minimum share of the budget has to be spent to the first two groups, while the third group is depending on the share of budget spent to Food totally. In the next table a + in the column 'share main' for food3 describes this effect of positive influence of increasing budget share for Food and increasing share of this Food budget to stimulants.

Table 6.2 *Signs of estimated parameters for the effect of income, household size and age on budget shares of sixteen subcategories of goods*

	Share main			Income			Size			Age		
	NL	FR	BR	NL	FR	BR	NL	FR	BR	NL	FR	BR
Food1	-	-	-	-	-	-	+	+	+	0	+	+
Food2	-	+	-	-/0	+	+/-	0	+		+	+	-
Food3	+	+	+	+	+	+	-	-	-	-	-	-
Home1	-	+	-	-	-	-	+	-	+	+	-	-
Home2	+	+	+	+	+	+	-	-	-	-	+	+/-
Home3	-/0	+/-	+	+	+	+	-	-		-	-	-
Home4	-	-	-	-	-	-	+	+	+	+	+	+
Leis1	-	-	-	-	-	+/-	+	+	+	0	+	+/-
Leis2	-	-	-	-	-	-	+	+/-	+	+/-	+/-	+/-
Leis3	+	+	+	+	+	+	-	+/-	-	-	-	+/-
Tran1	+	+	+	+	+	+	0	+		-	+/-	+
Tran2	+	-	-	+/-	+/-	+/-	0	+/-	-	-	+/-	-
Tran3	-	-	-	-	-	-	0	-		+	+	
Othe1	+/-	-	-	+	-	-	-	-		+/-	+/-	-
Othe2	+/-	+	+	-	+	+	+	+		+/-	+/-	+

In general the directions or signs of the four explanatory variables on the budget share of the subcategories are similar for the three countries. Mainly the share of the corresponding main group and income effects are very similar. The influence of age and size is less important, and also shows different signs for different household types.

Food

For food1 a direct relation with household size is shown in table 6.2, while this effect is less clear for food2. For products in food2 households can choose for less or more expensive products, while in food1 the quantity will mainly influence expenditures. For food3 a clear positive relation between main share and income is resulting; size and age have a negative impact on budget shares for food3. The presence of children and getting older (and wiser?) result in relatively less expenditures to stimulants.

Home

For home1 the effects of explanatory variables in the different countries are not similar, mainly for France different signs are found compared to the Netherlands and Germany. An explanation for a negative impact of the share of home on the share of home1 (rent) could be the fact that changing houses will not take place very often; so if income rises, and budget share of home total rises, this will not result in increasing rents but in more luxury furniture or appliances. Therefore the minus signs for main share and income on expenditures to rent are compensated by positive signs for furniture and appliances. An increasing household size will have more impact on the size of the dwelling than on the furniture in that dwelling.

With respect to energy (home4) expenditures on energy seem to be more depending on the size of the house than on the appliance stock. Energy demand for heating of course is more than energy demand for electrical appliances. The positive signs at age can be explained by the fact that older people are more at home (for example retired), and in general like a higher room temperature.

Leisure

For subcategories of leisure also similar results for the three countries have been found, mainly for total share of leisure expenditures and income. From the table it becomes clear that an increasing share of expenditures to leisure and in increasing income will positively effect holidays and excursions, and negatively effect budget share of goods and services for leisure and development. It can be concluded that visiting restaurants and holidays are experienced more as luxury than sports and cinema visits. The effect of size and age is most clear for leis1; families with children will relatively spend more to leisure goods like books and sport equipment for all household members than to cinema and concerts, which is in general only for the parents.

Transport

If larger part of total budget is spent to transport, this will mainly influence expenditures on cars. Depending on efficiency of the new, larger cars this will also effect energy expenditures, but in general increase in energy expenditures are smaller than increase in expenditures for vehicles. Of course less budget is spent to public transport then. With respect to income, about the same effect can be seen, also because of the positive impact of income on total budget share of transport. The effect of size and age are rather varying for the different types of households. Presence of children will influence the choice of buying a car, but more children will not automatically lead to a larger car.

Other

For the products in the 'other' group the effects are rather varying between household types and countries. In general a larger share of expenditures to other will be caused by larger expenditures to medical care. The different income effects on budget shares between the Netherlands on the one hand and France and Germany on the other hand could be explained by different insurance systems. In the Netherlands insurance costs and costs of medicines are not directly related to income levels (apart from difference between collective and private insurances). Presence of children will have a positive effect on budget share for medicines, and thus a negative effect on personal care.

6.2 Time series estimation

Based on the parameter estimations from cross-section estimation, and time series of explanatory variables for 1980 to 1990, a new series can be prepared representing variance not explained by cross section estimates. These series are subtracted from realized expenditure data:

sfood = realized share of food in total expenditures

sfood_{cs} = forecast based on cross-section estimations

sfoodr = residual (sfood - sfood_{cs})

When analysing these new series, mean values can give a good approximation of the quality of the estimations. For the residual shares (sfoodr, etc.) a mean value of 0 is optimal. From the following table it is clear that mean of 'r' series lies in between -1.13 and 1.38 for the Netherlands, for France between -7.03 and 4.05, and for Germany between -2.72 and 2.41.

Table 6.3 Mean values of 'residual' series for the Netherlands and France
(sfoodr = sfood - sfood_{cs})

	Mean r (optimal=0)		
	NL	FR	BR
Food	1.38	1.93	1.48
Home	-0.05	-2.60	-2.72
Clothe	-1.13	0.85	-0.33
Leisure	0.50	-7.03	-1.05
Trans	1.20	2.79	2.41
Other	-0.48	4.05	0.20

For the Netherlands cross-section estimates per household type are used to create the 'residual' time series. The mean values are the overall mean values, so not per household type. This is an explanation for the sum of the means not being 0. Overall results for the Netherlands are rather close to the optimal value 0. For France and Germany the sum of the mean values is 0 because one estimated equation and one value for each explanatory variable is used per year. The variation however between the types of goods is rather large. Mainly leisure and other show a large difference from the optimal value. This could be explained by the limited number of data for time series. For each year only average values are available, this means 11 values in total. Of course the smaller the number of cases, the larger the variation. Therefore it can not be concluded that the cross-section estimations are very poor, nor very good.

The time series of sfoodr, representing part of variation which is not explained by the cross-section variables, can be explained by a trend variable and by prices. Also income can be considered as explaining variable again, because the time-series influence can be different from cross-section influence.

Table 6.4 Comparison of influence of prices in time series estimation on residual series for the Netherlands (N), France (F), and Germany (B)

	Pfood			Phome			Pclothes			Pleisure			Ptransp			Pother		
	N	F	B	N	F	B	N	F	B	N	F	B	N	F	B	N	F	B
Food	+	+			+	-						-				+		
Home				+	+	+		+										+
Clothe								+	+			-						
Leisure												-						
Transp																		+
Pother	-														+			-

In general it can be concluded that only a limited number of prices are influencing budget shares in a significant way. Mainly prices of food, home and clothes have impacts on the budget shares of the same three groups. It can be stated that the other goods are not necessary goods, but their shares are depending on what is left after buying food, home, and clothes. This observation is somewhat fortified by the fact that income is a significant explanatory variable for the three last groups for the Netherlands, and not for home and clothes.

For the Netherlands only three prices have a significant impact on budget shares for the six main categories of goods. Food and home can be considered as necessary goods, so price increases of these goods will have impact on budget shares. Shares of food and home will increase due to higher prices, and will be compensated by decreasing budget shares for clothes, transport and other.

The high R^2 values for France are a result of only 11 cases in the estimation. For food, home and clothes the own relative price will influence budget shares positively. However, also other prices have a positive sign, which is hard to explain. It could be explained by correlation between both prices, for example price of food and price of home. Based on mainly the signs of the price effects an ordering of importance could be considered: budget shares for food and home will increase in any case, not only due to own price increases but also due to other price increases. For clothes the an increasing own price results in larger budget share, but when leisure becomes more expensive, this category is more important and will result in lowering shares of clothes. Transport on the other hand seems less important than clothes because of the negative parameter, but more important than other. For leisure and other no price influences are found, so conclusions for these categories are not possible to be made.

Time series estimation on residual series are for the Netherlands also carried out for three large groups of households, viz. one-person households, more-person households with low incomes and more-person households with high incomes (see also estimation on savings). When comparing R^2 values for both estimates, results from the procedure for three groups of households are better for most groups of goods.

It is clear that it is not easy to find good estimations for the constructed time series. Because of the way they are constructed these series contain a large part of variation

that could not be explained by the cross-section variables. This variation partly results from income, price and trend developments, but also partly from 'normal variation' between individual households. Mainly for home, leisure and transport it is hard to find good estimations for the residual time series, for the other groups results are acceptable.

For sixteen subgroups of categories the explanatory variables which could be included in the model are the prices of the subgroups in the corresponding main group. For example, prices of food1, food2 and food3 could influence budget share of food1.

Based on the mean values of the residual series, constructed as described above, and the estimation results, it is decided not to include price effects on this level. The limited availability of data, mainly for France, did not allow for reliable estimation results. Furthermore the selection of groups of categories was also based on the assumption that price influences could effect the distribution of income at the higher level, and based on this distribution and household characteristics, the budget shares at the lower level of sixteen subgroups are decided.

