

BONN ECON DISCUSSION PAPERS

Discussion Paper 31/2001

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November 2001

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An Exploratory Analysis of the Effect of Current Income on the Relative Change in Aggregate Consumption: A Heterogeneous Household Approach*

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Key Words: Aggregate Consumption, Income Distribution, Heterogeneity, Average Derivative Estimator, Representative Agent Model.

JEL Classification Number: C14, C52, D12, E21.

Abstract

This paper attempts to find out the explanatory power of observed changes in the distribution of current income in explaining the relative change in aggregate consumption using the distributional approach of aggregation by Hildenbrand and Kneip (1999, 2001). The coefficients in the aggregate relation in each period can be estimated from cross-section data as an average derivative of the individual consumption relation without requiring a specific functional form of this relation and the time-invariance property needed in the time-series model of Davidson et al. (1978). We use the nonparametric Direct Average Derivative Estimation technique to estimate these coefficients of the aggregate relation in the Family Expenditure Survey of UK [1974-1993]. It turns out that for most of the commodity groups the inclusion of dispersion in the income distribution, in addition to the mean, improves the predictive power of the model.

*We thank Werner Hildenbrand and Alois Kneip for their valuable comments. We would also like to thank Jens-Uwe Scheer for his helpful suggestions. We especially thank Jürgen Arns for his assistance in dealing with the FES-data set. Financial support by Deutsche Forschungsgemeinschaft is gratefully acknowledged.

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1 Introduction

In most cases the main focus of economic policy is to deal with aggregate consumption and savings, total tax revenue, aggregate wage level, and unemployment. But the most studied subject of the aggregate relation has been the consumption function as consumer expenditure accounts for 50% to 70% of spending in most economies. The consumption function has received the first significant attention around 1940's after Keynes (1936) emphasized the role of the consumption function in his general theory. Despite the well-known aggregation problem the theory was presented in terms of individual behaviour but used on the aggregate level. However, empirical studies with cross-section studies as well as long-time series data produced evidence that contradicts the assumptions of Keynes. Therefore new theories of consumption behaviour were put forward to explain these anomalies which led to substantial improvement both in the theoretical and empirical work on aggregate consumption behaviour. Two important new theories appeared in the literature, the *life-cycle hypothesis* by Modigliani and Brumberg (1954, 1979) and the *permanent income hypothesis* by Friedman (1957).

However the whole empirical analysis of these new theories is based on either aggregate time-series data where an aggregate consumption function has been estimated [Davidson, Hendry, Srba and Yeo (1978)] or on estimating the Euler equation for an optimal intertemporal decision of a representative consumer directly from aggregate data [Hall (1978)]. Yet, all empirical analysis starting from Keynesian consumption function to the *permanent income/life-cycle theory* neglects the aggregation problem as without considering the problem of aggregation they directly test the implications of individual behavioural hypotheses on aggregate data. These attempts implicitly assume the existence of a representative agent which serves as the bridge from individual behaviour to aggregate behaviour. Hence, using this procedure one takes into account only the mean of the income distribution by taking mean income as the representative agent's income. Therefore one overlooks the possible influence of heterogeneity in household behaviour by neglecting the other parameters of the income distribution.

The aggregation problem in consumption has led many authors to use household-level survey data to estimate the Euler equation, but this can not be done with cross-section data. Direct estimates of the consumption function based on individual level data are really scarce [see Carrol (1994), Miles (1997)]. Blundell and Stoker (2000) thoroughly discussed this problem of aggregation and the issue of bridging the gap between the micro-econometric view of individuals and macro-units, i.e., the aggregates considering hetero-

geneity in individual behaviour¹. But their survey mainly touches the issue of individual behaviour and the distribution of it's heterogeneity and the relationship among economic aggregates in a parametric framework.

An alternative approach to deal with the problem of aggregation starting with heterogeneous micro-units *without specific assumptions on individual behaviour* is due to Hildenbrand (1998) and Hildenbrand and Kneip (1999, 2001) [henceforth described as HK]. In this approach heterogeneity of households in their behavioural responses is incorporated through heterogeneity in the observable household attributes. In modelling the change in aggregate consumption and to find out the explanatory variables for the aggregate relation they start with the statistical distribution of the household-level consumption relation over different subsets of the population characterized by various household attributes. Hence, they achieve an aggregate consumption function in which, in addition to the mean, also another parameter of the income distribution, i.e. the dispersion of income, is present. HK show that the *representative agent model* approximates their model under certain conditions. Therefore their model can be used to validate the *representative agent model*.

Based on this distributional approach our goal is to find out the explanatory power of observed changes only in the distribution of current income in explaining the relative change of aggregate consumption. We use cross-section data of the UK-Family Expenditure Survey to incorporate the heterogeneity in households' behavior. In the second section we briefly describe the model which is used for estimation and the estimation methodology. Section 3 deals with the data description. In section 4 we present our final results and goodness-of-fit tests. Finally, the conclusions are drawn in section 5.

2 Model and Estimation

2.1 Model

Our estimation is based on the theoretical approach of HK for modelling the change in aggregate consumption.

Considering intertemporal utility maximization under the life-cycle budget constraint at the household level one can obtain the following micro-

¹See Browning, Hansen and Heckman (1998) for the problem of aggregation with respect to different aspects of heterogeneity across individuals in the population.

relation without assuming any particular functional form

$$c_t^h = c(y_t^h, v_t^h) \quad (1)$$

where y_t^h denotes current non-property income of household h in period t and v_t^h denotes all other explanatory variables derived from dynamic optimization, such as wealth, interest rates, expected future labour income, and preferences.

The aggregate (mean) consumption C_t is therefore defined by

$$C_t = \int c(y, v) \text{distr}(y_t^h, v_t^h | H_t). \quad (2)$$

This can be expressed as

$$C_t := \int \left[\frac{1}{\#H_t(y, a)} \sum_{h \in H_t(y, a)} c_t^h \right] \text{distr}(y, a | H_t) \quad (3)$$

where c_t^h denotes the consumption expenditure of household h in period t and $H_t(y, a)$ denotes the subpopulation of all households in the population H_t with current income y and attribute profile a consisting of various observed household characteristics. Hence, we first consider mean consumption expenditure of the subpopulation consisting of all households with current income y and attribute profile a . Then we consider the average over all subpopulations. The regression function of $c_t(y, a)$ on y and a is defined by $\frac{1}{\#H_t(y, a)} \sum_{h \in H_t(y, a)} c_t^h$. The graph $c_t(\cdot, a)$ is called the Engel curve of the subpopulation $H_t(a)$ denoted as $c_t^a(y)$.

To find out the variables which determine the relative change in aggregate consumption, $\frac{C_t - C_s}{C_s}$, HK require certain hypotheses concerning the time-invariance of distributions involving y , v , and a .² Using a first-order Taylor expansion this change can be approximated as

$$\begin{aligned} \frac{C_t - C_s}{C_s} &= \beta_s(m_t - m_s) + \gamma_s \left(\frac{\sigma_t - \sigma_s}{\sigma_s} \right) & (4) \\ &+ \text{effects of changes in other explanatory variables like interest} \\ &\quad \text{rates, price indices, assets, expected future non-property income} \\ &+ \text{error (omitting higher order terms for approximation)} \end{aligned}$$

²The hypotheses are derived from the concept of *structural stability* of statistical distributions, developed by Malinvaud (1993).

The first two terms capture the effect of the changing distribution of current income which is characterized by mean m_t and standard deviation σ_t of the log-income distribution thus reflecting the dispersion of income. We have used log-income since the log-income distribution is approximately symmetric. Hence, m_t is approximately the median of the income distribution, less affected by extreme values as compared to the mean of the income distribution. The other terms in (4), as we have explained earlier, are obtained from the dynamic optimization of the expected intertemporal utility function under the life-cycle budget constraint. Since in the FES-data set the individual asset level is not given and one has to find suitable proxies for the expectational variables we will concentrate only on the two parameters of the income distribution and neglect the other effects.

Our goal is to observe how far these two parameters of the observed distribution of current income can capture the change in the observed consumption expenditure, i.e. the model predictive power only with respect to these parameters. Yet, one should keep in mind that the other terms which are not included in our empirical model do not constitute and i.i.d. error term.

We would like to mention that one important novelty of HK's approach is that the coefficients β_s and γ_s can be estimated directly from cross-section data as a derivative of the Engel curve c_s^a . They are defined by

$$\beta_s := \frac{1}{C_s} \int y \partial_y c_s^a(y) \text{distr}(y, a | H_s) \quad (5)$$

and

$$\gamma_s := \frac{1}{C_s} \int (\ln y - m_s) y \partial_y c_s^a \text{distr}(y, a | H_s). \quad (6)$$

If we recall the definition of *elasticity* it will easily be seen by (4) that β_s and γ_s can be interpreted as elasticities with respect to mean current income Y_s and with respect to current income dispersion σ_s , respectively, while holding all other variables constant. This means that β_s can be regarded as the well-known *income-elasticity of consumption expenditure*. In contrast, the coefficient γ_s as an *income dispersion elasticity* is a new concept.

We would like to emphasize two important advantages of this cross-sectional approach. First, the coefficients β_s and γ_s are estimated for each chosen time-period s , i.e. every year in our analysis, separately, which means that they can be time-varying. This is in contrast to the time-series approach where the coefficients are implicitly assumed to be time-invariant. The second advantage is the possibility to estimate the effect of other terms, like

the time-series variables given in (4) or proxies for unobservable variables, without affecting the cross-sectional plug-in values of the estimates of β_s and γ_s .

HK's approach can be used to test whether the *representative agent approach* is valid or not. It can be shown that

$$\beta_s(m_t - m_s) + \gamma_s\left(\frac{\sigma_t - \sigma_s}{\sigma_s}\right) = \beta_s \log \frac{Y_t}{Y_s} + \bar{\gamma}_s \log \frac{\sigma_t}{\sigma_s} \quad (7)$$

where Y_t denotes the mean of current income in period t and $\bar{\gamma}_s := \gamma_s - \frac{\beta_s}{Y_t} \int y(\log y - m_s) \text{distr}(y, a | H_s)$. If $\bar{\gamma}_s$ is small the *representative agent model* $\beta_s \log \frac{Y_t}{Y_s}$ will be a good approximation of the left-hand side of (7). This is a completely empirical question. The answer may depend on the data set and the commodity group. Yet, even if the *representative agent model* turned out to be valid we should keep in mind that we estimate β_s separately for each year without considering it as a constant time-series variable.

2.2 Estimation

Sample estimates of the coefficients β_s and γ_s defined by (5) and (6) are obtained in the following way:

$$\hat{\beta}_s = \frac{\sum_a c_s^a \hat{\beta}_s^a}{\sum_a c_s^a} \quad (8)$$

where

$$\hat{\beta}_s^a = \frac{\sum_{h \in H_s(a)} \frac{\partial \hat{c}_s^a(x_s^h)}{\partial x}}{\sum_{h \in H_s(a)} c_s^h} \quad (9)$$

The denominator in this expression is c_s^a which is the sum of consumption expenditure over the subpopulation $H_s(a)$, stratified by the attribute profile a . Similarly one can derive a sample estimate of γ_s by

$$\hat{\gamma}_s = \frac{\sum_a c_s^a \hat{\gamma}_s^a}{\sum_a c_s^a} \quad (10)$$

where

$$\hat{\gamma}_s^a = \frac{\sum_{h \in H_s(a)} (x - m_s) \frac{\partial \hat{c}_s^a(x_s^h)}{\partial x}}{\sum_{h \in H_s(a)} c_s^h} \quad (11)$$

with $x = \log y$.

From equations (9) and (11) one can easily observe that the coefficients capturing the effect of the current income distribution can be obtained by an average derivative estimator (ADE) through a nonparametric procedure where it is not necessary to specify any functional form of the subgroup's Engel function. In our case the direct average derivative estimator [see Stoker(1991)] can be obtained as a sample average of the estimated values of the regression derivatives

$$\hat{\delta} = E[\hat{c}'_s(x_s^h|H_s(a))] = \frac{1}{\#H_s(a)} \sum_{h \in H_s(a)} \hat{c}'_s(x_s^h) \quad (12)$$

where $\hat{c}'_s(x_s^h)$ is the Engel curve derivative w.r.t. x , i.e., $\log(\text{income})$.³

To obtain the estimate of the derivative of the regression function, we use the Nadarraya-Watson type kernel regression estimator and the Rosenblatt-Parzen density estimator with $K(\cdot) = \frac{1}{b}K(\frac{\cdot}{b})$, $b = \text{bandwidth}$. So

$$\widehat{c}_s(x_s) = \frac{\sum c_s^h K(\frac{x_s - x_s^h}{b})}{\sum K(\frac{x_s - x_s^h}{b})}$$

Then we take the regression derivative as

$$\hat{c}' = \frac{\partial \hat{c}}{\partial x}$$

For the estimation we use the quartic kernel which is of the following form

$$K(u) = \frac{15}{16}(1 - u^2)^2 \text{ for } |u| \leq 1$$

To get β_s and γ_s we explored quite a high range of bandwidth values, i.e. from $.25 * \text{stand.dev.}(\log(\text{income}))$ to $2 * \text{stand.dev.}(\log(\text{income}))$. Yet, here we present the results only for that value of b , where the estimates β_s and γ_s are most stable.