7. SIMULATED CONSUMPTION PATTERNS

7.1 Social-economic key factors

The ELSA model for the Netherlands has an elaborate social-economic module which translates macro-economic developments concerning output and labour productivity into micro-economic developments such as income by household type. The E³Life model for Germany contains a small number of devices to produce an income distribution by household type. For France the model does not distinguish various household types. As is explained in the previous chapters the after tax income is the starting point for the consumption allocation. Yet, the way the aggregate consumption budget is 'made available' to the households differs between the households and furthermore distributional impacts may differ between scenarios. Macro economic and micro economic prospects can therefore differ to some degree. The discussion below will focus on the Dutch consumption patterns generated in the ELSA model, though some results for Germany (produced by IER-Stuttgart) will be shown as well.

Since the probability to be employed as well as the labour time can be manipulated in the ELSA model the same macro economic assumptions regarding growth of value added and labour productivity can produce different income distributions and consequently result in different consumption patterns. Therefore, anterior to the presentation of simulated consumption patterns, the relevant differences between the scenarios will be explained. For a more elaborate discussion on the scenarios see Weber et al (1996) and Perrels and van Arkel (1996).

During the project four scenarios have been defined, named:

- Business as Usual (BU)*
- Stagnation (SG)*
- Sustainability through reflective Consumption (SC)*
- Sustainability through Technological breakthrough (ST)*

The overall economic growth from 1990 to 2010 varies from 28% in the SG and SC scenarios up to 71% in the ST scenario, while it is rated at 48% in the BU scenario. Labour time reduction, either through less hours per week or through more holidays per year is absent in the SG scenario. In the BU and ST scenario it only applies to somewhat more holidays and a larger share of part time jobs in the whole labour market. In the SC scenario full time jobs are reduced to - on average - 34 hours per week, while also an increase of the share of part time jobs is taken into account. All in all it results in a substantial reduction of second earners compared to 1990 in the SG scenario, while in the BU and ST scenario the overall engagement in paid labour (in % terms) does not change much. However in the latter two scenarios second earners are to a large extent relegated to part time jobs. In the SC scenario almost full employment is achieved, nevertheless this results in absolute or relative income losses for some single earner households, since the labour time reduction is not compensated by higher wage rates. Wage rates only increase due to transferred gains of labour productivity improvements and higher education levels. Furthermore, in the SG scenario the average level of social security benefits is reduced, while it remains almost constant in the BU and SC scenario. In the ST scenario some growth of the social security benefits is allowed. The population and household development is

identical in all scenarios. Another source of impact differentiation are the price scenarios. Price developments of the six main consumption categories differ per scenario. Obviously, the scenarios produce different income distributions. Table 7.1 gives an overview of the development of the purchasing power per household type for each consecutive scenario. The figures denote the total increase of purchasing power over the period 1990 - 2010 expressed in % shifts. The effects shown in table 7.1 are a combination of scenario-specific economic effects and common demographic effects. For example, the number of young families decreases by approximately 12%, while the number of middle aged families increases with about 18%. The number of elderly singles virtually doubles up to 2010 and the number of elderly couples increases by 35%.

Table 7.1 *Percentage changes in aggregate disposable income by household group from 1990 to 2010 for four scenarios*

	BU	SG	SC	ST
Single <36	46	32	12	61
Single 36-60	60	43	22	77
Single >60	109	80	80	145
Couple <36	63	41	52	81
Couple 36-60	55	43	49	80
Couple >60	53	30	41	85
Family <36	12	1	9	26
Family 36-60	37	26	29	62
1-Parent fam. <36	49	35	14	65
1-Parent fam. 36-60	76	53	68	115
Total average	47%	30%	33%	69%

The figures in table 7.1 show that not only the overall volume differs between the scenarios, but also the distribution of gains and losses over household types has marked differences. For example, the elderly singles as a group always show an important increase in purchasing power (+80% to +145%), but only in the BU and ST scenario also the personal purchasing power improves. This will supposedly have a distinct impact on the budget allocation.

7.2 Simulated consumption patterns

7.2.1 Calculated expenditure shares at the micro level

The model as has been introduced in the previous chapters and implemented in the ELSA model starts its calculations the micro level of the ten typical households. First calculated disposable income is split up in non-mandatory savings and consumption budget. Subsequently, the consumption budget is allocated to six main categories. This is done in two steps, representing the influences of household characteristics and

prices respectively. Finally, the resulting - corrected - expenditure shares for six main categories are further disaggregated into 16 expenditure categories. Then the aggregation process can start by translating expenditure shares into micro-level outlays and subsequently adding up to macro level outlays, i.e. total consumer demand by category and/or household type. In this section an overview is provided of the results at the micro-level for the SC scenario, just for the purpose of illustrating the process (presenting results of all scenarios would need a lot of space). In the next section (7.2.2) results at the macro-level for all scenarios will be presented.

Scenario : SC	Non-mandatory savings as shares of disposable income		
	1990	2000	2010
Singles <36	7,8%	6,6%	6,6%
Singles 36-60	9,4%	8,5%	8,3%
Singles >60	7,8%	7,3%	7,1%
Couples <36	8,0%	9,9%	11,3%
Couples 36-60	9,9%	10,7%	11,2%
Couples >60	4,7%	5,2%	5,6%
Families <36	6,1%	9,0%	10,2%
Families 36-60	8,6%	9,5%	10,3%
1_Parent families <36	-5,8%	-5,3%	-5,7%
1_Parent families 36-60	0,9%	2,8%	3,6%

Figure 7.1 *The development of the propensity to save in the SC Scenario (output from ELSA model)*

Generally one can say that household types of which real disposable income rises over time, have increasing saving fractions, while indeed household types with decreasing real incomes display a decreasing propensity to save. The negative fraction for savings of one-parent families in figure 7.1, though perhaps somewhat overstated, does indeed reflect the difficult financial situation of that group. A situation that is often reported by social security agencies. The SC scenario, which stresses the redistribution of labour over all employable persons, is disadvantageous for households from which only one person can be recruited. With some delay this also affects the incomes of (newly) retired singles.

The above calculated fractions were used to obtain the consumption budget for each household type. Subsequently that budget was allocated to six main expenditure categories. This allocation was carried out by first calculating shares per category by household type and year by using the cross-section base consumption function representing the household characteristics (see also section 3.2.1). In a next step the longitudinal information, mainly relative prices, is added, leading to a correction of the originally calculated fraction (see also sections 2.3 and 3.2.1). Figure 7.2 contains a table of calculated fractions resulting from step 1 (cross-section base). Figures 7.3a and 7.3b display the calculated fractions for the sixteen category level. The calculation of the latter set of fractions is carried out by splitting the calculated fractions of the six main categories.

Household expenditures

Scenario : SC		SIMULATED BUDGET SHARES BY CATEGORY - CROSS SECTION BASE								
		QC(food)			QC(home)			QC(clothes)		
		1990	2000	2010	1990	2000	2010	1990	2000	2010
Singles <36		12,5	12,7	12,7	33,8	34,2	34,2	6,8	7,0	6,6
Singles 36-60		14,1	14,3	14,3	38,1	38,4	38,5	6,3	6,5	6,2
Singles >60		15,2	15,4	15,5	44,3	44,2	44,1	6,0	6,0	5,9
Couples <36		16,7	13,5	13,0	33,0	32,3	31,6	7,1	7,3	7,4
Couples 36-60		18,8	18,4	18,1	38,4	34,5	34,8	6,9	6,9	7,0
Couples >60		18,8	18,9	18,7	39,3	39,2	39,2	6,3	6,3	6,3
Families <36		18,4	16,9	16,2	35,3	34,9	34,7	7,2	7,5	7,6
Families 36-60		19,9	19,4	18,7	34,0	33,9	34,0	8,1	8,2	8,3
1_Parent families <36		19,9	19,8	19,9	35,8	35,7	35,7	7,2	7,2	7,2
1_Parent families 36-60		18,7	18,3	18,0	34,7	34,4	34,2	7,6	7,8	7,8
total average		16,4	16,9	16,3	36,0	35,9	35,8	6,5	6,6	6,6
		QC(leisure)			QC(transport)			QC(other)		
		1990	2000	2010	1990	2000	2010	1990	2000	2010
Singles <36		22,5	22,2	22,6	12,2	11,8	11,8	12,2	12,2	12,2
Singles 36-60		17,0	16,7	16,9	10,2	9,9	9,8	14,3	14,3	14,3
Singles >60		11,7	11,6	11,6	9,6	9,6	9,6	13,1	13,2	13,4
Couples <36		18,0	18,9	19,8	11,8	12,5	13,2	12,8	14,7	14,3
Couples 36-60		13,3	13,6	13,9	11,4	11,5	11,4	14,4	14,2	14,1
Couples >60		11,8	11,6	11,8	10,8	10,9	11,0	13,9	13,7	13,8
Families <36		12,0	12,9	13,4	10,3	11,2	11,6	15,9	18,3	18,1
Families 36-60		14,1	14,3	14,5	9,8	10,1	10,3	15,5	15,3	15,1
1_Parent families <36		14,5	14,5	14,5	8,3	8,4	8,3	15,5	15,5	15,5
1_Parent families 36-60		15,7	16,1	16,3	9,6	10,1	10,3	14,8	14,5	14,4

Figure 7.2 The development of budget share at the 6 main category level in Scenario SC

The share of the consumption budget spent on the home (housing/mortgage, interior decoration, furniture, garden, appliances, energy) represents the largest single portion in the budget. In the SC scenario it is fairly stable, since possible higher construction costs of homes are at least partly compensated by constructing a notably more apartments and fewer detached dwellings. Due to the modest changes in purchasing power the shifts in the budget shares are not that dramatic either. The expenditure shares for leisure and transport are increasing for most households. From the more detailed 16 category level (see table 7.3) we can learn that the greater part of the extra expenditures are allotted to holidays and restaurants, which is a relatively energy intensive category within the service oriented expenditure categories.

After calculating the cross-section based fractions as displayed in figure 7.2, the influence of prices is taken into account and consequently the prices also influence the allocation of expenditures at the 16 category level. In the SC scenario the movements of relative prices is calculated as is displayed in table 7.2 (based on price increases of commodity categories).

Table 7.2 Relative consumer prices in the SC scenario (1980=100)

	Food	Home	Clothes	Leisure	Transport	Other
1980	100	100	100	100	100	100
1990	93	106	84	101	102	102
2000	88	115	71	99	110	110
2010	97	118	64	100	111	107

Household expenditures

	QQ(development&leisure - goods)			QQ(development&leisure - services)		
	1990	2000	2010	1990	2000	2010
Singles <36	0,074	0,073	0,074	0,028	0,028	0,029
Singles 36-60	0,063	0,062	0,063	0,024	0,024	0,025
Singles >60	0,052	0,052	0,052	0,017	0,017	0,018
Couples <36	0,068	0,071	0,073	0,022	0,025	0,027
Couples 36-60	0,052	0,054	0,056	0,014	0,015	0,015
Couples >60	0,047	0,049	0,050	0,015	0,015	0,015
Families <36	0,062	0,057	0,060	0,018	0,018	0,018
Families 36-60	0,055	0,058	0,059	0,008	0,008	0,008
1_Parent families <36	0,057	0,059	0,060	0,030	0,031	0,033
1_Parent families 36-60	0,062	0,066	0,068	0,028	0,029	0,030
	QQ(restaurants & holidays)			QQ(car purchases)		
	1990	2000	2010	1990	2000	2010
Singles <36	0,135	0,131	0,134	0,030	0,030	0,030
Singles 36-60	0,096	0,092	0,094	0,021	0,021	0,021
Singles >60	0,057	0,056	0,055	0,029	0,029	0,030
Couples <36	0,104	0,118	0,131	0,038	0,039	0,040
Couples 36-60	0,078	0,088	0,096	0,038	0,037	0,036
Couples >60	0,069	0,076	0,082	0,033	0,034	0,034
Families <36	0,049	0,075	0,083	0,031	0,035	0,037
Families 36-60	0,072	0,080	0,088	0,023	0,024	0,024
1_Parent families <36	0,074	0,081	0,085	0,008	0,009	0,008
1_Parent families 36-60	0,080	0,089	0,095	0,016	0,019	0,021
	QQ(motor fuel)			QQ(public transport)		
	1990	2000	2010	1990	2000	2010
Singles <36	0,027	0,028	0,028	0,099	0,102	0,102
Singles 36-60	0,020	0,020	0,020	0,086	0,088	0,089
Singles >60	0,015	0,015	0,015	0,086	0,087	0,088
Couples <36	0,025	0,027	0,029	0,068	0,067	0,066
Couples 36-60	0,018	0,019	0,019	0,065	0,064	0,063
Couples >60	0,025	0,025	0,026	0,070	0,070	0,070
Families <36	0,029	0,029	0,029	0,052	0,049	0,048
Families 36-60	0,025	0,025	0,025	0,053	0,053	0,052
1_Parent families <36	0,014	0,016	0,017	0,088	0,087	0,088
1_Parent families 36-60	0,017	0,017	0,018	0,082	0,079	0,078
	QQ(hygiene & personal care)			QQ(medical care)		
	1990	2000	2010	1990	2000	2010
Singles <36	0,033	0,034	0,034	0,091	0,094	0,094
Singles 36-60	0,036	0,036	0,036	0,104	0,107	0,107
Singles >60	0,048	0,049	0,050	0,084	0,085	0,087
Couples <36	0,024	0,033	0,032	0,092	0,101	0,096
Couples 36-60	0,030	0,030	0,030	0,100	0,098	0,096
Couples >60	0,036	0,035	0,036	0,077	0,075	0,075
Families <36	0,039	0,052	0,052	0,107	0,116	0,113
Families 36-60	0,033	0,033	0,033	0,107	0,105	0,102
1_Parent families <36	0,056	0,056	0,056	0,092	0,091	0,091
1_Parent families 36-60	0,041	0,040	0,039	0,097	0,095	0,093

Figure 7.3b Calculated expenditure shares for 16 categories, Scenario SC (output from ELSA Model)

7.2.2 Consumption patterns at the macro level

Given the income overviews in section 7.1 it should not be a surprise that the aggregate consumption expenditures increases in all scenarios. The total outlay in 1990 amounts to 210 billion guilders (= 126 bln. US\$ of 1996 or 102 bln. ECU of 1996). The aggregate consumption in 2010 for the various scenarios amounts to:

Business as Usual (BU):	299 bln. guilders
Stagnation (SG):	279 bln.
Sustainability through reflective Consumption (SC):	284 bln.
Sustainability through Technological breakthrough (ST):	341 bln.

The combination of different total expenditures and variations in expenditure shares, as illustrated for SC in section 7.2.1, results in significant differences in aggregate outlay per consumption category. For example in the Stagnation Scenario the aggregate expenditures on Non-basic foodstuffs *decrease* from 17.3 billion in 1990 to 16.8 billion in 2010, while in the Sustainability through Technological Breakthrough Scenario they increase up to 23.5 billion. The biggest chunk of extra aggregate purchasing power is allocated to housing. Housing claims already 44.8 billion in 1990 and increases up to 64.8 billion in the Sustainability through Reflective Consumption Scenario and even up to 78.3 billion in the Sustainability through Technological Breakthrough Scenario. Remarkably enough the expenditures on medical care grow somewhat less than proportional in most scenarios. Only the vast increase in personal wealth in the Sustainability through Technological Breakthrough Scenario results in a slightly more than proportionate increase of outlays on medical care. Given, the massive increase of the number of households with retired persons (from 1.5 million to 2.5 million), it is very likely that the actual (physical) consumption of medical services increases substantially. However, given the current system of payment and insurances of health care, the model implicitly assumes that any growth beyond what it has projected will be paid by collective funds.

In all scenarios the expenditures on outdoor meals and holidays grow substantially. They even more than double (+119%) in the ST Scenario. Such developments are perfectly in line with recent trends and current short run expectations. Please note that this expenditure category is energy intensive, notwithstanding its strong service orientation. Observing the expenditures related to development and leisure it strikes that the expenditures on goods were much larger in 1990 and continue to be much larger in the future. In the ST scenario the disparity even increases. This is in line with the observation that in the ST scenario the time budget hardly gets more relaxed while the money budget expands enormously. In the SC and FG scenario where money budgets have modest increases (or even decreases) and time gets more abundant for some groups (though in different ways) indeed development and leisure services grow more than the corresponding outlays for goods. An overview of the relative growth of consumption categories is given in figure 7.1 below.

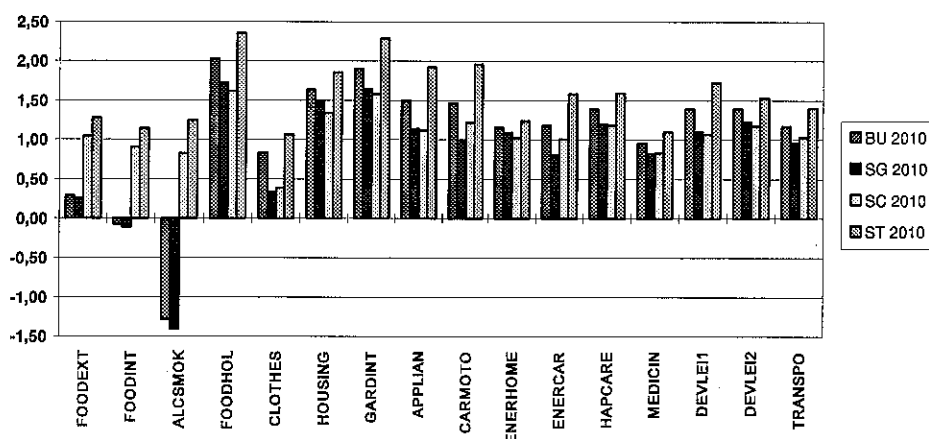


Figure 7.4 *Proportionality rating on the development of consumption categories by scenario (1 = proportional growth -> constant share)*

The legend to figure 7.4 can be found in figure 7.5 below. Figure 7.4 summarizes the dynamics of the aggregate consumption system in the different scenarios. The rating is defined in such a way that if a bar indicates 1,0, it means that the related category has a constant share in total expenditures. Ratings exceeding 1,0 imply an increasing share and consequently ratings lower than 1,0 indicate a decreasing share. In case of an absolute decrease of the expenditure level of a category a negative rating results (as is the case for alcohol and tobacco in the BU and SG scenario).

The discussion of the implications of the calculated consumption patterns for the energy and emission volumes in the different scenarios is dealt with in separate reports, being Weber et al, 1996 (the main report on the EU project Consumers' Lifestyles and Pollutant Emissions) and a related ECN report of Perrels and van Arkel, (1996).