Our econometric model used for the estimation is of the following form which is the counterpart of equation (4)⁴:

$$\Delta_{t-s} \log C_t = \beta_s(m_t - m_s) + \gamma_s \left(\frac{\sigma_t - \sigma_s}{\sigma_s} \right) + \varepsilon_{t,s} \quad (13)$$

³Here we would like to mention that there exists an indirect way of estimating the average derivative estimator [see Härdle and Stoker (1989), Härdle, Hart, Marron and Tsybakov (1992)] of the regression function which is asymptotically equivalent to this direct approach. But we have not used that method because of the vanishing boundary assumption of the density required in that method. This might create a problem of biasedness in small samples especially when the tail region is not negligible and a problem of inconsistency also in the subgroups which are of high density regions.

⁴We use the common notation for the $(t - s)$ -lag difference operator: $\Delta_{t-s} \log C_t := \log C_t - \log C_s$.

where the error term $\varepsilon_{t,s}$ includes all omitted time-series variables, unobserved variables and higher-order terms of approximation. Recall that $\varepsilon_{t,s}$ is not assumed to be i.i.d.

2.3 Time Series Model and Goodness-of-fit Measures

As explained above the model of HK offers the (new) possibility to estimate the coefficients of an equation for the change of mean consumption expenditure by using cross-section data. For comparison and to test the goodness-of-fit of our empirical model we will also consider the time-series *representative agent model* widely used in the literature, i.e. the model of Davidson, Hendry, Srba and Yeo [DHSY (1978)]. The most basic version of the DHSY-model is

$$\Delta_1 \log C_t = \theta_1 \Delta_1 \log Y_t + \theta_2 (\log Y_t - \log C_t) + \varepsilon_t. \quad (14)$$

Note that the coefficients θ_1 and θ_2 have to be estimated simultaneously from time-series data in contrast to the coefficients β_s and γ_s in (4). Also, we would like to mention again that the coefficients θ_1 and θ_2 are constant over time whereas β_s and γ_s are not.

In the following, we will use the estimated coefficients to predict the changes in mean consumption expenditure $\frac{C_t - C_s}{C_s} \approx \log C_t - \log C_s$. The following four criteria are considered for prediction:

1. $|\Delta_{t-s} \log C_t| = |\log C_t - \log C_s|$ (as a benchmark model)
2. $\widehat{\Delta_{t-s} \log C_t} = \hat{\beta}_s (m_t - m_s)$
3. $\widehat{\Delta_{t-s} \log C_t} = \hat{\beta}_s (m_t - m_s) + \hat{\gamma}_s \frac{\sigma_t - \sigma_s}{\sigma_s}$
4. DHSY-model given by (14)

Recall that m_t and σ_t are the mean and the standard deviation of *log*-income in period t , respectively. By comparing the results for the second and the third model one is able to judge about the importance of the influence of the *dispersion* of income on the change in mean consumption expenditure. The difference between model two or three and our econometric model (13) is a real prediction error, but there is no statistical, data-analytical reason to assume that this difference might be small. Different from direct time-series estimates of the parameters θ_1 and θ_2 in model (14), $\hat{\beta}_s$ and $\hat{\gamma}_s$ are estimated

independently and not by minimizing an average squared distance between consumption data and corresponding predictions.

To test the goodness-of-fit of these models two different criteria are used:

- the average absolute error (AAE)

$$AAE = \frac{1}{T} \sum_t |\Delta_{t-s} \log C_t - \Delta_{t-s} \widehat{\log C_t}| \quad (15)$$

- the relative residual sum of squares (RRSS)

$$RRSS = \frac{\sum_t |\Delta_{t-s} \log C_t - \Delta_{t-s} \widehat{\log C_t}|^2}{\sum_t |\Delta_{t-s} \log C_t|^2} \quad (16)$$

This goodness-of-fit test is of particular interest for our econometric model since our model does not incorporate any parameter which is fitted to the time-series in contrast to the DHSY-model. Hence the smaller the values of AAE and RRSS the better is the performance of our model to support the underlying theory. The results will be presented in section 4.

3 Data Description

For the estimation of the coefficients β_s and γ_s we use the UK Family Expenditure Survey (FES)⁵. This cross-sectional data set offers information on income, consumption expenditure, and, which is most important for our empirical analysis, also on household characteristics, like household size and composition, age, and employment status of the head of household. The FES covers about 7,000 households from all over Great Britain and Northern Ireland each year. It started in January 1957 but due to changes in the definition of the basket of goods and services we only use data from 1974 to 1993 to ensure a consistent definition of the consumption good categories. We also excluded the year 1978 because problems within the data base made the construction of our income variable impossible.

Closely connected with the FES is the so called Retail Price Index (RPI) which we used for deflating the income and consumption expenditure values to get real values. Hence, all numbers are deflated with respect to the price level of January 1987.

⁵For a detailed description of the data structure see Kemsley et al. (1980).

We use disposable non-property income (which means excluding deductions like tax and excluding investment income). We present results for the following six (groups of) consumption goods: *total consumption* (excluding durable goods and housing costs), *food, alcohol and tobacco, fuel and light, services, clothing and footwear*.

In the following we will describe our treatment of the data in detail and give some reasoning why we proceed in the chosen way.

Our first step is to check for outliers to avoid problems with “extreme” observations. Therefore we followed three different rules to decide on what can be regarded as outliers of different kinds:

- Exclude the 0.1% households with highest and lowest income, respectively.
- Exclude those households whose individual consumption expenditure on one of the five *subgroups* of goods (i.e. except *total*) is larger than the household’s own income.
- Fix the consumption expenditure of households whose expenditure on *total* exceeds three-times the mean consumption expenditure on *total* and three-times the household’s own income as three-times the mean consumption expenditure on *total*.

While the first rule is due to statistical reasons (higher stability of the results) the second and the third rule are based on reflections about consumption behaviour. On one hand it should not be possible to spend more than one’s own income on *only one subgroup* of consumption expenditure. But on the other hand consumption behaviour differing from the average behaviour is possible: very poor households, naturally, will have to spend more on *total* than their income to survive. Very rich households can afford to spend much more than the average household due to their higher income. But it is not a very common case to exceed the mean consumption expenditure on *total* and the own income simultaneously by a very high percentage. Although this is a very rare case, it is not unexplainable because there may be some extraordinary circumstances occurring in these households.⁶ So we do not exclude these households but rather bring them down to a certain

⁶In that context it should be mentioned that households participating in the survey were asked to keep notes on their expenditure for a time span of just two weeks while information on income were calculated as an average of yearly data.

limit by which their peculiar behaviour is, to some extent, incorporated into our analysis.⁷

The second step, i.e., the grouping of the households, is necessary to enable the application of the nonparametric estimation procedure to the Engel curve for different subgroups characterised by several qualitative household characteristic variables. We group the households of the modified (after adjusting for outliers) sample into thirteen groups according to the structure given in table 1. The number of observations for each group can be found in table A.1 in the appendix. Here our procedure is based on our intuition about connections between income, consumption expenditure, and household characteristics but is supported by the descriptive statistics also given in tables A.3 to A.9. These tables give the mean and the standard deviation of income and of consumption expenditure for the six commodities. The results show substantial differences across the 13 subgroups. Therefore, the choice of characteristics to construct the subgroups gives credit to the distributional pattern of income as well as to the differences in the consumption expenditure pattern.

Charac- teristics	Employment status	Head age	Number of persons	Household composition	Number of persons working	Number of group
Categories	Employee	≤ 65	1	adult	1	1
			2	only adults	1	2
					2	3
			≥ 3	only adults \geq two adults with children	≥ 1	4
					1	5
			≥ 2	\geq two adults	≥ 2	6
	≥ 1	7				
	Self-employed	any	≤ 2	only adults	≥ 1	8
			≥ 3	\geq two adults	≥ 1	9
	Unemployed/ Unoccupied	≤ 65	≤ 2	only adults	≥ 0	10
			≥ 3	\geq two adults	≥ 0	11
		> 65	any	any	≥ 0	12
	Retired	≥ 60	1	adult	0	13
2			two adults	≥ 0		

Table 1: Household characteristics considered for forming subgroups

First, we use the employment status of the head of household to form four major groups. This was done because different employment statuses

⁷The number of households fulfilling the third criterion ranges only from 0 to 7 over the years.

mean different characteristics of the income source. A household with a self-employed head, for example, faces more uncertainty than a household with a full-employed head. Additionally, the employment status is in some way connected with other household characteristics, like age of the head of household. In contrast to, for example, the quite obvious observation that a large fraction of the households with employed head belongs to the age group for head of household of under 65 years, we find that the group “Unemployed/Unoccupied” contains households of both age groups, i.e., under 65 years and also over 65 years. As the next characteristic we consider household composition which also determines the consumption pattern and the allocation of expenditure in different consumption categories. Therefore, naturally, the next step is to divide the four groups by considering household size and if possible also household composition. That means taking into account if there are children present in the household or not. Unfortunately, due to too few observations it was not possible to divide all subgroups according to all characteristics. So we only consider what we thought to be the most typical groups representing different kinds of consumers. For example, we exclude all households with retired head with a household size of more than two persons because of the small number of observations in this category. In addition, we exclude households which consist of a single adult with one or more children because these two groups are more peculiar and uncommon in their behavioural pattern. For the largest group, households with employed head, it is possible to take into account a further characteristic, the number of persons working. For example, we assume that the presence of a working wife, in addition to a working husband, influences not only the amount of the income but also the consumption habits of the family.

Because of the exclusion of outliers and the grouping procedure we get a smaller sample compared to the original sample for each year. The number of observations of the modified sample and some other descriptive statistics on income and consumption expenditure can be found in table A.2 in the appendix.

4 Results

Table 2 presents the estimated values for the coefficients β_s and γ_s , $s = 1974, \dots, 1993$ for all six commodity groups. For *food*, *fuel* and *light*, and *total* we can see that the β_s -values are not varying very much across the years, but the γ_s -values vary. For other commodity groups both β_s and γ_s vary significantly over the years. Though there is no clear time trend of these

coefficients it is obvious that these coefficients vary over time (see also the figures 1 and 2). Therefore, the assumption of time-invariance, incorporated in time-series models, seems to be justified only for some commodity groups.

We can also see that the γ_s -values are very low compared to the β_s -values, which holds for all commodity groups. For *services* the γ_s -values are largest in comparison to the γ_s -values for the other commodity groups. By interpreting the β_s -values as income elasticities one can describe all commodities as necessary goods because β_s -values are less than one for all years. But the very high values of β_s for *services* and *clothing and footwear* indicate a more luxurious nature of these commodity groups. If one interprets the results in terms of the mean of β_s and γ_s , $mean(\beta)$ and $mean(\gamma)$, respectively, another fact also becomes clear. A higher value for $mean(\beta)$ also means a higher value for $mean(\gamma)$, for example *services* with highest values for both, [$mean(\beta) = 0.89$] and [$mean(\gamma) = 0.234$]. The only exception from this pattern is *fuel and light*. This means that the more luxurious a commodity group is the higher is the influence of the dispersion of income. So, a change in this dispersion, i.e., an increasing (in)equality in the distribution of current disposable income, affects the relative change of mean consumption expenditure for luxurious goods more than for necessary goods, under the *ceteris paribus* assumption that the mean of the log-income distribution does not change.

If one wants to test the validity of the *representative agent approach* one will have to estimate the coefficient $\bar{\gamma}_s$. This depends on β_s , γ_s , and the distribution of current income (see section 2). Therefore one would expect that the results differ very much across the aggregates. Indeed, for *fuel and light* the mean of the $\bar{\gamma}_s$'s is 0.001 which is in favour of the *representative agent approach* but estimated without the time-invariance assumption. Yet, for *clothing and footwear* the corresponding mean takes the value -0.139. In that case the *representative agent approach* neglects the important influence of the dispersion of income and cannot be used as a valid substitute for the distributional model of HK.