AGGREGATE CONSUMER EXPENDITURES BY CONSUMPTION CATEGORY AND BY SCENARIO										
Category description	Cat name	1990	BU 2000	BU 2010	SG 2000	SG 2010	SC 2000	SC 2010	ST 2000	ST 2010
Basic foodstuffs	FOODEXT	11391	11726	12197	11601	12112	11216	14997	11211	16156
Non-basic foodstuffs	FOODINT	17314	16437	17005	16231	16863	15816	21846	15618	23539
Alcohol and tobacco	ALCSMOK	4428	3413	3420	3339	3345	3141	5476	3100	6218
outdoor meals and holidays	FOODHOL	15599	23089	29230	22157	25908	21072	24875	22938	34186
clothing and footwear	CLOTHES	15892	17098	19685	16603	17207	16511	17440	16793	21043
housing (rents, etc.)	HOUSING	44791	61053	72066	59598	68342	57790	64858	60081	78346
gardening, furniture, etc.	GARDINT	12725	18249	22681	17340	20496	17235	20027	17727	26939
domestic appliances	APPLIAN	7390	9241	11295	8810	10019	8854	9969	9041	13267
car and motor purchases	CARMOTO	6158	7820	9324	7433	7998	7585	8569	7741	11207
energy at home (gas, power, heat)	ENERHOME	9912	12034	13519	11926	13246	11765	12990	11971	13878
motorfuels for private car	ENERCAR	5012	5984	6898	5763	6147	5901	6526	5947	7889
health and personal care	HAPCARE	7930	10267	11866	10065	10978	9810	10894	10221	12530
medical care	MEDICIN	21392	24983	27459	24691	28449	24502	26497	24915	28666
development and leisure	DEVLEI1	12252	15244	18075	14779	16433	14464	16275	15147	20351
development and leisure	DEVLEI2	3632	4621	5350	4532	5080	4435	4985	4614	5620
transport services, maintenance	TRANSP0	14062	16890	19265	16557	18097	16852	18464	16808	20783
TOTAL		209782	258148	299134	251426	278718	246751	284688	253875	340598
AGGREGATE CONSUMER EXPENDITURES BY HOESEHOLD TYPE AND BY SCENARIO										
		1990	BU 2000	BU 2010	SG 2000	SG 2010	SC 2000	SC 2010	ST 2000	ST 2010
	Singles <36	15803	21170	22291	20768	20947	19214	18050	20630	23360
	Singles 36-60	13381	17491	21112	17112	19593	15880	16896	17057	22326
	Singles >60	20243	30010	42500	29178	38727	28272	37482	29401	46846
	Couples <36	20403	25454	30492	24439	27818	24891	30013	25174	34520
	Couples 36-60	19601	26185	29875	25619	28485	25746	30257	25822	34938
	Couples >60	26006	29491	38010	28543	34304	28315	37476	28869	45926
	Families <36	50631	55967	55265	54578	52303	53668	56056	55278	62614
	Families 36-60	34519	40954	46230	39998	43985	39884	46085	40370	54733
	1_Parent f. <36	6448	7576	8749	7461	8313	6979	7706	7414	9784
	1_Parent f. 36-60	2747	3848	4611	3730	4243	3903	4667	3861	5551

Figure 7.5 Summary of developments in expenditures by category and household type for 4 scenarios based on ELSA model calculations

LITERATURE

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APPENDIX A. DEFINITION OF CONSUMPTION CATEGORIES

Food1. Food (energy extensive)

- bread, pastry and groceries
- potatoes
- dairy products

Food2. Food (energy intensive)

- vegetables (fresh and packed)
- fruit (fresh and packed)
- sweet products
- non-alcoholics
- oil and fats
- meat (fresh and packed)
- fish (fresh and packed)

Food3. Stimulants

- alcoholics
- cigarettes, sigars

Leis3. Excursions, restaurants

- eating out (incl. canteens)
- holidays and day trips

Clot1. Clothes and shoes

- clothes for men, women and children
- clothes accesories
- dress materials
- shoes
- finery
- sport shoes and sport clothes

Home1. House (rent)

- rent, rentvalue
- insurances

Home2. House and garden (furnishing)

- maintenance
- installations fixed with nails
- garden, flowers and plants
- furniture, upholstering and linen

Home3. Energy intensive capital goods (house)

- appliances and tools,
- hifi, tv, video

Tran1. Energy intensive capital goods (transport)

- cars (new and second-hand)
- motorbikes (new and second-hand)
- mopeds (new and second-hand)

Home4. Energy

- natural gas
- electricity
- steam, warm water (collective systems)
- others (petroleum, wood, etc)

Tran2. Energy for transportation

- motorfuels

Othe1. Hygiene and personal care

- domestic services
- detergents, toilet articles
- hair care, etc.

Othe2. Medical care

- medicins
- medical care (not assured)
- medical insurance

Leis1. Development, leisure, sport and games (goods)

- books, newspapers, magazines
- stationary
- music (instruments, cd)
- photocameras
- domestic animals
- hobbies, toys

Leis2. Development, leisure, sport and games (services)

- courses
- music, dance
- hiring sport accomodation and sport clothes
- cinema
- clubs

Tran3. Transport and communication

- public transport
- bicycles
- telephone
- other services

APPENDIX B. SUMMARY OF RESULTS FOR SAVINGS

Summary of results for savings as a function of income and other household characteristics.

The Netherlands

1. Absolute level of savings:

S = real savings/1000
income = real net income/1000
child = dummy (1=child(eren), 0=no child(eren))

Group (1) $S = -5.0 + 0.26 \times \text{income}$
(2) no significant variables
(3) $S = -8.1 + 0.26 \times \text{income}$
(2)+(3) $S = -8.7 + 0.28 \times \text{income} - 1.11 \times \text{child}$

2. Savings as share of income

W_s = savings/income $\times 100$

Group (1) $W_s = -10.0 + 0.64 \times \text{income}$
(2) $W_s = 6.8 - 4.37 \times \text{child}$
(3) $W_s = -5.6 + 0.30 \times \text{income}$

France

1. Absolute level of savings:

S = real savings/1000
income = real net income/1000
child = dummy (1=child(eren), 0=no child(eren))

Group (1) $S = -51.2 + 10.4 \times \text{income} + 4.1 \times \text{age}$
(2) $S = -86.1 + 16.6 \times \text{income} - 26.1 \times \text{child} + 3.5 \times \text{age}$
(3) $S = -121.5 + 20.7 \times \text{income} - 21.0 \times \text{child} + 2.1 \times \text{age}$
(2)+(3) $S = -90.0 + 15.8 \times \text{income} - 21.0 \times \text{child} + 2.1 \times \text{age}$

Germany

1. Absolute level of savings:

APPENDIX C. ESTIMATION RESULTS FOR THE NETHERLANDS

Results of cross section estimation by household type, for 6 main categories

(Hh=15)	Const	Income	Size	Age	Educ	Educpartner	R ²
Food	56.8	-4.66		0.55			0.09
Home	93.2	-6.43		1.33			0.10
Clothes							
Leisure	18.5			-1.35	1.89		0.13
Transport	-68.6	8.40		-0.72			0.13
Other	10.4			0.57			0.05

(Hh=2)	Const	Income	Size	Age	Educ	Educpartner	R ²
Food	59.7	-4.1				-0.89	0.16
Home	88.9	-5.4		1.79	-1.55		0.06
Clothes	4.0				0.77		0.04
Leisure	-35.8	4.0			3.14		0.13
Transport	-76.5	9.5		-2.87			0.09
Other	66.4	-4.8			-1.25	0.79	0.16

(Hh=37)	Const	Income	Size	Age	Educ	Educpartner	R ²
Food	100.1	-8.0					0.22
Home	102.9	-6.7					0.07
Clothes	-21.9 ¹	2.9					0.04
Leisure	-64.7	7.9					0.15
Transport	-77.9	8.6					0.18
Other	61.6	-4.6					0.14

(Hh=4)	Const	Income	Size	Age	Educ	Educpartner	R ²
Food	86.0	-6.9	1.09	1.20	-1.32		0.22
Home	72.5	-3.6					0.01
Clothes	-27.2	3.1	0.59				0.05
Leisure	-23.9	3.0			1.30		0.07
Transport	-105.4	12.1		-1.57	-0.99		0.12
Other	92.5	-7.5				0.50	0.21

Household expenditures

(Hh= 6)	Const	Income	Size	Age	Educ	Educpartner	R ²
Food	127.9	-11.0		0.63			0.32
Home	31.8				2.26	-1.56	0.06
Clothes	-12.8	1.9					0.02
Leisure	-79.1	9.9		-1.33			0.26
Transport	-40.5	5.6			-1.67		
Other	61.0	-4.5					0.13

(Hh= 8)	Const	Income	Size	Age	Educ	Educpartner	R ²
Food	101.4	-8.0	0.99		-0.57		0.23
Home	72.4	-3.7		-0.65	1.16		0.03
Clothes	-21.1	2.8					0.01
Leisure	-34.9	4.7					0.02
Transport	-93.4	10.3			-1.17		0.10
Other	68.7	-5.1					0.16

(Hh=9)	Const	Income	Size	Age	Educ	Educpartner	R ²
Food	100.3	-8.6					0.22
Home	49.8				-1.72		0.04
Clothes	9.0				-0.94		0.05
Leisure	-32.8	4.5					0.06
Transport	-61.5	6.7			1.52		0.19
Other							

(Hh=10)	Const	Income	Size	Age	Educ	Educpartner	R ²
Food	102.8	-7.9			-1.04		0.25
Home	94.2	-5.4					0.04
Clothes	10.9			0.41			0.01
Leisure	-33.5	4.1			1.02		0.09
Transport	-74.6	8.4					0.10
Other	11.5				0.67		0.02

Results of cross section estimation per household type for 16 subgroups

Hh=15	Const	Share main	Inc	Size	Age	Educ	Educpart	R ²
Food1	144.0	-0.58	-10.1					0.12
Food2	55.5					-2.1		0.02
Food3	-155.8	0.79	16.9		-1.16			0.14
Home1	137.6		-7.3					0.03
Home2	-68.6	0.26	7.3					0.08
Home3	-57.4		7.2		-1.03			0.09
Home4	73.2	-0.19	-5.4					0.18
Leis1	44.8	-0.57						0.07
Leis2	88.3	-0.35	-6.9					0.14
Leis3	34.0	0.97						0.16
Tran1	-166.1	1.41	16.5					0.52
Tran2	7.1	0.65						0.11
Tran3	321.0	-2.0	-22.9					0.46
Othe1	37.4	-0.84						0.07
Othe2	63.6	0.84						0.07

Hh=2	Const	Share main	Inc	Size	Age	Educ	Educpart	R ²
Food1	43.7	-0.58						0.07
Food2								
Food3	0.0	0.58			2.64			0.05
Home1	213.8	-0.49	-16.1		2.83			0.19
Home2	-181.8	0.72	17.1					0.33
Home3	-47.4		5.7					0.04
Home4	110.3	-0.22	-8.8					0.37
Leis1	140.0	-0.56	-9.1					0.10
Leis2	-7.6	-0.20						0.07
Leis3	-75.3	0.74	11.2					0.16
Tran1	10.7	1.40						0.03
Tran2								
Tran3	258.1	-1.53	-18.1					0.15
Othe1	27.6	-0.74					1.62	0.09
Othe2	72.4	0.74					-1.62	0.09

Household expenditures

Hh=37	Const	Share main	Inc	Size	Age	Educ	Educpart	R ²
Food1	41.9	-0.27						0.05
Food2								
Food3	19.6			-3.0				0.05
Home1	228.3	-0.33	-16.3			3.3		0.21
Home2	-163.1	0.55	15.5					0.31
Home3	-53.6		6.7			-1.84		0.16
Home4	96.1	-0.18	-7.3					0.32
Leis1								
Leis2	141.7		-12.3					0.12
Leis3	30.1	1.0						0.12
Tran1	-439.8		44.6					0.36
Tran2	-8.4	0.65				3.8		0.13
Tran3	542.4	-1.19	-45.0					0.48
Othe1	46.7				-2.5			0.07
Othe2	53.3				2.5			0.07

Hh=4	Const	Share main	Inc	Size	Age	Educ	Educpart	R ²
Food1	111.3	-0.29	-7.8	1.81		1.01	1.05	0.09
Food2	53.6	-0.21						0.02
Food3	-31.0	0.48	4.0	-1.34			-1.03	0.08
Home1	232.9	-0.36	-17.3		2.15	1.34	1.77	0.15
Home2	-167.3	0.58	16.6		-1.98			0.25
Home3	-61.8		7.5			-0.85	-0.85	0.06
Home4	109.8	-0.27	-8.7	0.53				0.36
Leis1	57.8	-0.66					-2.3	0.04
Leis2	71.6	-0.37	-6.0	2.23				0.09
Leis3	20.3	1.08					3.3	0.10
Tran1	286.9	1.20	29.1					0.15
Tran2								
Tran3	286.5	-1.42	-21.7					0.19
Othe1	-167.0	0.97	18.6	-1.32	-2.12			0.16
Othe2	267.0	-0.97	-18.6	1.32	2.12			0.16

Estimation results for the Netherlands

Hh=6	Const	Share main	Inc	Size	Age	Educ	Educpart	R ²
Food1	140.7	-0.69	-9.3					0.19
Food2	56.0						-1.9	0.04
Food3	-122.7	0.94	13.1		-1.7			0.18
Home1	174.8		-11.8			2.1		0.08
Home2	-103.6	0.36	10.5					0.16
Home3	-62.9		7.4			-1.3		0.07
Home4	105.5	-0.23	-8.5				0.91	0.55
Leis1	51.3	-1.06						0.16
Leis2	14.5	-0.33						0.09
Leis3	34.2	1.40						0.22
Tran1	16.1	1.24						0.02
Tran2								
Tran3								
Othe1	-82.5		10.2					0.07
Othe2	182.5		-10.2					0.07

Hh=8	Const	Share main	Inc	Size	Age	Educ	Educpart	R ²
Food1	131.7	-0.51	-9.6	3.0			1.4	0.19
Food2	52.7	-0.15			0.53		-0.8	0.02
Food3	-73.2	0.65	8.5	-3.1	-0.67			0.14
Home1	171.3	-0.10	-11.6	1.0		2.0	1.1	0.07
Home2	-127.0	0.37	13.3	-1.0		-1.4		0.14
Home3	-28.9	-0.06	4.5	-0.6		-0.8		0.04
Home4	88.0	-0.21	-6.9	0.7	0.44		-0.3	0.31
Leis1	132.6	-0.19	-9.8	2.2				0.04
Leis2	41.6	-0.18	-3.7		0.8			0.07
Leis3	-75.3	0.37	14.0	-5.0	-1.4			0.09
Tran1	-142.1	1.41	16.0		-2.6			0.17
Tran2	115.9		-8.7					0.02
Tran3	131.6	-1.37	-8.4		3.6			0.16
Othe1	-76.3	0.36	9.6		-1.5	1.1		0.08
Othe2	176.3	-0.36	-9.6		1.5	-1.1		0.08

Household expenditures

Hh=9	Const	Share main	Inc	Size	Age	Educ	Educpart	R ²
Food1	43.2	-0.52						0.11
Food2	146.4	-0.49	-8.6					0.08
Food3	-127.1	1.1	12.3					0.26
Home1								
Home2	-103.5	0.16	12.0			-2.2		0.16
Home3								
Home4	136.4	-0.22	-11.8			1.08		0.52
Leis1	55.9	-1.2						0.11
Leis2	175.9	-0.9	-12.2		-2.6			0.31
Leis3	15.4	2.2						0.29
Tran1	-168.6	1.7	17.0					0.75
Tran2	35.8	0.51			-2.7			0.13
Tran3	328.5	-2.2	-23.7					0.66
Othe1	-6.6				3.7			0.05
Othe2	106.6				-3.7			0.05

Hh=10	Const	Share main	Inc	Size	Age	Educ	Educpart	R ²
Food1	152.1	-0.72	-10.1					0.20
Food2	56.2							0.01
Food3	-144.9	0.80	13.9					0.18
Home1	40.1				2.0			0.02
Home2	-87.2	0.32	11.6		-1.5	-1.6	-1.8	0.15
Home3	-27.1		3.4					0.03
Home4	77.5	-0.17	-6.4		0.7			0.37
Leis1	53.0	-1.31						0.15
Leis2	76.0	-0.53	-5.7					0.19
Leis3	-81.7	1.76	10.9					0.29
Tran1	-80.8	1.61	8.5					0.44
Tran2	-59.6		7.8					0.02
Tran3	251.3	-1.46	-17.5					0.34
Othe1	-2.0	-0.75			3.5			0.05
Othe2	10.2	0.75			-3.5			0.05

Results of time series estimation for three groups of households, for 6 main groups of goods

one-person households

	Const	Inc	Pfood	Phome	Pclot	Pleis	Ptran	Pothe	Time	R ²
Sfoodr	1.4		15.8	-19.7						0.40
Shomer	-41.3	7.0	-26.1	42.9						0.61
Sclother	0.9					21.7			-0.24	0.85
Sleisr	-17.4	3.5								0.12
Stransr	74.4	-13.4								0.32
Sotherr	40.8	-7.7								0.64

more-person households with low incomes

	Const	Inc	Pfood	Phome	Pclot	Pleis	Ptran	Pothe	Time	R ²
Sfoodr	0.7								-0.23	0.35
Shomer	-2.4			37.8			47.6	-22.7		0.62
Sclother	-248.3	42.9								0.28
Sleisr	77.2	-13.6								0.20
Stransr	-64.2	11.3								0.28
Sotherr	70.7	-12.4								0.26

more-person households with high incomes

	Const	Inc	Pfood	Phome	Pclot	Pleis	Ptran	Pothe	Time	R ²
Sfoodr	1.5		47.0					15.0		0.76
Shomer										
Sclother	12.5	-2.0		-11.6						0.22
Sleisr	-0.5					-9.8				0.12
Stransr	35.9	-6.2	-20.3							0.26
Sotherr	-1.8		-23.0							0.49

Household expenditures

Results of time series estimation for three groups of households, for 16 sub groups of goods

one person households

	Const	Inc	Price group	Price1	Price2	Price3	Price4	Time	R ²
Food1	69.5	-14.1			18.2				0.63
Food2	-3.1			21.5					0.12
Food3	-75.4	15.5							0.42
Home1	850.9	-158.8							0.29
Home2	161.1		-32.9						0.40
Home3	70.9	-12.5							0.29
Home4	2.2						18.6		0.78
Leis1	-78.7	13.6				60.5			0.31
Leis2									
Leis3									
Tran1	-84.9	19.7							0.16
Tran2	7.1			22.1					0.25
Tran3	76.4	-19.4		31.8					0.31
Othe1									
Othe2	65.6	-12.2							0.18

more-person households with low incomes

	Const	Inc	Price group	Price1	Price2	Price3	Price4	Time	R ²
Food1									
Food2									
Food3									
Home1	-86.8	13.3		56.7					0.64
Home2	-74.1	13.7			64.7				0.53
Home3	63.0	-10.8							0.28
Home4	60.4		-12.3				18.7		0.87
Leis1									
Leis2									
Leis3	128.1	-21.0							0.14
Tran1									
Tran2	-426.2	76.6			43.0				0.62
Tran3	-632.0	108.2							0.36
Othe1									
Othe2									

more-person households with high incomes

	Const	Income	Price group	Price 1	Price 2	Price 3	Price 4	Time	R ²
Food1									
Food2	687.7	-111.8							0.12
Food3									
Home1									
Home2	10.1			-43.5					0.11
Home3									
Home4	4.5								0.25
Leis1									
Leis2	-316.1	54.3							0.49
Leis3									
Tran1									
Tran2	634.6	-104.2							0.56
Tran3									
Othe1									
Othe2									