Table 3 presents the goodness-of-fit test, using the average absolute error (AAE) and the relative residual sum of squares (RRSS), as described in section 2.3. In the second column of the table we describe the models used for prediction purpose. The first four rows for each commodity indicate the four models described in section 2.3 with the first lag. The fourth model, i.e., the DHSY-model, is given for comparison for the one-lag case only. Here we would like to emphasize again that the DHSY-model is estimated by minimizing the sum of squared errors, so that obviously the residual statistic should

year	Commodity groups											
	Food		Alcohol & tobacco		Fuel & light		Services		Clothing & footwear		Total	
	β	γ	β	γ	β	γ	β	γ	β	γ	β	γ
1974	0.26	0.023	0.49	0.048	0.22	0.060	0.92	0.220	0.76	0.069	0.53	0.090
1975	0.26	0.013	0.57	0.092	0.18	0.038	0.92	0.219	0.83	0.115	0.52	0.076
1976	0.25	0.035	0.68	0.105	0.16	0.048	0.86	0.236	0.85	0.164	0.52	0.096
1977	0.24	0.028	0.62	0.040	0.14	0.058	0.89	0.203	0.87	0.161	0.50	0.084
1979	0.24	0.018	0.62	0.096	0.25	0.034	0.92	0.214	0.67	0.050	0.53	0.072
1980	0.25	0.023	0.52	0.059	0.17	0.056	0.73	0.150	0.81	0.085	0.50	0.074
1981	0.25	0.024	0.53	0.051	0.17	0.058	0.87	0.185	0.70	0.054	0.52	0.085
1982	0.26	0.027	0.54	0.055	0.24	0.053	0.90	0.242	0.86	0.115	0.55	0.105
1983	0.24	0.021	0.52	0.060	0.23	0.058	0.86	0.228	0.72	0.112	0.51	0.092
1984	0.28	0.044	0.56	0.065	0.24	0.062	0.99	0.265	0.85	0.117	0.59	0.110
1985	0.25	0.015	0.58	0.067	0.23	0.071	0.88	0.180	0.81	0.074	0.56	0.094
1986	0.26	0.023	0.48	0.028	0.19	0.068	0.87	0.243	0.79	0.130	0.55	0.101
1987	0.22	0.016	0.45	0.056	0.20	0.038	0.86	0.213	0.77	0.113	0.52	0.084
1988	0.24	0.031	0.39	0.038	0.21	0.060	0.98	0.325	0.74	0.093	0.54	0.111
1989	0.23	0.020	0.35	0.011	0.17	0.033	0.84	0.207	0.75	0.133	0.50	0.091
1990	0.21	0.032	0.36	0.037	0.17	0.064	0.88	0.309	0.65	0.129	0.51	0.111
1991	0.22	0.028	0.40	0.010	0.16	0.044	0.85	0.231	0.65	0.034	0.49	0.075
1992	0.23	0.024	0.34	0.008	0.15	0.052	0.87	0.265	0.65	0.076	0.50	0.096
1993	0.24	0.034	0.34	0.061	0.22	0.065	0.93	0.306	0.73	0.182	0.55	0.130
mean	0.24	0.025	0.49	0.052	0.19	0.054	0.89	0.234	0.76	0.106	0.53	0.094

Table 2: β and γ values for DADE procedure

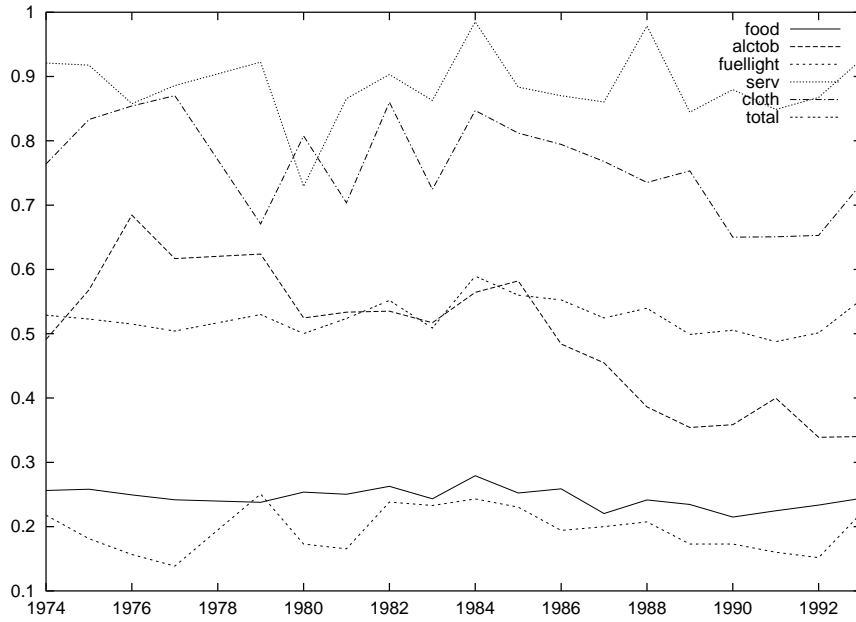


Figure 1: $\beta_s, s = 1974, \dots, 1993$ for the six commodity groups

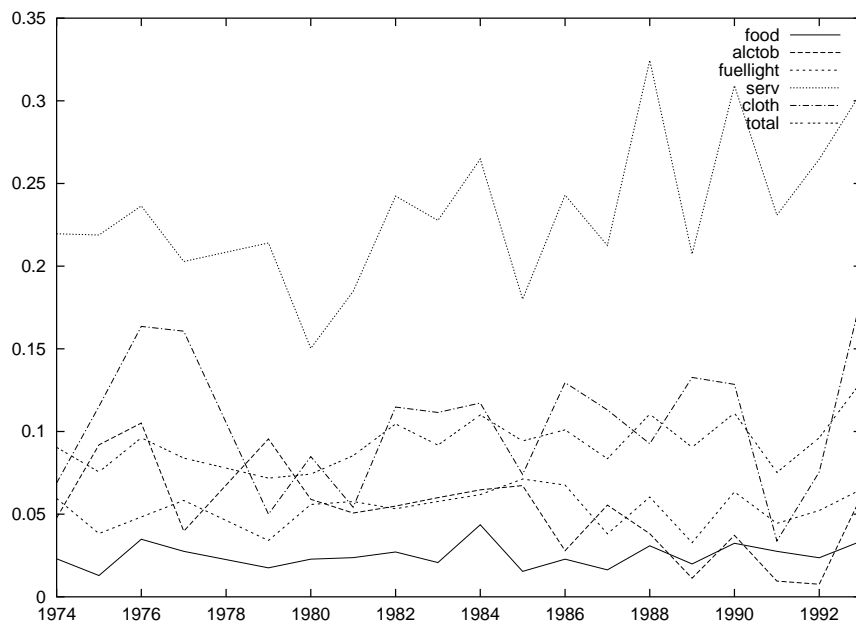


Figure 2: $\gamma_s, s = 1974, \dots, 1993$ for the six commodity groups

be low. But from table 3 we see that including only the two parameters, i.e. mean and standard deviation, of the current income distribution makes the prediction power of our model very much of the same order for *fuel and light* and *clothing and footwear*. Also for the other commodity groups there is not much difference. Hence, it might well happen that after incorporating additional variables of the theoretical model (4) in our empirical model, the extended model will perform better than the existing time-series model.

We see that for *food*, *fuel and light*, and *alcohol and tobacco* AAE and RRSS increase if we increase the lag, indicating that for these commodity groups a higher lag is not meaningful for prediction purpose. But this observation is not true for *services*, *clothing and footwear*, and *total*. For these three aggregates we also observe the interesting phenomenon of increasing significance of the income-dispersion term in explaining the change in aggregate consumption expenditure for all lags up to four. The differences in AAE and RRSS values between the models including and excluding dispersion are maximum for *services*, the most luxurious commodity group. The lowest absolute values for AAE and RRSS result for *total*, which is the commodity group of major policy concern. For *alcohol and tobacco* the values for AAE and RRSS are very high and increase by incorporating the dispersion term. This indicates that our empirical model may not be appropriate for predicting the change in consumption expenditure on this commodity group due to the special nature of this commodity group as an intoxicant with lots of zero observations. For *food* and *fuel and light* this is not true. Here the results for the model excluding dispersion and the model including dispersion do not differ very much and in some cases even are in favour of the model including dispersion. The insignificance of the dispersion for more necessary aggregates is quite plausible as for these commodity groups there is not much scope to vary the consumption pattern.

In support of our observations from table 3 we also provide the plot of the original change in mean consumption and of the predicted change from our empirical model, including and excluding dispersion of income distribution. Figures 3 to 8 depict the graphs for all six aggregates. For *total* and *services* it can be seen that for the first years from 1975 to 1983 our empirical model, including only the parameter of the income distribution, can predict a significant proportion of the change in original aggregate consumption. But from 1984 onwards the predicted values are moving apart from the original values indicating the importance of the excluded unobserved variables in model (4) in these later years. Also, for these two commodity groups the predicted values from the model including dispersion move more closely to the original values as compared to the model excluding dispersion. For all other aggre-

gates a clear conclusion cannot be drawn which is consistent with the high values of AAE and RRSS.

5 Conclusions

In this paper we used the heterogeneous household approach for aggregation by Hildenbrand and Kneip (1999, 2001) to explore the effect of a change in the distribution of current income on the relative change of aggregate consumption expenditure. We estimated the two corresponding coefficients of the aggregate equation for six commodity groups by using cross-section data and the method of nonparametric direct average derivative estimation. We performed goodness-of-fit tests based on predicted values to judge about the importance of the dispersion of income for the aggregate consumption function. The results for the three most luxurious commodity groups, including *total*, show a higher predictive power of the model including the dispersion of income. Additional evidence contradicts the properties of the *representative agent model* which neglects the income dispersion. Although the inclusion of dispersion does not lead to improved results for the necessary commodity groups this does not mean that the income dispersion is unimportant for the change in aggregate consumption expenditure. First, the results show that the coefficient of the dispersion term in the aggregate relation is not equal to zero. Second, in this paper we concentrated on the income distribution and neglected all other terms incorporated in the theoretical aggregate relation. Therefore, it might be possible that a combination of the dispersion term with other relevant factors, like uncertainty, leads to better results in terms of the predictive power of the model. Certainly, the analysis can be extended further in that direction to establish the relevant explanatory variables for the change in aggregate consumption. Moreover, these results may be tested for robustness with regard to our treatment of the data, relating to the outlier selection and the choice of household attributes to form subgroups.

Table 3: Goodness-of-fit test (AE and RRSS)

Commodity	Model	AAE*100	RRSS
food	$ \Delta_{t-1} \log C_t $	2.067	
	$\Delta_{t-1} \log C_t = \hat{\beta}_{t-1}(m_t - m_{t-1})$	1.860	0.782
	$\Delta_{t-1} \log C_t = \hat{\beta}_{t-1}(m_t - m_{t-1}) + \hat{\gamma}_{t-1} \log(\frac{\sigma_t}{\sigma_{t-1}})$	1.864	0.776
	$\Delta_1 \log C_t = \hat{\theta}_1 \Delta_1 \log Y_t + \hat{\theta}_2 (\log Y_{t-1} - \log C_{t-1})$	1.690	0.562
	$ \Delta_{t-2} \log C_t $	3.260	
	$\Delta_{t-2} \log C_t = \hat{\beta}_{t-2}(m_t - m_{t-2})$	3.029	0.792
	$\Delta_{t-2} \log C_t = \hat{\beta}_{t-2}(m_t - m_{t-2}) + \hat{\gamma}_{t-2} \log(\frac{\sigma_t}{\sigma_{t-2}})$	3.026	0.786
	$ \Delta_{t-3} \log C_t $	3.476	
	$\Delta_{t-3} \log C_t = \hat{\beta}_{t-3}(m_t - m_{t-3})$	3.311	0.874
	$\Delta_{t-3} \log C_t = \hat{\beta}_{t-3}(m_t - m_{t-3}) + \hat{\gamma}_{t-3} \log(\frac{\sigma_t}{\sigma_{t-3}})$	3.336	0.873
	$ \Delta_{t-4} \log C_t $	3.298	
	$\Delta_{t-4} \log C_t = \hat{\beta}_{t-4}(m_t - m_{t-4})$	3.534	1.056
$\Delta_{t-4} \log C_T = \hat{\beta}_{t-4}(m_t - m_{t-4}) + \hat{\gamma}_{t-4} \log(\frac{\sigma_t}{\sigma_{t-4}})$	3.559	1.067	
alcohol & tobacco	$ \Delta_{t-1} \log C_t $	3.234	
	$\Delta_{t-1} \log C_t = \hat{\beta}_{t-1}(m_t - m_{t-1})$	3.364	0.964
	$\Delta_{t-1} \log C_t = \hat{\beta}_{t-1}(m_t - m_{t-1}) + \hat{\gamma}_{t-1} \log(\frac{\sigma_t}{\sigma_{t-1}})$	3.387	0.954
	$\Delta_1 \log C_t = \hat{\theta}_1 \Delta_1 \log Y_t + \hat{\theta}_2 (\log Y_{t-1} - \log C_{t-1})$	2.239	0.431
	$ \Delta_{t-2} \log C_t $	5.011	
	$\Delta_{t-2} \log C_t = \hat{\beta}_{t-2}(m_t - m_{t-2})$	6.205	1.225
	$\Delta_{t-2} \log C_t = \hat{\beta}_{t-2}(m_t - m_{t-2}) + \hat{\gamma}_{t-2} \log(\frac{\sigma_t}{\sigma_{t-2}})$	6.278	1.227
	$ \Delta_{t-3} \log C_t $	7.105	
	$\Delta_{t-3} \log C_t = \hat{\beta}_{t-3}(m_t - m_{t-3})$	9.593	1.425
	$\Delta_{t-3} \log C_t = \hat{\beta}_{t-3}(m_t - m_{t-3}) + \hat{\gamma}_{t-3} \log(\frac{\sigma_t}{\sigma_{t-3}})$	9.739	1.450
	$ \Delta_{t-4} \log C_t $	9.030	
	$\Delta_{t-4} \log C_t = \hat{\beta}_{t-4}(m_t - m_{t-4})$	12.646	1.699
$\Delta_{t-4} \log C_t = \hat{\beta}_{t-4}(m_t - m_{t-4}) + \hat{\gamma}_{t-4} \log(\frac{\sigma_t}{\sigma_{t-4}})$	12.875	1.746	
fuel & light	$ \Delta_{t-1} \log C_t $	3.312	
	$\Delta_{t-1} \log C_t = \hat{\beta}_{t-1}(m_t - m_{t-1})$	3.075	0.945
	$\Delta_{t-1} \log C_t = \hat{\beta}_{t-1}(m_t - m_{t-1}) + \hat{\gamma}_{t-1} \log(\frac{\sigma_t}{\sigma_{t-1}})$	3.050	0.957
	$\Delta_1 \log C_t = \hat{\theta}_1 \Delta_1 \log Y_t + \hat{\theta}_2 (\log Y_{t-1} - \log C_{t-1})$	3.034	0.965
	$ \Delta_{t-2} \log C_t $	4.491	
	$\Delta_{t-2} \log C_t = \hat{\beta}_{t-2}(m_t - m_{t-2})$	4.486	0.971
	$\Delta_{t-2} \log C_t = \hat{\beta}_{t-2}(m_t - m_{t-2}) + \hat{\gamma}_{t-2} \log(\frac{\sigma_t}{\sigma_{t-2}})$	4.548	1.003
	$ \Delta_{t-3} \log C_t $	4.484	
	$\Delta_{t-3} \log C_t = \hat{\beta}_{t-3}(m_t - m_{t-3})$	4.117	0.984
	$\Delta_{t-3} \log C_t = \hat{\beta}_{t-3}(m_t - m_{t-3}) + \hat{\gamma}_{t-3} \log(\frac{\sigma_t}{\sigma_{t-3}})$	4.216	1.030
	$ \Delta_{t-4} \log C_t $	3.903	
	$\Delta_{t-4} \log C_t = \hat{\beta}_{t-4}(m_t - m_{t-4})$	3.783	1.033
$\Delta_{t-4} \log C_t = \hat{\beta}_{t-4}(m_t - m_{t-4}) + \hat{\gamma}_{t-4} \log(\frac{\sigma_t}{\sigma_{t-4}})$	3.838	1.111	
continued on next page			

Table 3: Goodness-of-fit test (AE and RRSS)

Commodity	Model	AAE*100	RRSS
services	$ \Delta_{t-1} \log C_t $	5.032	
	$\Delta_{t-1} \log C_t = \hat{\beta}_{t-1}(m_t - m_{t-1})$	3.648	0.530
	$\Delta_{t-1} \log C_t = \hat{\beta}_{t-1}(m_t - m_{t-1}) + \hat{\gamma}_{t-1} \log(\frac{\sigma_t}{\sigma_{t-1}})$	3.358	0.478
	$\Delta_1 \log C_t = \hat{\theta}_1 \Delta_1 \log Y_t + \hat{\theta}_2 (\log Y_{t-1} - \log C_{t-1})$	2.768	0.386
	$ \Delta_{t-2} \log C_t $	6.788	
	$\Delta_{t-2} \log C_t = \hat{\beta}_{t-2}(m_t - m_{t-2})$	3.760	0.405
	$\Delta_{t-2} \log C_t = \hat{\beta}_{t-2}(m_t - m_{t-2}) + \hat{\gamma}_{t-2} \log(\frac{\sigma_t}{\sigma_{t-2}})$	3.337	0.308
	$ \Delta_{t-3} \log C_t $	9.409	
	$\Delta_{t-3} \log C_t = \hat{\beta}_{t-3}(m_t - m_{t-3})$	5.960	0.354
	$\Delta_{t-3} \log C_t = \hat{\beta}_{t-3}(m_t - m_{t-3}) + \hat{\gamma}_{t-3} \log(\frac{\sigma_t}{\sigma_{t-3}})$	5.030	0.262
	$ \Delta_{t-4} \log C_t $	11.546	
	$\Delta_{t-4} \log C_t = \hat{\beta}_{t-4}(m_t - m_{t-4})$	6.652	0.331
$\Delta_{t-4} \log C_t = \hat{\beta}_{t-4}(m_t - m_{t-4}) + \hat{\gamma}_{t-4} \log(\frac{\sigma_t}{\sigma_{t-4}})$	5.688	0.235	
clothing & footwear	$ \Delta_{t-1} \log C_t $	5.779	
	$\Delta_{t-1} \log C_t = \hat{\beta}_{t-1}(m_t - m_{t-1})$	5.239	0.750
	$\Delta_{t-1} \log C_t = \hat{\beta}_{t-1}(m_t - m_{t-1}) + \hat{\gamma}_{t-1} \log(\frac{\sigma_t}{\sigma_{t-1}})$	5.273	0.752
	$\Delta_1 \log C_t = \hat{\theta}_1 \Delta_1 \log Y_t + \hat{\theta}_2 (\log Y_{t-1} - \log C_{t-1})$	5.260	0.763
	$ \Delta_{t-2} \log C_t $	9.718	
	$\Delta_{t-2} \log C_t = \hat{\beta}_{t-2}(m_t - m_{t-2})$	7.011	0.550
	$\Delta_{t-2} \log C_t = \hat{\beta}_{t-2}(m_t - m_{t-2}) + \hat{\gamma}_{t-2} \log(\frac{\sigma_t}{\sigma_{t-2}})$	6.954	0.530
	$ \Delta_{t-3} \log C_t $	11.609	
	$\Delta_{t-3} \log C_t = \hat{\beta}_{t-3}(m_t - m_{t-3})$	8.743	0.576
	$\Delta_{t-3} \log C_t = \hat{\beta}_{t-3}(m_t - m_{t-3}) + \hat{\gamma}_{t-3} \log(\frac{\sigma_t}{\sigma_{t-3}})$	8.811	0.564
	$ \Delta_{t-4} \log C_t $	13.763	
	$\Delta_{t-4} \log C_t = \hat{\beta}_{t-4}(m_t - m_{t-4})$	10.476	0.568
$\Delta_{t-4} \log C_t = \hat{\beta}_{t-4}(m_t - m_{t-4}) + \hat{\gamma}_{t-4} \log(\frac{\sigma_t}{\sigma_{t-4}})$	10.388	0.566	
total	$ \Delta_{t-1} \log C_t $	2.452	
	$\Delta_{t-1} \log C_t = \hat{\beta}_{t-1}(m_t - m_{t-1})$	1.672	0.417
	$\Delta_{t-1} \log C_t = \hat{\beta}_{t-1}(m_t - m_{t-1}) + \hat{\gamma}_{t-1} \log(\frac{\sigma_t}{\sigma_{t-1}})$	1.620	0.402
	$\Delta_1 \log C_t = \hat{\theta}_1 \Delta_1 \log Y_t + \hat{\theta}_2 (\log Y_{t-1} - \log C_{t-1})$	1.476	0.364
	$ \Delta_{t-2} \log C_t $	4.247	
	$\Delta_{t-2} \log C_t = \hat{\beta}_{t-2}(m_t - m_{t-2})$	2.353	0.336
	$\Delta_{t-2} \log C_t = \hat{\beta}_{t-2}(m_t - m_{t-2}) + \hat{\gamma}_{t-2} \log(\frac{\sigma_t}{\sigma_{t-2}})$	2.059	0.297
	$ \Delta_{t-3} \log C_t $	4.654	
	$\Delta_{t-3} \log C_t = \hat{\beta}_{t-3}(m_t - m_{t-3})$	2.206	0.302
	$\Delta_{t-3} \log C_t = \hat{\beta}_{t-3}(m_t - m_{t-3}) + \hat{\gamma}_{t-3} \log(\frac{\sigma_t}{\sigma_{t-3}})$	1.990	0.259
	$ \Delta_{t-4} \log C_t $	4.238	
	$\Delta_{t-4} \log C_t = \hat{\beta}_{t-4}(m_t - m_{t-4})$	2.441	0.263
$\Delta_{t-4} \log C_t = \hat{\beta}_{t-4}(m_t - m_{t-4}) + \hat{\gamma}_{t-4} \log(\frac{\sigma_t}{\sigma_{t-4}})$	2.226	0.229	

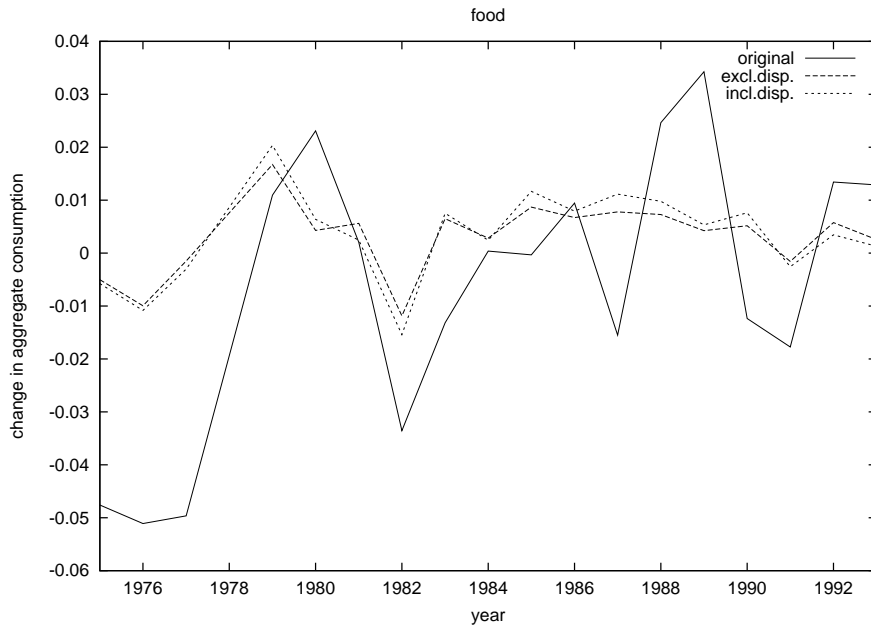


Figure 3: original and predicted changes in mean aggregate food consumption



Figure 4: original and predicted changes in mean aggregate alcohol and tobacco consumption



Figure 5: original and predicted changes in mean aggregate fuel and light consumption

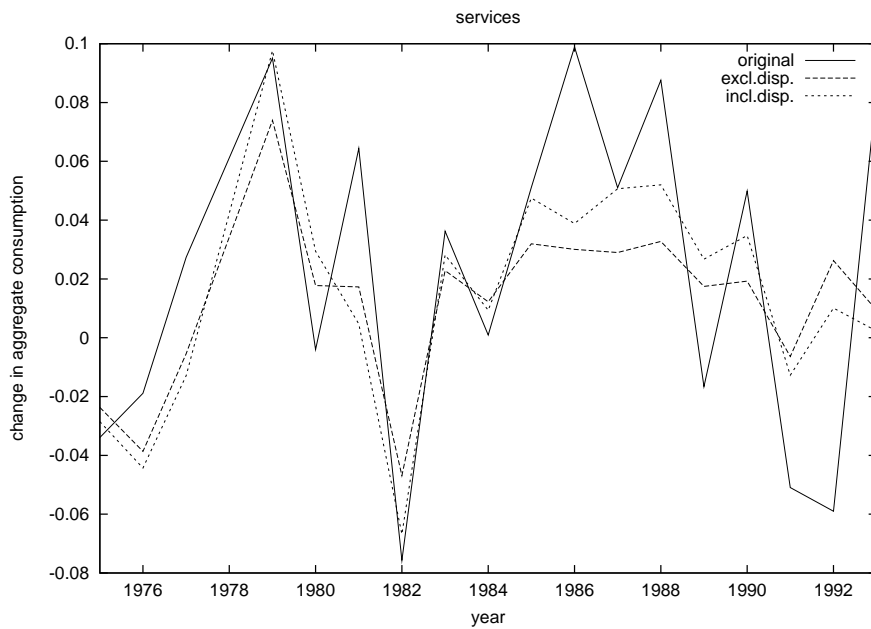


Figure 6: original and predicted changes in mean aggregate services consumption

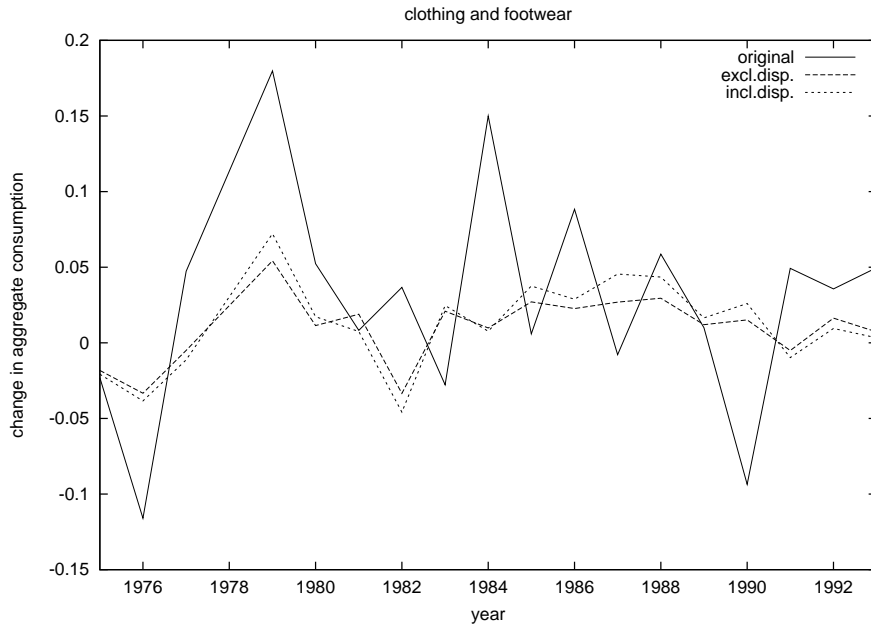


Figure 7: original and predicted changes in mean aggregate clothing and footwear consumption