APPENDIX D. ESTIMATION RESULTS FOR FRANCE

Results of cross section estimation per householdtype, for 6 main categories

Hh=1	Const	Ln(inc)	Age	Size	R ²
Food	51.36	-6.68	1.75		0.14
Home	67.45	-5.29			0.03
Clothes	11.87		-2.19		0.02
Leisure					
Trans	-50.75	11.06			0.13
Other					

Hh=2	Const	Ln(inc)	Age	Size	R ²
Food	77.4	-9.28			0.29
Home					
Clothes	-6.2	1.96			0.01
Leisure					
Trans	-36.1	8.27			0.06
Other					

Hh=3	Const	Ln(inc)	Age	Size	R ²
Food	51.21	-6.39		3.02	0.13
Home	99.07	-11.25		2.88	0.17
Clothes	13.27		-3.26		0.04
Leisure	-18.04	5.70			0.07
Trans	-47.21	9.29			0.16
Other	13.09			-1.87	0.03

Household expenditures

Hh=4	Const	Ln(inc)	Age	Size	R ²
Food	89.7	-11.12		1.33	0.27
Home	27.6			2.72	0.02
Clothes	-3.45	1.77		-0.78	0.03
Leisure	(1.84)	1.85	3.00	-1.13	0.02
Trans	-21.43	6.56		-2.32	0.06
Other	(-3.13)	1.48			0.01

Hh=5	Const	Ln(inc)	Age	Size	R ²
Food	78.75	-11.47	2.60		0.33
Home					
Clothes	(-2.93)	1.49			0.02
Leisure	30.12		-2.58		0.03
Trans	-20.70	6.39	-1.46		0.12
Other	-9.78	1.78	1.24		0.03

Hh=6	Const	Ln(inc)	Age	Size	R ²
Food	100.5	-13.40	2.46		0.41
Home	48.70		-3.58		0.03
Clothes	-7.00	1.88			0.04
Leisure		2.55			0.02
Trans	-33.3	7.21			0.08
Other	(1.04)		1.42		0.01

Hh=7	Const	Ln(inc)	Age	Size	R ²
Food	88.0	-12.68	1.88	4.25	0.36
Home	48.38		-2.59	-2.16	0.04
Clothes	9.67		-0.81		0.01
Leisure	7.12	1.55			0.01
Trans	-33.78	5.92	1.96		0.11
Other	-10.75	2.71			0.03

Hh=8	Const	Ln(inc)	Age	Size	R ²
Food	95.0	-12.96	2.17	2.15	0.43
Home	45.9		-3.81		0.05
Clothes	-6.3	1.88			0.02
Leisure	(0.9)	2.54			0.02
Trans	-34.1	7.53	0.72	-1.51	0.09
Other	(-0.8)	0.70	0.64		0.01

Estimation results for France

Hh=9	Const	Ln(inc)	Age	Size	R ²
Food	104.3	-11.49	-1.95		0.23
Home					
Clothes	(-2.1)	1.37			0.01
Leisure	(1.6)	2.48			0.02
Trans	(3.2)	2.19	-1.38		0.04
Other	-35.9	3.93	3.77		0.04

Hh=10	Const	Ln(inc)	Age	Size	R ²
Food	124.6	-15.22			0.43
Home					
Clothes	-4.68	1.56			0.02
Leisure	-15.2	3.33	1.47		0.03
Trans	(-2.3)	5.27	-3.26		0.10
Other	-42.9	4.22	4.40		0.05

Household expenditures

Results of cross section estimation per household type, for 16 categories

Hh=1	Const	Smain	Ln(inc)	Size	Age	R ²
Food1	88.26	-0.72	-8.22			0.11
Food2	-4.75	0.43	8.51			0.04
Food3	14.65	0.30				0.01
Home1	41.64	0.38				0.05
Home2						
Home3	-7.50		7.15		-8.58	0.04
Home4	51.76	-0.22	-6.45		3.01	0.14
Leis1	32.46		-3.47			0.01
Leis2	51.05	-0.59				0.08
Leis3	38.54	0.55				0.07
Tran1	-72.65	1.21	10.88			0.50
Tran2	16.45	-0.28	11.90			0.04
Tran3	139.47	-0.96	-7.79		-12.81	0.22
Othe1	79.32	-2.56				0.27
Othe2	20.68	2.56				0.27

Hh=2	Const	Smain	Ln(inc)	Size	Age	R ²
Food1	96.95	-0.64	-9.26			0.14
Food2						
Food3	-20.89	0.36	4.91			0.02
Home1	84.07	-0.15	-6.78		9.38	0.05
Home2	-13.14	0.20	5.48		-6.08	0.06
Home3	-20.50	0.15	6.80		-5.33	0.05
Home4	49.57	-0.19	-5.50		2.03	0.16
Leis1						
Leis2	142.92	-1.10	-9.49		-5.43	0.22
Leis3	-51.18	1.00	11.17			0.19
Tran1	-104.77	1.67	14.45			0.63
Tran2	139.92	-0.85	-12.77			0.24
Tran3	53.98	-0.83				0.15
Othe1	66.97	-2.46				0.20
Othe2	33.03	2.46				0.20

Estimation results for France

Hh=3	Const	Smain	Ln(inc)	Size	Age	R ²
Food1	82.59	-0.52	-8.33	3.38		0.19
Food2	46.25	0.59				0.13
Food3	-23.86		9.50	-3.27	-6.26	0.11
Home1	39.73	0.44				0.06
Home2	-19.19		5.19			0.04
Home3	43.72	-0.35			-8.16	0.10
Home4	70.54	-0.28	-10.20	3.52	4.73	0.18
Leis1	10.66	-0.15				0.02
Leis2	60.78	-0.46				0.04
Leis3	28.37	0.61				0.07
Tran1	-16.43	1.55		3.73		0.51
Tran2	(4.4)				13.35	0.03
Tran3	97.73	-1.21		-8.47		0.20
Othe1	61.33	-1.87				0.19
Othe2	36.67	1.87				0.19

Hh=4	Const	Smain	Ln(inc)	Size	Age	R ²
Food1	67.02	-0.39	-5.95	2.10		0.12
Food2	17.29	0.19	5.94			0.03
Food3	15.49	0.20		-2.03		0.04
Home1	91.99		-5.84			0.01
Home2	-38.32	0.20	8.40	-1.45		0.06
Home3	-19.48		5.17			0.02
Home4	68.59	-0.24	-7.68	1.05		0.22
Leis1	-10.01		1.74	1.41		0.02
Leis2	169.72	-0.63	-10.35	-3.34	-7.90	0.13
Leis3	-57.84	0.70	8.55	2.08	6.37	0.11
Tran1	-67.63	1.81	9.29			0.53
Tran2	114.52	-1.06	-8.15			0.22
Tran3	45.59	-0.75				0.10
Othe1	131.93	-2.75	-9.51			0.26
Othe2	-31.93	2.75	9.51			0.26

Household expenditures

Hh=5	Const	Smain	Ln(inc)	Size	Age	R ²
Food1	61.63	-0.31	-5.76		1.15	0.09
Food2	45.82				3.75	0.03
Food3	-5.24	0.26	5.46		-4.74	0.08
Home1	72.24	0.27			-7.63	0.08
Home2	-68.89	0.16	10.21		4.88	0.15
Home3	-10.15		3.65			0.02
Home4	82.09	-0.39	-10.81		3.90	0.28
Leis1	13.18	-0.12				0.01
Leis2	126.21	-0.74	-9.66			0.17
Leis3	-38.47	0.87	9.50			0.21
Tran1	-28.32	1.33	3.35			0.54
Tran2	67.40				-9.28	0.05
Tran3	71.91	-1.15	-5.90		9.82	0.27
Othe1	70.11	-1.99				0.19
Othe2	29.89	1.99				0.19

Hh=6	Const	Smain	Ln(inc)	Size	Age	R ²
Food1	67.88	-0.25	-5.90			0.09
Food2	55.09				2.37	0.02
Food3	-14.20	0.24	4.96		-2.91	0.07
Home1	93.69		-3.27		-7.24	0.04
Home2	-52.80	0.23	7.87		4.23	0.07
Home3	-28.36	0.07	6.24			0.05
Home4	95.85	-0.41	-10.87		1.97	0.30
Leis1	7.53	-0.17			1.12	0.02
Leis2	134.12	-0.72	-10.79		2.48	0.15
Leis3	-43.72	0.89	11.09		-3.57	0.21
Tran1	-73.61	1.76	9.80			0.64
Tran2	52.77	-0.86				0.13
Tran3	107.83	-0.92	7.79			0.18
Othe1	64.85	-2.24				0.24
Othe2	35.15	2.24				0.24

Estimation results for France

Hh=7	Const	Smain	Ln(inc)	Size	Age	R ²
Food1	63.99	-0.24	-5.66	1.48		0.09
Food2	37.76	0.23	3.31			0.04
Food3						
Home1	85.57	0.35	-3.72	-2.73	-5.79	0.11
Home2	-45.61		7.88		4.26	0.08
Home3	-10.25		5.24		-1.89	0.04
Home4	71.00	-0.37	-9.06	2.04	3.33	0.27
Leis1	19.25	-0.13	-2.05		1.71	0.03
Leis2	88.94	-0.25	-6.89		5.14	0.08
Leis3	(-8.2)	0.38	8.95		-6.85	0.14
Tran1	-35.17	1.79	5.81		-2.70	0.54
Tran2	11.19	-0.53		4.91	4.08	0.06
Tran3	144.64	-1.21	-10.58	-3.30		0.25
Othe1	76.22	-2.00		-3.81		0.21
Othe2	23.78	2.00		3.81		0.21