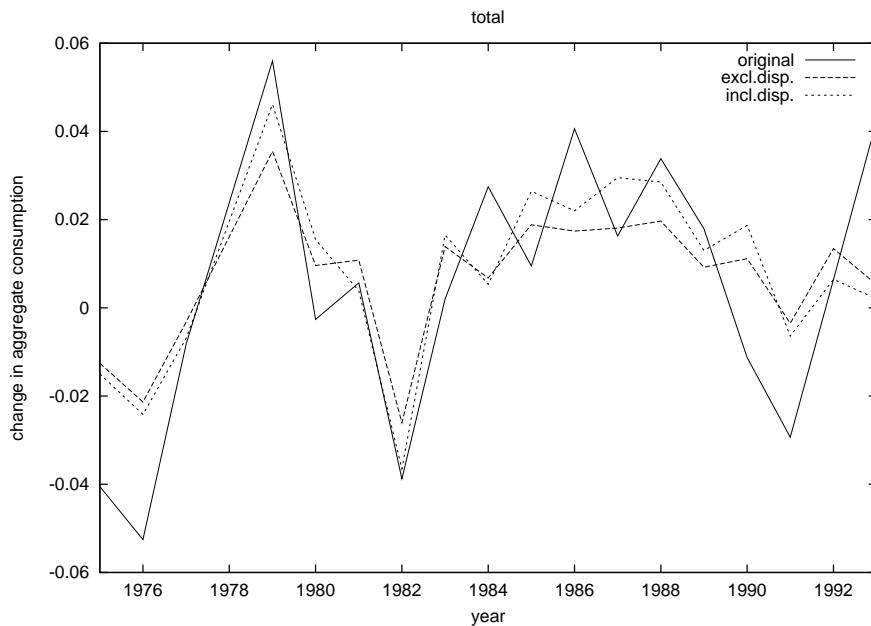


Figure 8: original and predicted changes in mean aggregate total consumption

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A Appendix

Table A.1: Number of observations in subgroups

year	Number of group												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1974	358	292	780	380	730	1283	139	323	162	94	363	349	571
1975	405	337	796	400	793	1457	135	291	167	129	421	429	623
1976	438	343	802	414	694	1381	151	230	217	159	409	429	646
1977	412	315	855	423	679	1399	132	289	195	166	377	457	651
1979	449	234	801	342	603	1340	105	255	164	137	359	482	643
1980	394	257	794	377	540	1406	136	247	197	190	366	494	633
1981	420	264	803	456	551	1379	158	338	252	313	376	538	759
1982	450	257	752	425	748	1186	144	296	311	313	356	551	714
1983	409	242	635	376	648	1009	138	321	323	319	368	505	728
1984	425	233	674	399	590	1072	164	300	343	303	358	540	734
1985	428	216	694	393	580	969	185	322	317	312	325	610	754
1986	450	212	764	402	492	993	191	348	329	283	273	670	773
1987	525	211	778	361	476	1017	206	374	276	342	233	770	796
1988	521	191	769	371	456	1024	257	395	261	254	228	767	815
1989	500	198	777	405	470	1024	278	380	299	224	228	742	874
1990	541	163	761	356	372	964	281	375	200	174	221	755	784
1991	536	177	763	344	349	913	272	330	281	248	188	832	769
1992	559	154	792	333	340	912	274	373	320	309	183	810	854
1993	516	162	669	308	301	914	232	338	308	291	143	755	810

Table A.2: Descriptive statistics

year	sample size	Descriptive statistics of income and consumption						
		income	food	alcohol tobacco	fuel light	services	clothing footwear	total
1974	5824	167.46 (92.475)	31.82 (17.194)	17.00 (19.370)	10.26 (9.692)	12.62 (14.102)	8.77 (13.129)	99.45 (62.648)
1975	6383	162.88 (88.208)	30.34 (16.527)	16.91 (19.493)	9.85 (9.983)	12.20 (14.721)	8.57 (12.962)	95.50 (59.009)
1976	6311	156.31 (85.576)	28.83 (15.362)	16.48 (18.762)	9.49 (7.706)	11.97 (13.933)	7.63 (12.480)	90.61 (53.784)
1977	6350	154.39 (82.417)	27.43 (14.650)	15.61 (17.741)	10.19 (7.380)	12.30 (14.631)	8.00 (12.884)	89.87 (52.911)
1979	5914	167.80 (93.280)	27.73 (15.592)	16.15 (19.590)	10.36 (7.315)	13.53 (16.086)	9.58 (14.640)	95.05 (59.704)
1980	6031	172.39 (98.126)	28.38 (15.848)	15.84 (18.696)	9.65 (7.192)	13.47 (14.881)	10.09 (15.257)	94.70 (58.005)
1981	6607	174.92 (100.744)	28.44 (15.585)	14.94 (18.084)	9.74 (7.211)	14.37 (17.643)	10.18 (15.593)	95.33 (59.587)
1982	6503	163.96 (89.218)	27.50 (15.389)	13.47 (15.530)	9.47 (6.385)	13.32 (16.469)	10.56 (16.235)	91.71 (57.720)
1983	6021	168.94 (95.658)	27.14 (14.855)	14.05 (17.129)	9.87 (6.268)	13.81 (16.190)	10.27 (16.086)	91.90 (56.961)
1984	6135	170.64 (94.894)	27.15 (15.152)	13.65 (16.206)	9.67 (6.611)	13.83 (16.883)	11.93 (19.334)	94.45 (60.994)
1985	6105	178.50 (104.401)	27.14 (15.284)	13.42 (16.674)	9.89 (6.519)	14.55 (16.756)	12.00 (19.026)	95.35 (62.563)
1986	6180	185.96 (112.974)	27.40 (16.385)	13.25 (15.650)	10.22 (6.833)	16.06 (20.427)	13.11 (20.552)	99.30 (66.804)
1987	6365	195.62 (124.473)	26.98 (16.120)	13.21 (16.327)	10.42 (6.774)	16.90 (21.188)	13.01 (20.378)	100.93 (68.502)
1988	6309	206.99 (136.874)	27.65 (16.351)	13.06 (17.845)	10.11 (6.608)	18.45 (29.369)	13.79 (21.957)	104.41 (75.580)
1989	6399	210.90 (137.828)	28.61 (17.248)	13.11 (16.927)	9.80 (6.493)	18.15 (23.013)	13.93 (22.808)	106.29 (74.040)
1990	5947	218.82 (149.159)	28.26 (16.931)	12.56 (15.718)	9.44 (5.941)	19.08 (25.238)	12.69 (21.383)	105.10 (74.402)
1991	6002	216.27 (144.939)	27.77 (17.156)	11.72 (15.244)	9.66 (5.980)	18.13 (23.650)	13.33 (21.271)	102.06 (71.660)
1992	6213	219.18 (142.521)	28.14 (16.827)	11.30 (13.925)	10.10 (6.420)	17.09 (21.827)	13.81 (22.259)	102.72 (69.772)
1993	5745	220.44 (143.355)	28.51 (16.781)	11.47 (14.024)	10.30 (6.099)	18.59 (25.412)	14.52 (25.731)	107.16 (76.347)

Table A.3: Descriptive statistics of income for subgroups

Year	Group number												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1974	114.06 (53.482)	142.00 (64.357)	205.70 (70.314)	254.43 (79.621)	178.55 (70.452)	223.19 (73.533)	158.24 (98.883)	219.35 (106.029)	74.23 (47.013)	170.23 (89.666)	72.14 (54.138)	56.93 (28.654)	91.54 (38.553)
1975	108.93 (51.412)	140.22 (63.013)	202.57 (60.464)	259.24 (75.824)	171.51 (60.779)	221.93 (71.596)	161.26 (98.216)	195.37 (94.550)	82.56 (56.435)	139.99 (62.160)	69.83 (49.180)	58.54 (29.183)	94.75 (44.090)
1976	112.67 (45.802)	141.39 (59.656)	194.08 (60.434)	251.51 (77.933)	161.62 (55.263)	215.20 (73.544)	144.96 (91.096)	198.37 (95.834)	76.15 (42.648)	147.28 (66.435)	67.50 (43.021)	56.01 (19.846)	93.89 (42.335)
1977	107.51 (46.224)	131.38 (45.673)	189.68 (58.350)	243.74 (70.203)	162.30 (58.286)	208.81 (67.293)	139.86 (88.535)	199.73 (97.426)	85.65 (54.893)	138.13 (58.145)	67.15 (42.052)	55.85 (22.116)	92.85 (40.738)
1979	119.60 (49.181)	151.39 (64.002)	215.05 (69.352)	279.59 (84.267)	180.79 (64.873)	227.96 (75.066)	146.41 (78.080)	216.31 (98.902)	84.13 (55.271)	151.32 (76.187)	69.87 (49.689)	59.43 (23.039)	96.58 (42.341)
1980	124.05 (54.488)	157.75 (69.366)	222.69 (70.608)	269.55 (85.274)	183.52 (64.683)	236.82 (82.884)	182.08 (118.118)	222.43 (101.493)	77.26 (42.903)	147.66 (76.947)	68.28 (45.263)	58.19 (23.362)	99.57 (46.248)
1981	132.98 (58.017)	162.62 (78.082)	228.06 (77.106)	288.36 (95.704)	192.96 (78.015)	233.47 (83.439)	187.32 (122.320)	222.88 (108.861)	93.05 (58.502)	140.25 (66.173)	72.78 (42.747)	65.18 (30.607)	104.45 (44.109)
1982	124.73 (54.755)	153.25 (64.932)	213.32 (68.823)	263.41 (77.512)	175.47 (60.407)	229.76 (74.619)	164.53 (96.106)	210.96 (97.446)	82.35 (48.959)	143.63 (61.456)	72.89 (43.849)	66.96 (25.474)	105.15 (42.980)
1983	128.93 (55.572)	155.65 (67.572)	222.09 (75.651)	276.63 (91.732)	193.96 (75.661)	236.59 (81.510)	172.18 (115.912)	214.47 (106.853)	90.09 (49.602)	145.37 (62.660)	77.04 (44.633)	72.47 (31.888)	115.78 (53.849)
1984	128.51 (53.144)	158.09 (64.753)	229.66 (76.492)	282.90 (88.712)	188.19 (67.447)	240.85 (78.916)	164.64 (99.743)	215.18 (103.280)	84.41 (35.764)	149.55 (58.639)	79.06 (43.363)	71.80 (26.377)	116.70 (51.272)
1985	135.44 (54.760)	173.14 (82.493)	242.79 (84.168)	296.76 (95.249)	202.48 (78.638)	251.66 (88.645)	197.17 (124.108)	239.77 (119.483)	90.66 (55.150)	148.43 (61.736)	79.76 (43.677)	74.27 (29.709)	116.68 (51.264)
1986	140.18 (62.263)	177.28 (90.883)	251.74 (96.700)	312.31 (107.174)	207.50 (86.207)	265.56 (96.741)	193.11 (120.120)	247.92 (126.556)	92.33 (49.371)	150.67 (71.044)	78.56 (43.221)	76.04 (34.413)	124.59 (60.880)

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Year	Group number												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1987	158.35 (74.909)	195.55 (117.495)	272.23 (112.528)	314.09 (117.785)	222.79 (101.821)	278.14 (101.883)	219.24 (145.312)	275.81 (151.467)	95.22 (55.006)	165.98 (83.397)	78.58 (42.673)	76.40 (40.150)	123.30 (61.963)
1988	160.61 (73.776)	194.30 (99.231)	286.64 (113.407)	345.65 (118.236)	235.94 (115.047)	296.28 (114.275)	244.34 (156.721)	293.31 (174.915)	87.55 (46.372)	171.11 (102.077)	84.55 (72.212)	77.54 (40.072)	124.89 (71.295)
1989	171.78 (82.894)	208.73 (103.352)	292.91 (119.920)	354.12 (125.485)	238.92 (104.393)	301.45 (117.136)	232.75 (157.515)	300.74 (160.319)	97.38 (67.044)	169.23 (89.603)	82.01 (53.704)	73.81 (33.994)	126.82 (63.700)
1990	185.33 (101.425)	216.80 (111.161)	309.65 (132.030)	359.59 (140.630)	244.08 (119.100)	312.76 (129.109)	241.55 (149.510)	311.84 (181.118)	96.39 (68.455)	183.02 (120.942)	78.87 (55.827)	74.50 (37.309)	127.74 (66.064)
1991	180.26 (89.527)	234.04 (134.669)	313.01 (123.402)	362.51 (139.350)	270.86 (139.488)	310.93 (125.194)	226.23 (146.707)	300.54 (158.857)	108.93 (92.239)	168.43 (92.054)	88.81 (54.304)	78.00 (39.907)	134.43 (70.943)
1992	187.69 (88.595)	211.70 (99.106)	307.12 (119.978)	371.46 (137.101)	263.65 (123.079)	318.34 (125.859)	245.00 (169.991)	302.50 (159.702)	117.03 (86.718)	169.61 (90.299)	94.74 (67.471)	83.50 (40.898)	145.75 (77.580)
1993	181.04 (85.927)	230.85 (107.549)	315.65 (129.280)	360.18 (142.628)	264.01 (130.648)	325.85 (124.942)	234.92 (165.574)	277.17 (154.717)	115.27 (84.862)	187.19 (103.124)	90.12 (58.751)	85.14 (40.944)	150.17 (81.236)

Table A.3: Descriptive statistics of income for subgroups

Table A.4: Descriptive statistics of food for subgroups

Year	Group number												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1974	13.88 (7.212)	28.78 (10.766)	28.66 (10.414)	43.47 (13.919)	37.75 (15.076)	43.45 (16.782)	28.25 (16.452)	44.87 (18.769)	17.52 (8.910)	39.94 (16.656)	17.08 (10.970)	12.68 (4.916)	24.71 (7.634)
1975	13.42 (6.198)	27.44 (9.152)	26.87 (10.433)	42.11 (13.870)	35.61 (13.933)	42.58 (16.158)	25.33 (18.406)	41.78 (16.020)	17.83 (9.851)	37.08 (14.700)	16.63 (10.778)	12.51 (4.968)	23.65 (7.678)
1976	13.07 (6.818)	27.95 (10.921)	26.65 (10.852)	40.28 (13.772)	34.27 (12.860)	39.97 (14.399)	25.78 (11.462)	40.36 (17.564)	17.34 (8.498)	36.71 (13.902)	15.39 (8.734)	12.10 (4.882)	23.76 (7.451)
1977	12.89 (6.322)	25.84 (9.802)	25.15 (10.914)	38.45 (12.979)	31.54 (12.197)	37.50 (14.308)	23.30 (14.273)	37.39 (14.962)	17.52 (9.251)	33.96 (13.853)	15.17 (9.748)	11.97 (4.715)	22.96 (7.470)
1979	12.39 (6.742)	27.51 (9.437)	25.72 (11.348)	39.84 (14.332)	33.74 (12.997)	38.29 (16.022)	24.01 (11.567)	39.49 (15.860)	17.20 (9.302)	31.89 (12.969)	14.70 (8.458)	12.27 (4.820)	23.55 (8.833)
1980	12.81 (7.925)	29.22 (11.375)	26.31 (9.916)	38.72 (14.138)	34.84 (13.488)	39.70 (15.799)	24.45 (12.012)	38.74 (16.051)	16.37 (9.828)	33.88 (15.126)	14.58 (9.612)	12.04 (5.016)	23.14 (7.796)
1981	12.44 (6.369)	27.95 (10.467)	25.31 (9.923)	40.30 (14.415)	34.30 (13.026)	39.14 (15.067)	23.78 (11.228)	14.16 (15.219)	18.72 (10.611)	33.70 (12.812)	15.60 (10.368)	12.37 (5.517)	23.65 (7.576)
1982	12.60 (6.490)	25.37 (9.552)	25.11 (9.810)	38.77 (12.687)	33.11 (12.377)	39.40 (16.520)	25.62 (16.708)	38.95 (15.441)	17.16 (9.875)	32.42 (13.756)	14.58 (8.498)	12.36 (5.385)	23.93 (8.444)
1983	12.30 (7.247)	27.31 (11.026)	25.08 (10.569)	38.84 (13.139)	34.10 (13.423)	37.98 (14.233)	24.18 (11.978)	39.74 (15.921)	16.62 (8.976)	31.16 (11.643)	15.04 (8.814)	12.50 (5.285)	24.13 (8.424)
1984	12.25 (6.345)	26.01 (8.517)	25.91 (11.320)	39.91 (13.660)	34.07 (13.315)	38.69 (14.456)	22.55 (12.513)	40.17 (15.678)	15.70 (8.351)	30.31 (12.445)	14.86 (9.355)	12.56 (5.461)	24.40 (8.941)
1985	12.30 (6.739)	26.72 (10.302)	25.33 (10.870)	41.38 (15.240)	34.06 (12.779)	38.73 (14.602)	24.36 (12.029)	40.76 (17.871)	16.87 (9.089)	31.08 (12.417)	14.16 (7.219)	12.91 (5.455)	24.38 (8.338)
1986	12.26 (7.429)	27.68 (11.086)	26.15 (12.858)	40.34 (16.109)	35.78 (15.377)	38.78 (16.376)	24.11 (13.481)	39.98 (19.698)	17.26 (10.670)	31.88 (13.603)	14.69 (7.730)	12.82 (5.888)	25.63 (9.878)

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Year	Group number												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1987	12.59 (8.133)	28.97 (11.746)	25.12 (12.593)	40.57 (15.017)	34.85 (14.518)	38.70 (16.119)	24.19 (13.240)	41.34 (16.882)	16.70 (9.896)	32.59 (15.843)	15.17 (8.010)	12.47 (4.923)	24.52 (9.075)
1988	12.69 (6.846)	28.07 (11.812)	26.00 (11.269)	40.61 (15.913)	37.65 (15.711)	40.12 (16.125)	25.16 (13.358)	41.46 (17.362)	15.99 (9.125)	31.69 (14.594)	16.04 (12.833)	12.82 (5.439)	25.28 (8.426)
1989	13.35 (7.952)	30.41 (12.051)	27.25 (12.357)	42.17 (17.507)	37.42 (17.103)	40.83 (16.766)	25.49 (14.915)	43.32 (18.653)	16.95 (10.460)	33.14 (16.653)	15.88 (9.128)	13.13 (5.854)	26.73 (11.294)
1990	13.09 (7.995)	27.91 (10.812)	27.27 (12.515)	42.43 (14.306)	37.88 (16.018)	41.66 (17.034)	25.34 (13.743)	43.44 (17.443)	16.04 (10.465)	34.79 (15.233)	14.69 (8.590)	13.47 (5.850)	25.83 (9.538)
1991	13.38 (8.272)	28.39 (11.452)	27.17 (13.888)	43.11 (17.614)	40.15 (18.803)	40.53 (16.119)	25.25 (14.400)	43.04 (17.153)	16.40 (9.993)	32.79 (16.530)	15.47 (8.783)	12.92 (5.679)	26.53 (9.710)
1992	12.78 (7.867)	30.07 (11.988)	26.76 (11.959)	43.58 (16.511)	39.18 (17.182)	40.47 (16.301)	26.11 (13.718)	43.57 (16.276)	5.00 (2.673)	32.58 (17.680)	16.46 (9.198)	13.61 (5.970)	28.19 (10.834)
1993	14.40 (9.432)	29.30 (12.972)	27.40 (14.427)	42.14 (14.374)	39.27 (18.193)	41.62 (16.155)	25.01 (11.828)	41.34 (15.891)	17.39 (11.182)	34.37 (16.700)	15.28 (7.296)	14.24 (6.536)	27.69 (10.440)

Table A.4: Descriptive statistics of food for subgroups

Table A.5: Descriptive statistics of alcohol & tobacco for subgroups

Year	Group number												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1974	11.40 (16.171)	14.04 (13.413)	20.21 (19.992)	33.00 (27.117)	16.07 (13.863)	22.81 (20.668)	16.82 (21.525)	22.06 (20.124)	7.19 (11.472)	29.51 (26.346)	4.43 (10.522)	3.61 (5.413)	9.22 (11.167)
1975	10.95 (13.097)	14.64 (14.758)	20.19 (18.711)	33.78 (28.394)	15.48 (15.280)	23.92 (21.302)	14.88 (16.339)	20.94 (21.698)	8.52 (11.735)	24.15 (21.226)	5.44 (15.600)	3.99 (6.792)	8.33 (8.997)
1976	13.76 (15.539)	13.80 (14.745)	19.51 (16.242)	33.32 (28.201)	15.25 (13.095)	22.84 (21.673)	12.80 (15.184)	20.40 (18.420)	10.71 (13.849)	21.63 (19.472)	4.47 (11.467)	3.30 (5.303)	9.37 (11.275)
1977	11.27 (12.630)	13.06 (12.538)	19.88 (17.866)	31.49 (24.472)	14.45 (14.398)	20.93 (18.816)	13.77 (16.306)	19.74 (20.185)	9.55 (13.213)	22.06 (19.966)	3.69 (9.658)	3.04 (4.821)	7.87 (10.037)
1979	13.32 (19.778)	14.38 (17.919)	21.11 (18.482)	33.57 (28.568)	15.06 (14.884)	21.76 (21.428)	16.55 (16.511)	21.49 (23.236)	10.61 (14.965)	19.90 (17.937)	3.66 (8.714)	3.50 (5.812)	7.51 (9.715)
1980	12.24 (16.030)	14.86 (23.350)	19.89 (17.363)	29.72 (25.719)	15.00 (14.349)	21.42 (19.588)	17.05 (17.825)	21.69 (21.758)	8.09 (11.127)	22.09 (21.954)	4.02 (10.958)	3.26 (5.036)	8.10 (10.088)
1981	10.26 (12.663)	12.90 (13.921)	19.45 (16.800)	32.96 (29.299)	12.60 (13.715)	19.35 (18.313)	15.95 (19.167)	36.17 (22.157)	8.96 (11.602)	18.77 (17.891)	3.80 (9.885)	3.20 (5.678)	7.41 (9.208)
1982	10.66 (11.548)	12.70 (13.349)	16.29 (14.664)	27.23 (22.062)	12.34 (11.998)	18.66 (17.627)	16.31 (17.831)	18.13 (18.639)	9.76 (10.594)	15.88 (15.656)	3.40 (8.376)	3.79 (5.805)	7.50 (9.488)
1983	11.41 (13.143)	13.83 (14.143)	18.03 (18.353)	31.14 (27.066)	12.42 (12.944)	18.83 (18.116)	13.27 (15.205)	19.52 (20.386)	9.71 (11.171)	18.02 (18.080)	3.15 (7.116)	3.16 (5.138)	9.16 (10.940)
1984	10.14 (11.763)	12.69 (13.468)	18.55 (18.012)	28.12 (22.815)	12.54 (12.088)	18.72 (18.300)	14.36 (14.084)	18.36 (17.388)	8.81 (10.584)	17.45 (17.845)	2.72 (6.061)	3.63 (6.651)	8.44 (10.042)
1985	10.89 (12.952)	12.29 (12.433)	16.55 (15.066)	30.62 (25.213)	12.38 (12.381)	18.08 (17.812)	16.24 (17.614)	21.00 (25.228)	8.85 (12.033)	17.09 (16.102)	3.61 (8.054)	3.51 (5.697)	6.86 (8.644)
1986	10.99 (11.255)	11.40 (12.066)	16.55 (15.400)	29.19 (23.465)	12.01 (11.317)	17.88 (17.325)	14.83 (17.033)	19.11 (18.979)	9.89 (11.215)	16.94 (14.243)	2.70 (5.669)	3.16 (5.204)	7.86 (10.117)