Hh=8	Const	Smain	Ln(inc)	Size	Age	R ²
Food1	61.44	-0.32	-5.60	1.92	0.68	0.10
Food2	45.52	0.13	1.90		0.82	0.01
Food3	-7.70	0.18	3.60	-1.60	-1.41	0.03
Home1	85.63	0.21	-2.90		-7.39	0.08
Home2	-35.45	0.15	5.92		3.11	0.04
Home3	-27.58		5.29		2.36	0.03
Home4	76.15	-0.34	-8.32		2.03	0.28
Leis1	8.19	-0.07		0.66		0.01
Leis2	104.44	-0.34	-7.59		2.87	0.07
Leis3	-18.07	0.40	8.15		-3.12	0.09
Tran1	-64.06	1.91	8.07	2.15	-1.79	0.57
Tran2	90.60	-1.06	-4.02	-1.75		0.21
Tran3	66.22	-0.85	-3.90		3.08	0.14
Othe1	92.30	-2.81	-4.85		2.51	0.26
Othe2	7.70	2.81	4.85		-2.51	0.26

Household expenditures

Hh=9	Const	Smain	Ln(inc)	Size	Age	R ²
Food1	77.76	-0.32	-7.32			0.15
Food2	44.76	0.15	3.06			0.02
Food3	-22.53	0.17	4.26			0.07
Home1	-6.99	0.47	5.65			0.08
Home2	-24.84		7.81			0.05
Home3	(-3.5)		2.11			0.01
Home4	135.67	-0.49	-15.55			0.24
Leis1	16.31	-0.14				0.01
Leis2	150.42	-0.70	-13.64			0.18
Leis3	-59.96	0.85	12.41			0.23
Tran1	-20.25	0.93	2.92			0.36
Tran2	54.46	0.69	-7.59			0.10
Tran3	85.65	-1.59	-5.55		6.78	0.32
Othe1	114.62	-1.33			-8.66	0.21
Othe2	-14.62	1.33			8.66	0.21

Hh=10	Const	Smain	Ln(inc)	Size	Age	R ²
Food1	74.80	-0.25	-6.91			0.13
Food2						
Food3	-42.79	0.25	7.12			0.09
Home1						
Home2	-38.59	0.50	8.23			0.12
Home3	-6.83		3.34			0.01
Home4	127.68	-0.53	-13.34			0.27
Leis1	31.21	-0.22	-2.19			0.03
Leis2	147.99	-0.75	-11.75			0.16
Leis3	-50.33	0.98	13.17		-3.80	0.28
Tran1	-64.06	1.54	6.55		2.59	0.60
Tran2	126.44	-0.23	-14.67			0.05
Tran3	44.99	-1.30	-7.53		11.87	0.29
Othe1	54.06	-1.46				0.24
Othe2	45.94	1.46				0.24

APPENDIX E. ESTIMATION RESULTS FOR GERMANY

Results of cross section estimation per householdtype, for 6 main categories

Hh=1	Const	Income	Size	Age	Emp	Mun	Soz	R ²
Food	77.46	-6.46						0.19
Home	167.64	-15.87		4.70	9.58	3.28		0.28
Clothes	7.86							
Leisure	25.23				-6.84			0.10
Trans	-156.66	17.78						0.28
Other	16.01				-4.90		-1.77	0.04

Hh=2	Const	Income	Size	Age	Emp	Mun	Soz	R ²
Food	88.06	-6.48			-2.98			0.28
Home	95.74	-6.60		3.47				0.09
Clothes	8.77							
Leisure	68.38	-5.11				1.97		0.08
Trans	-144.90	17.13		-4.03		-3.53		0.27
Other	8.81						-0.99	0.08

Hh=3	Const	Income	Size	Age	Emp	Mun	Soz	R ²
Food	82.71	-6.28						0.16
Home	194.62	-17.25	5.27	1.97				0.38
Clothes	11.46			-0.48				0.04
Leisure	-36.37	5.69					-1.60	0.19
Trans	-101.77	11.31						0.23
Other	4.57							

Household expenditures

Hh=4	Const	Income	Size	Age	Emp	Mun	Soz	R ²
Food	108.23	-9.20	1.43			1.05		0.26
Home	99.97	-6.23			2.06			0.05
Clothes	8.69							
Leisure	-23.11	2.48	1.24			1.51	0.82	0.06
Trans	-107.33	13.44	-3.20		-2.42	-1.56		0.19
Other	11.50				-1.60		-0.95	0.06

Hh=5	Const	Income	Size	Age	Emp	Mun	Soz	R ²
Food	73.38	-5.34			-6.06			0.30
Home	125.92	-8.48						0.13
Clothes	5.33				2.55			0.04
Leisure	30.79						-2.89	0.15
Trans	-54.74	6.85						0.08
Other	-13.93	1.90						0.04

Hh=6	Const	Income	Size	Age	Emp	Mun	Soz	R ²
Food	130.93	-10.97		0.42				0.39
Home	145.98	-9.89				-1.93		0.14
Clothes	3.96				1.34		0.68	0.03
Leisure	-30.11	4.75		-1.08		1.58		0.11
Trans	-118.62	12.58						0.16
Other	-13.28	2.48			-2.17			0.11

Hh=7	Const	Income	Size	Age	Emp	Mun	Soz	R ²
Food	82.71	-6.28						0.16
Home	194.62	-17.25	5.27	1.97				0.38
Clothes	11.46			-0.48				0.04
Leisure	-36.37	5.69					-1.60	0.19
Trans	-101.77	11.31						0.23
Other	4.57							

Hh=8	Const	Income	Size	Age	Emp	Mun	Soz	R ²
Food	105.44	-8.75	1.15	0.31		1.46		0.27
Home	126.68	-8.41						0.09
Clothes	-1.12	0.87			0.58			0.02
Leisure	-32.51	4.90	-0.99		-0.82	0.84	-0.44	0.07
Trans	-82.89	8.73			1.32	-1.12	1.23	0.11
Other	-14.79	2.26			-0.78	0.41	-0.94	0.09

Estimation results for Germany

Hh=9	Const	Income	Size	Age	Emp	Mun	Soz	R ²
Food	89.07	-7.26						0.20
Home	96.12	-5.17						0.04
Clothes	-15.58	2.23				0.84		0.05
Leisure	-58.54	7.31						0.13
Trans	-17.51	2.63						0.03
Other	39.25			0.88	23.49		-6.12	0.04

Hh=10	Const	Income	Size	Age	Emp	Mun	Soz	R ²
Food	103.67	-9.03		0.70		0.72		0.34
Home	113.65	-7.22						0.09
Clothes	6.52					0.75		0.01
Leisure	-26.27	3.64				1.67		0.04
Trans	-85.50	9.88				-2.44		0.18
Other	-11.07	2.27			-3.24		-0.81	0.05

Hh=11	Const	Income	Size	Age	Emp	Mun	Soz	R ²
Food	82.05	-6.19			2.17			0.27
Home	134.59	-10.24	3.39			-3.12	1.39	0.32
Clothes	-19.37	2.57						0.05
Leisure	-23.00	3.45						0.04
Trans	-93.39	10.24						0.16
Other	5.92							

Household expenditures

Results of cross section estimation per household type, for 16 sub groups of goods

Hh=1	Const	Smain	Inc	Size	Age	Emp	Mun	Soc	R ²
Food1	198.99	-0.64	-12.32						0.06
Food2	81.64	-0.43	-6.80						0.08
Food3	-180.63	1.06	19.11						0.18
Home1	246.90	-0.30	-17.41						0.23
Home2	-105.94	0.36	10.66						0.17
Home3	-45.68		5.32						0.07
Home4	21.01	-0.12							0.04
Leis1	126.76		-10.41						0.07
Leis2	74.00	-0.39	-5.02						0.08
Leis3	-110.13	0.55	16.04						0.14
Tran1	-175.23	1.13	18.42						0.61
Tran2	35.49							-3.22	0.05
Tran3	166.47	-1.08	-14.97				6.81	4.86	0.45
Tran4	14.60								0.00
Other1	195.66	-4.46	-9.89						0.36
Other2	-95.66	4.46	9.89						0.36

Hh=2	Const	Smain	Inc	Size	Age	Emp	Mun	Soc	R ²
Food1	250.91	-1.18	-15.22						0.20
Food2	10.75				-1.45				0.04
Food3	-156.77	1.09	15.22						0.17
Home1	221.48	-0.56	-14.76				3.06		0.22
Home2	-169.66	0.65	15.99						0.27
Home3	-84.42	0.22	8.32						0.12
Home4	138.98	-0.33	-10.32					-0.83	0.41
Leis1	29.34								0.00
Leis2	20.36	-0.39							0.09
Leis3	49.78	0.42							0.03
Tran1	-144.96	1.42	14.65						0.70
Tran2	28.26	-0.66				6.18			0.33
Tran3	148.30	-0.40	-10.13			-8.58			0.32
Tran4	13.35	-0.44				5.20	-1.78	1.75	0.35
Other1	101.29	-3.06				-9.02			0.22
Other2	-1.29	3.06				9.02			0.22