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Year	Group number												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1987	10.90 (12.011)	12.26 (14.879)	17.69 (16.607)	26.90 (23.544)	11.50 (11.056)	16.99 (16.964)	17.54 (21.554)	20.80 (21.085)	9.22 (11.096)	17.67 (18.836)	3.09 (8.322)	3.09 (5.570)	8.11 (10.587)
1988	10.66 (12.135)	11.75 (12.293)	17.52 (25.410)	29.20 (27.367)	12.46 (14.351)	16.91 (16.707)	16.39 (18.622)	20.02 (20.389)	8.12 (10.351)	16.63 (17.525)	2.90 (6.272)	3.31 (5.716)	6.94 (9.045)
1989	9.87 (11.189)	11.86 (15.473)	16.83 (15.110)	29.01 (26.564)	12.75 (13.232)	17.14 (17.051)	19.14 (24.951)	20.51 (23.192)	8.63 (10.366)	15.43 (16.365)	3.11 (6.611)	2.84 (4.934)	7.14 (9.376)
1990	11.06 (12.860)	12.67 (11.526)	17.12 (18.138)	27.71 (23.425)	11.67 (11.758)	15.77 (14.408)	15.21 (14.960)	18.88 (21.830)	8.90 (11.020)	16.47 (15.058)	1.78 (4.100)	2.69 (4.895)	7.34 (10.212)
1991	9.99 (11.085)	12.10 (12.763)	15.89 (15.865)	27.03 (24.557)	11.86 (16.717)	15.05 (14.649)	12.79 (12.857)	18.60 (19.607)	8.28 (11.350)	14.75 (17.427)	2.60 (6.638)	2.53 (5.291)	6.98 (8.967)
1992	9.94 (12.622)	10.95 (15.084)	15.00 (13.652)	25.44 (21.823)	10.85 (11.245)	14.15 (14.354)	12.38 (14.734)	17.20 (16.563)	16.82 (11.637)	14.46 (13.677)	3.57 (8.600)	3.02 (5.292)	6.77 (8.324)
1993	9.56 (10.501)	10.87 (11.588)	15.30 (14.789)	27.87 (21.849)	10.16 (11.272)	14.05 (14.275)	13.89 (13.952)	16.12 (14.427)	9.22 (10.926)	14.97 (16.614)	2.87 (6.986)	3.02 (6.101)	7.39 (9.568)

Table A.5: Descriptive statistics of alcohol & tobacco for subgroups

Table A.6: Descriptive statistics of fuel & light for subgroups

Year	Group number												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1974	5.86 (4.780)	10.69 (8.336)	9.44 (8.437)	11.80 (8.422)	11.29 (8.067)	11.97 (10.088)	9.47 (10.083)	13.87 (19.283)	8.20 (9.051)	12.91 (10.943)	7.38 (5.594)	7.12 (6.846)	9.78 (9.018)
1975	5.64 (4.086)	9.61 (11.017)	8.95 (7.216)	11.69 (11.573)	10.93 (9.878)	11.86 (11.059)	10.34 (13.970)	12.14 (8.833)	6.93 (4.349)	11.01 (9.791)	7.46 (6.729)	6.55 (4.645)	9.90 (13.806)
1976	5.87 (5.455)	9.86 (11.901)	9.00 (6.308)	11.35 (7.902)	10.50 (6.950)	11.26 (8.282)	10.32 (9.823)	12.47 (8.799)	7.73 (6.853)	11.93 (6.885)	7.18 (5.555)	6.05 (4.383)	8.82 (7.091)
1977	6.51 (5.279)	9.78 (7.753)	9.54 (6.443)	12.01 (9.562)	11.47 (7.027)	11.62 (6.285)	9.86 (7.485)	14.68 (11.720)	8.15 (6.576)	11.72 (6.513)	7.99 (6.003)	6.65 (5.249)	10.00 (7.616)
1979	6.37 (4.732)	11.40 (9.476)	9.42 (5.595)	12.14 (7.074)	11.92 (7.030)	12.23 (7.428)	10.94 (7.244)	13.97 (9.724)	7.46 (7.061)	12.97 (8.400)	7.89 (5.917)	7.46 (5.966)	9.87 (7.365)
1980	6.02 (4.430)	9.99 (8.690)	9.00 (7.572)	11.52 (7.948)	10.55 (5.895)	11.45 (6.399)	9.22 (6.579)	13.48 (9.376)	7.57 (5.966)	10.73 (5.372)	7.24 (5.336)	6.40 (5.288)	9.58 (8.967)
1981	6.63 (5.249)	8.74 (5.021)	8.70 (5.135)	11.69 (8.429)	10.94 (7.713)	11.64 (7.288)	10.04 (6.902)	21.09 (20.919)	8.00 (5.743)	11.00 (8.215)	7.33 (5.695)	6.31 (4.683)	9.24 (6.945)
1982	6.29 (4.628)	9.12 (5.958)	8.88 (5.579)	10.96 (6.145)	10.90 (6.206)	11.33 (6.515)	9.92 (6.481)	11.96 (8.833)	7.18 (5.106)	11.28 (6.055)	7.33 (4.868)	6.85 (6.106)	8.92 (6.319)
1983	6.23 (4.277)	10.28 (7.074)	8.94 (4.677)	12.17 (5.766)	11.37 (5.516)	12.07 (6.596)	9.03 (5.632)	13.06 (8.886)	7.11 (4.785)	10.96 (5.577)	7.72 (5.527)	7.07 (5.122)	9.53 (6.333)
1984	6.59 (5.747)	10.04 (6.170)	8.98 (4.789)	11.94 (6.489)	11.54 (7.432)	11.59 (6.268)	9.06 (8.273)	12.29 (10.692)	7.32 (4.993)	11.10 (6.294)	7.52 (4.867)	6.42 (3.930)	9.45 (6.486)
1985	6.24 (4.535)	10.80 (8.141)	9.86 (6.899)	11.99 (5.965)	11.24 (5.748)	11.84 (6.416)	10.36 (7.340)	12.17 (7.438)	7.37 (4.700)	10.96 (5.066)	7.85 (5.395)	7.09 (4.660)	9.73 (7.481)
1986	6.95 (4.898)	10.94 (6.627)	10.17 (9.273)	12.53 (6.639)	10.71 (4.932)	12.22 (6.343)	10.26 (7.794)	13.30 (8.457)	8.07 (5.156)	12.15 (6.733)	7.75 (4.477)	7.28 (4.615)	10.09 (6.307)

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Year	Group number												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1987	7.34 (4.458)	11.41 (7.370)	9.98 (6.735)	13.06 (6.206)	12.53 (7.285)	12.45 (6.945)	10.94 (7.914)	13.46 (8.450)	7.67 (4.869)	12.40 (6.875)	8.05 (5.498)	7.33 (4.649)	9.78 (6.191)
1988	7.03 (4.736)	10.67 (6.530)	9.71 (5.094)	13.47 (8.197)	11.62 (5.868)	12.13 (5.626)	10.78 (11.672)	12.96 (9.245)	7.73 (4.537)	11.41 (6.067)	7.99 (5.200)	7.08 (4.293)	9.66 (6.157)
1989	6.66 (4.252)	10.51 (6.358)	9.62 (7.184)	12.19 (6.489)	11.57 (6.618)	11.63 (6.012)	10.30 (7.500)	13.26 (9.046)	7.51 (4.829)	12.25 (6.854)	7.63 (4.887)	6.96 (4.458)	8.87 (5.462)
1990	6.91 (4.473)	9.99 (7.515)	9.42 (6.506)	11.89 (6.433)	10.86 (5.356)	11.23 (5.292)	9.24 (5.832)	12.51 (7.420)	7.28 (5.426)	11.33 (5.287)	7.20 (4.079)	6.80 (4.263)	9.00 (5.737)
1991	6.73 (4.359)	10.40 (6.642)	9.32 (5.253)	11.62 (5.824)	11.25 (5.462)	11.62 (5.608)	9.73 (6.113)	13.02 (7.747)	7.55 (4.692)	11.82 (6.771)	8.22 (5.330)	7.16 (4.177)	9.57 (6.761)
1992	7.17 (4.610)	10.67 (4.700)	9.79 (6.946)	12.60 (5.673)	12.10 (7.980)	12.30 (5.846)	10.33 (8.213)	13.39 (9.862)	9.04 (11.178)	11.44 (5.694)	8.51 (5.385)	7.44 (4.328)	9.67 (4.990)
1993	7.46 (5.258)	11.05 (6.465)	9.64 (4.792)	12.41 (6.138)	12.70 (7.202)	12.82 (5.943)	10.34 (6.651)	12.87 (7.003)	7.96 (4.499)	11.77 (6.714)	7.86 (4.718)	7.53 (4.599)	10.23 (5.870)

Table A.6: Descriptive statistics of fuel & light for subgroups

Table A.7: Descriptive statistics of services for subgroups

Year	Group number												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1974	10.37 (11.213)	11.92 (12.838)	14.09 (16.453)	18.71 (15.429)	13.23 (15.758)	15.22 (13.609)	13.59 (11.603)	16.69 (17.984)	7.35 (8.483)	13.54 (15.010)	7.07 (8.626)	5.14 (6.070)	8.60 (11.229)
1975	10.06 (16.074)	12.72 (17.410)	13.81 (14.338)	17.43 (15.001)	11.33 (12.375)	15.62 (16.697)	14.47 (14.442)	16.21 (19.014)	9.03 (9.459)	9.74 (9.081)	6.30 (8.952)	6.26 (12.207)	8.04 (9.616)
1976	9.97 (11.930)	12.12 (13.031)	12.86 (11.973)	19.00 (17.055)	11.30 (14.251)	15.31 (14.905)	15.56 (20.661)	18.28 (24.820)	7.67 (8.961)	10.20 (12.199)	6.45 (8.118)	4.68 (4.192)	8.34 (8.078)
1977	9.32 (11.240)	12.21 (11.814)	12.83 (12.333)	18.38 (16.122)	12.61 (14.796)	15.09 (13.469)	18.49 (33.786)	20.08 (26.539)	8.36 (10.290)	9.62 (12.141)	5.99 (6.429)	5.45 (6.299)	8.89 (11.524)
1979	10.53 (12.454)	13.40 (15.888)	15.55 (17.733)	23.62 (25.598)	14.64 (19.661)	17.13 (15.049)	13.79 (17.032)	17.22 (16.500)	8.55 (9.301)	10.78 (11.885)	7.46 (10.984)	5.63 (5.770)	8.90 (10.453)
1980	10.27 (10.399)	13.97 (18.562)	14.91 (14.911)	20.73 (17.608)	12.94 (13.239)	17.99 (16.593)	14.42 (14.193)	18.23 (20.277)	8.39 (10.296)	11.30 (10.392)	6.58 (6.170)	5.60 (6.570)	9.87 (12.633)
1981	12.16 (15.353)	15.57 (26.341)	16.66 (18.463)	22.53 (22.964)	14.79 (16.589)	18.14 (18.839)	15.42 (20.098)	13.65 (10.715)	9.60 (14.475)	11.75 (11.528)	7.51 (11.849)	6.33 (6.438)	9.57 (9.797)
1982	10.81 (15.688)	11.78 (10.666)	15.27 (17.338)	20.97 (25.276)	14.41 (18.101)	17.55 (15.212)	14.32 (13.936)	20.03 (26.444)	7.69 (8.403)	10.60 (13.356)	6.86 (6.089)	6.27 (8.229)	10.04 (12.668)
1983	11.82 (14.377)	12.64 (12.450)	16.07 (16.418)	20.35 (15.282)	15.83 (22.883)	18.57 (18.298)	17.10 (21.793)	17.07 (18.226)	8.07 (9.529)	10.72 (11.065)	7.46 (6.745)	7.14 (8.372)	11.28 (12.831)
1984	11.72 (15.277)	14.61 (18.839)	16.77 (19.873)	21.52 (21.191)	14.62 (19.256)	18.29 (18.824)	13.02 (15.015)	20.07 (22.501)	6.77 (8.100)	10.72 (12.963)	8.05 (10.677)	7.00 (6.312)	10.80 (9.726)
1985	11.96 (13.196)	15.91 (22.230)	16.77 (15.747)	23.77 (22.908)	15.93 (18.826)	19.60 (18.308)	18.09 (23.989)	21.17 (21.787)	7.70 (8.410)	10.05 (9.496)	7.20 (6.112)	8.02 (9.180)	10.73 (11.077)
1986	11.96 (13.081)	17.76 (32.812)	19.35 (22.469)	25.73 (23.258)	16.48 (18.887)	23.96 (23.447)	15.64 (15.426)	21.65 (21.819)	8.64 (12.344)	11.71 (14.484)	7.46 (6.785)	7.40 (7.003)	12.19 (21.284)