Estimation results for Germany

Hh=3	Const	Smain	Inc	Size	Age	Emp	Mun	Soc	R ²
Food1	65.22							2.22	0.05
Food2	13.68				-0.77		-1.47		0.15
Food3	27.56							-2.12	0.05
Home1	49.08							2.73	0.10
Home2	-108.65		11.78						0.21
Home3	-62.17	0.15	6.06						0.10
Home4	162.64	-0.21	-13.32	3.43				-1.27	0.36
Leis1	29.28								0.00
Leis2	230.45	-0.61	-17.32		-3.90				0.45
Leis3	-150.91	0.72	18.36		3.12			-3.58	0.35
Tran1	-200.98	1.18	21.45				-6.04		0.46
Tran2	10.75						7.94		0.14
Tran3	385.63	-1.18	-32.53						0.48
Tran4	11.84						5.25		0.07
Other1	67.51	-1.63						3.89	0.08
Other2	32.50	1.63						-3.89	0.08

Hh=4	Const	Smain	Inc	Size	Age	Emp	Mun	Soc	R ²
Food1	169.85	-0.55	-7.11				-1.65	-1.35	0.11
Food2	11.09	-0.12					-0.58	0.53	0.09
Food3	-79.09	0.69	7.46				2.34		0.16
Home1	279.69	-0.52	-18.92		3.27			-3.36	0.27
Home2	-271.83	0.67	25.15	-2.22				2.14	0.38
Home3	-38.97	0.12	3.43					1.53	0.06
Home4	132.27	-0.29	-10.37	1.33					0.40
Leis1	38.61	-0.40							0.02
Leis2	16.24	-0.33		3.29			-2.33		0.06
Leis3	36.72	0.74							0.05
Tran1	-226.67	1.65	22.77					-1.56	0.72
Tran2	104.56	-0.63	-6.92						0.41
Tran3	82.29	-0.53	-6.01					3.00	0.29
Tran4	128.28	-0.49	-9.39						0.38
Other1	67.51	-2.58						5.35	0.24
Other2	32.49	2.58						-5.35	0.24

Household expenditures

Hh=5	Const	Smain	Inc	Size	Age	Emp	Mun	Soc	R ²
Food1	79.58	-0.81							0.10
Food2	-28.10	-0.10	3.12		-1.13			0.65	0.13
Food3	13.45	0.94							0.13
Home1	286.58	-0.35	-19.74					-2.25	0.24
Home2	-202.98	0.44	19.72						0.33
Home3	-71.59		5.61			8.75		3.00	0.13
Home4	97.97	-0.17	-7.02			-3.32			0.28
Leis1	-115.87		11.18					6.45	0.12
Leis2	138.05	-0.67	-10.84						0.32
Leis3	27.60	1.06				15.05			0.27
Tran1	-245.68	1.51	23.17					3.53	0.71
Tran2	10.04					10.69			0.08
Tran3	269.51	-1.45	-20.56						0.37
Tran4	24.15				-1.46				0.03
Other1	250.83	-1.75	-16.82						0.14
Other2	-150.83	1.75	16.82						0.14

Hh=6	Const	Smain	Inc	Size	Age	Emp	Mun	Soc	R ²
Food1	195.34	-0.69	-11.67		2.76			-1.48	0.14
Food2	8.02	-0.07			-0.30				0.04
Food3	-100.31	0.75	11.47		-2.41			1.20	0.13
Home1	241.08	-0.49	-14.58		-0.92			-1.64	0.20
Home2	-212.01	0.57	18.45		1.08			2.14	0.29
Home3	-60.05	0.17	5.78						0.08
Home4	126.77	-0.24	-9.19			-0.95		-0.65	0.37
Leis1	36.91	-0.61			-1.80			2.93	0.09
Leis2	101.21	-0.42	-7.66						0.15
Leis3	-23.99	0.98	7.32					-2.34	0.18
Tran1	-144.19	1.57	14.66						0.73
Tran2	28.48	-0.35				3.50	-3.21		0.16
Tran3	14.19	-0.26			0.85	2.91	-2.18		0.38
Tran4	14.19	-0.26			0.85	2.91	-2.18		0.16
Other1	189.07	-2.19	-12.60			5.62		3.42	0.28
Other2	-89.07	2.19	12.60			-5.62		-3.42	0.22

Estimation results for Germany

Hh=7	Const	Smain	Inc	Size	Age	Emp	Mun	Soc	R ²
Food1	65.22							2.22	0.05
Food2	13.68				-0.77		-1.47		0.15
Food3	27.56							-2.12	0.05
Home1	49.08							2.73	0.10
Home2	-108.65		11.78						0.21
Home3	-62.17	0.15	6.06						0.10
Home4	162.64	-0.21	-13.32	3.43				-1.27	0.36
Leis1	29.28								0
Leis2	230.45	-0.61	-17.32		-3.90				0.45
Leis3	-150.91	0.72	18.36		3.12			-3.58	0.35
Tran1	-200.98	1.18	21.45					-6.04	0.46
Tran2	10.75							7.94	0.14
Tran3	385.63	-1.18	-32.53						0.48
Tran4	11.84							5.25	0.07
Other1	67.51	-1.63						3.89	0.08
Other2	32.50	1.63						-3.89	0.08

Hh=8	Const	Smain	Inc	Size	Age	Emp	Mun	Soc	R ²
Food1	177.89	-0.67	-9.31	2.85	1.35		-0.94	-1.18	0.15
Food2	7.53				-0.20				0.05
Food3	-77.68	0.67	8.57	-2.97	-1.26	0.92	1.19	1.03	0.16
Home1	250.69	-0.38	-16.94	1.68				-1.11	0.19
Home2	-252.32	0.72	23.40	-2.48				0.74	0.39
Home3	-31.55		3.35		-0.42	1.34	0.67	0.61	0.05
Home4	129.93	-0.32	-10.13	1.22	0.42				0.42
Leis1	35.52	-0.46		1.77		-3.65			0.07
Leis2	73.76	-0.24	-4.40	1.56	-1.05	-2.92			0.08
Leis3	-13.12	0.71	4.31	-3.07	1.81	6.29			0.16
Tran1	-132.36	1.58	13.91					-1.04	0.65
Tran2	77.78	-0.57	-3.01	-0.94	-1.22		-1.37		0.28
Tran3	56.73	-0.65	-3.45		1.14	-1.55	1.75	0.85	0.24
Tran4	100.94	-0.37	-7.13	-0.64		1.45			0.26
Other1	77.45	-2.84			-1.72			4.61	0.30
Other2	22.55	2.84			1.72			-4.61	0.30

Household expenditures

Hh=9	Const	Smain	Inc	Size	Age	Emp	Mun	Soc	R ²
Food1	182.17	-0.40	-9.74						0.10
Food2	4.37								0.06
Food3	-89.19	0.47	9.89						0.11
Home1	235.05	-0.30	-16.48						0.29
Home2	-209.63	0.44	21.05						0.38
Home3	-32.78		3.51				1.38		0.07
Home4	107.01	-0.15	-8.12				-0.85		0.35
Leis1	-11.22	-0.49			3.71				0.05
Leis2	169.10	-0.99	-13.35						0.29
Leis3	-125.02	1.44	15.62						0.31
Tran1	-99.05	1.66	12.57		-1.80	-16.58	-3.04		0.56
Tran2	-17.95	0.45	5.96		-2.82	-11.08	-2.17		0.32
Tran3	245.33	-2.55	-25.08		6.73	38.87	9.01		0.57
Tran4	-28.33	0.43	6.55		-2.12	-11.21	-3.80		0.31
Other1	71.42								0.00
Other2	28.58								0.00

Hh=10	Const	Smain	Inc	Size	Age	Emp	Mun	Soc	R ²
Food1	151.77	-0.41	-6.40						0.04
Food2	4.37								0.00
Food3	-65.21	0.40	6.95				1.80		0.05
Home1	191.79	-0.40	-11.48						0.16
Home2	-204.69	0.57	18.57					1.21	0.33
Home3	6.75								0.00
Home4	113.96	-0.23	-8.38						0.36
Leis1	41.68	-0.97							0.17
Leis2	74.05	-0.54	-5.12						0.19
Leis3	-34.09	1.50	6.88						0.29
Tran1	-149.85	1.65	15.25						0.73
Tran2	26.86	-0.18			-1.56	7.03	-3.40	2.18	0.10
Tran3	175.42	-1.27	-15.98		2.90		6.71		0.40
Tran4	41.06	-0.19			-1.45		-3.41		0.08
Other1	73.47	-1.99							0.15
Other2	26.53	1.99							0.15

Estimation results for Germany

Hh=11	Const	Smain	Inc	Size	Age	Emp	Mun	Soc	R ²
Food1	207.11	-0.94	-11.51	3.78					0.20
Food2	0.06					1.24		0.70	0.05
Food3	-128.45	1.01	12.87	-3.73					0.22
Home1	186.87	-0.68	-9.95						0.25
Home2	-216.54	0.82	20.30	-3.91					0.35
Home3	11.33					-2.20			0.05
Home4	138.52	-0.11	-10.16		-0.83				0.41
Leis1	45.81	-0.51			-2.44			2.64	0.12
Leis2	100.76	-0.37	-8.88	5.12					0.14
Leis3	-121.84	0.74	15.50						0.15
Tran1	-214.22	1.44	21.09						0.68
Tran2	38.62	-0.43			-1.23				0.17
Tran3	45.21	-0.90				-5.46			0.21
Tran4	115.22	-0.34	-8.34						0.20
Other1	76.16	-2.01							0.12
Other2	23.84	2.01							0.12