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Year	Group number												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1987	14.50 (18.269)	17.37 (21.512)	20.63 (24.336)	27.92 (30.930)	17.81 (19.480)	23.47 (23.617)	19.99 (21.953)	25.41 (32.352)	8.42 (10.003)	12.53 (12.560)	8.84 (8.883)	7.89 (8.728)	11.90 (12.604)
1988	12.99 (14.380)	18.78 (24.056)	21.44 (24.669)	32.49 (57.996)	21.86 (32.954)	27.42 (37.164)	19.61 (27.412)	23.27 (31.372)	7.20 (8.414)	15.29 (23.695)	12.16 (35.629)	8.24 (9.111)	12.74 (13.936)
1989	14.06 (15.694)	15.32 (11.827)	21.52 (24.163)	29.06 (24.710)	19.63 (21.301)	27.36 (32.311)	19.65 (36.650)	24.32 (22.097)	8.79 (11.144)	14.94 (16.986)	8.26 (7.126)	8.22 (9.336)	13.34 (15.269)
1990	15.67 (17.966)	20.06 (19.824)	21.28 (25.050)	28.96 (27.916)	21.65 (36.588)	27.58 (31.976)	19.59 (23.485)	28.36 (33.548)	8.53 (12.335)	17.08 (19.083)	10.33 (11.144)	8.94 (12.413)	13.64 (16.217)
1991	13.81 (17.102)	19.73 (31.289)	20.68 (19.647)	27.21 (23.051)	23.38 (33.538)	27.66 (29.809)	16.19 (15.496)	28.06 (37.375)	8.62 (14.687)	14.34 (20.125)	10.10 (15.545)	8.87 (10.339)	13.58 (17.135)
1992	14.20 (13.880)	18.31 (17.924)	18.86 (19.310)	27.76 (25.331)	20.83 (24.879)	23.76 (27.293)	19.64 (24.947)	25.22 (35.485)	8.19 (4.949)	13.28 (17.188)	9.68 (17.328)	7.92 (7.951)	13.81 (15.465)
1993	13.97 (16.804)	18.64 (17.541)	22.42 (23.430)	28.64 (28.693)	22.77 (32.913)	27.72 (31.272)	16.86 (17.673)	24.37 (31.592)	11.64 (21.702)	17.40 (27.267)	10.20 (10.538)	8.28 (9.656)	14.96 (26.211)

Table A.7: Descriptive statistics of services for subgroups

Table A.8: Descriptive statistics of clothing & footwear for subgroups

Year	Group number												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1974	5.59 (9.781)	6.33 (9.282)	8.43 (11.136)	14.97 (18.508)	8.89 (11.207)	12.94 (14.971)	7.39 (13.262)	14.15 (18.621)	4.77 (8.716)	12.00 (16.765)	3.67 (8.781)	1.78 (4.729)	4.26 (7.682)
1975	5.35 (10.264)	6.04 (11.077)	9.37 (13.417)	14.97 (17.712)	9.01 (11.963)	13.24 (14.999)	7.67 (11.021)	12.03 (14.213)	3.71 (6.399)	9.28 (13.174)	2.76 (5.836)	1.72 (4.149)	3.83 (8.123)
1976	4.48 (8.753)	6.88 (12.949)	7.81 (14.016)	13.41 (18.028)	8.21 (10.682)	12.30 (14.356)	6.11 (10.760)	11.16 (15.373)	2.94 (5.406)	7.36 (9.579)	2.13 (4.433)	1.65 (4.247)	3.86 (7.251)
1977	4.08 (8.967)	5.42 (9.659)	8.62 (11.900)	13.53 (15.648)	8.11 (12.942)	12.34 (14.088)	6.62 (15.020)	14.91 (20.816)	5.51 (14.075)	8.23 (12.514)	2.17 (4.940)	2.02 (5.384)	3.39 (6.471)
1979	5.29 (9.052)	8.83 (14.062)	11.28 (16.505)	18.16 (23.551)	10.82 (13.696)	14.52 (15.862)	7.58 (13.148)	13.32 (17.366)	5.14 (9.807)	9.03 (12.486)	2.95 (5.832)	1.75 (4.086)	4.37 (7.318)
1980	5.92 (11.851)	7.19 (12.264)	11.84 (15.983)	17.94 (22.989)	11.05 (15.031)	15.35 (16.334)	6.03 (8.906)	15.41 (18.469)	5.40 (11.313)	10.62 (17.707)	2.73 (5.777)	2.34 (5.710)	4.93 (8.754)
1981	7.50 (13.602)	7.75 (12.832)	11.83 (16.911)	18.17 (19.990)	9.88 (12.742)	15.08 (17.463)	9.27 (15.637)	19.96 (23.366)	5.04 (8.833)	11.30 (16.454)	3.55 (7.936)	2.14 (4.681)	4.67 (8.502)
1982	5.57 (11.497)	7.79 (15.851)	11.31 (14.704)	17.31 (18.724)	12.59 (17.382)	17.61 (19.999)	9.07 (16.093)	17.03 (21.608)	4.50 (8.307)	10.54 (14.800)	3.00 (6.758)	2.50 (6.099)	6.32 (11.085)
1983	7.13 (13.745)	8.76 (13.719)	11.17 (14.528)	20.24 (24.473)	12.07 (16.209)	16.73 (19.788)	9.59 (15.169)	14.86 (18.830)	4.92 (9.419)	10.41 (14.813)	2.76 (5.742)	2.77 (6.046)	5.46 (9.609)
1984	6.56 (14.158)	8.87 (14.033)	15.63 (24.073)	23.29 (26.606)	13.19 (17.988)	19.61 (23.150)	8.44 (13.929)	19.34 (19.573)	4.78 (15.014)	10.96 (16.771)	3.16 (7.129)	2.86 (6.413)	6.67 (12.034)
1985	7.66 (14.640)	10.84 (18.461)	14.55 (19.901)	23.79 (31.042)	14.79 (18.352)	20.03 (21.672)	8.68 (13.081)	20.41 (25.367)	4.51 (8.669)	10.37 (14.039)	3.63 (8.524)	2.66 (6.000)	6.07 (10.959)
1986	8.58 (13.694)	9.94 (16.709)	16.46 (23.423)	25.62 (29.663)	14.11 (18.232)	21.98 (24.800)	9.89 (17.441)	19.89 (21.925)	5.79 (11.294)	13.18 (20.013)	3.14 (7.211)	3.81 (9.635)	7.19 (14.084)

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Year	Group number												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1987	7.21 (13.744)	10.48 (20.834)	16.85 (21.498)	26.11 (28.404)	15.16 (18.308)	20.88 (23.756)	10.88 (18.742)	24.23 (29.778)	5.45 (9.786)	13.56 (19.685)	4.18 (10.804)	2.74 (6.240)	6.64 (10.914)
1988	8.39 (15.777)	9.49 (13.204)	19.51 (26.966)	27.50 (36.227)	16.34 (20.804)	22.09 (23.321)	12.26 (21.454)	22.27 (25.156)	6.39 (17.048)	12.74 (17.374)	3.91 (10.118)	3.05 (6.956)	6.72 (11.870)
1989	8.12 (14.027)	12.29 (18.621)	18.18 (26.488)	28.81 (32.985)	15.26 (20.175)	22.52 (27.892)	12.92 (24.647)	22.09 (27.592)	6.34 (12.391)	14.48 (20.347)	3.47 (7.638)	3.08 (7.009)	7.36 (13.138)
1990	7.12 (13.361)	10.58 (16.779)	17.45 (27.629)	23.06 (24.452)	13.80 (19.250)	21.12 (23.174)	10.74 (19.660)	21.26 (26.675)	5.11 (11.831)	17.44 (38.683)	3.86 (9.610)	2.49 (5.838)	6.52 (11.611)
1991	9.91 (19.421)	11.62 (16.963)	17.63 (25.303)	24.99 (27.779)	18.29 (24.372)	22.35 (24.662)	11.05 (18.674)	20.24 (24.421)	5.00 (9.771)	14.31 (23.508)	4.79 (9.398)	2.93 (6.491)	7.56 (12.593)
1992	9.22 (15.051)	10.98 (18.149)	16.94 (24.250)	29.14 (35.841)	17.69 (20.861)	22.28 (26.898)	13.56 (23.027)	23.99 (30.334)	11.22 (21.146)	12.35 (15.654)	6.02 (14.488)	3.79 (8.879)	8.06 (12.732)
1993	9.37 (17.710)	11.60 (16.247)	18.75 (30.076)	26.63 (28.478)	18.57 (29.659)	25.26 (32.733)	15.51 (30.529)	20.91 (24.836)	6.59 (13.745)	15.00 (22.945)	4.23 (7.359)	3.35 (8.424)	8.77 (14.165)

Table A.8: Descriptive statistics of clothing & footwear for subgroups

Table A.9: Descriptive statistics of total for subgroups

Year	Group number												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1974	60.02 (31.008)	86.16 (32.425)	104.32 (60.329)	152.53 (55.813)	106.66 (44.479)	132.23 (63.230)	90.85 (56.470)	137.54 (80.623)	57.39 (39.955)	132.01 (78.531)	46.39 (36.318)	35.88 (20.780)	65.84 (30.849)
1975	57.14 (32.241)	86.17 (48.103)	99.71 (47.407)	152.28 (61.063)	99.82 (43.051)	131.68 (58.543)	91.76 (73.453)	122.83 (54.801)	60.61 (41.045)	112.69 (56.606)	45.03 (38.197)	36.10 (21.649)	62.40 (30.735)
1976	58.38 (31.771)	85.10 (39.084)	94.80 (40.360)	144.53 (57.294)	96.30 (37.764)	123.55 (53.824)	85.36 (45.254)	126.79 (66.778)	58.05 (35.017)	106.37 (48.579)	41.40 (28.310)	33.10 (17.570)	63.79 (29.145)
1977	55.60 (28.940)	78.90 (31.400)	95.44 (40.946)	142.11 (49.328)	94.51 (41.865)	119.93 (49.618)	86.55 (64.284)	129.33 (64.374)	59.81 (47.719)	103.59 (48.093)	40.95 (29.562)	33.91 (16.880)	62.47 (28.583)
1979	60.07 (35.671)	91.31 (41.396)	104.50 (48.154)	162.71 (80.052)	105.30 (48.899)	129.28 (56.669)	86.01 (50.377)	125.17 (56.345)	58.52 (38.572)	104.37 (53.662)	42.79 (31.485)	35.14 (16.048)	63.04 (26.661)
1980	59.06 (34.632)	91.11 (52.414)	101.93 (43.220)	149.26 (62.288)	104.97 (46.536)	130.16 (55.078)	85.23 (40.580)	129.05 (60.171)	55.81 (41.474)	109.29 (58.046)	40.82 (29.021)	34.29 (17.000)	64.81 (31.305)
1981	61.65 (33.376)	91.90 (51.854)	103.41 (49.515)	157.30 (64.678)	102.80 (45.463)	127.08 (57.208)	92.09 (63.370)	43.90 (51.615)	59.96 (38.253)	106.24 (52.542)	44.11 (35.251)	35.51 (18.573)	63.32 (27.740)
1982	58.54 (34.773)	81.38 (43.035)	98.87 (42.559)	145.91 (66.892)	103.40 (48.276)	129.58 (60.447)	90.50 (49.789)	128.98 (66.523)	57.51 (31.537)	97.73 (46.559)	40.95 (27.109)	36.54 (19.002)	66.31 (32.107)
1983	61.19 (34.156)	88.34 (41.275)	100.43 (44.729)	152.39 (63.298)	107.43 (57.064)	128.43 (54.796)	86.01 (47.567)	125.79 (61.320)	55.59 (31.406)	97.89 (46.716)	41.52 (24.655)	38.31 (22.253)	69.47 (34.106)
1984	59.98 (39.183)	88.38 (41.616)	109.28 (55.152)	159.20 (70.894)	106.42 (54.761)	133.78 (58.902)	82.37 (41.626)	135.87 (62.344)	52.77 (36.005)	98.09 (50.610)	42.63 (30.063)	38.55 (19.140)	70.63 (31.959)
1985	63.34 (40.730)	95.51 (54.175)	106.21 (49.712)	164.70 (72.473)	111.27 (52.979)	135.87 (63.530)	93.88 (53.544)	141.00 (77.203)	54.64 (32.736)	96.24 (43.660)	42.28 (23.712)	39.90 (20.578)	68.39 (30.985)
1986	63.48 (34.128)	96.69 (62.635)	113.49 (59.311)	171.25 (82.280)	112.82 (57.254)	141.55 (63.546)	91.43 (49.773)	142.09 (74.040)	61.67 (41.331)	104.47 (56.282)	41.46 (25.076)	40.72 (25.210)	74.58 (40.564)

continued on next page

Year	Group number												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1987	66.98 (39.233)	101.64 (63.209)	116.82 (59.541)	173.26 (90.732)	116.09 (50.265)	141.87 (65.823)	104.18 (62.853)	155.08 (79.351)	58.86 (38.347)	109.84 (60.677)	46.50 (31.319)	39.04 (19.745)	73.75 (38.327)
1988	66.30 (39.416)	100.11 (58.118)	122.77 (75.898)	181.49 (104.437)	127.14 (68.707)	147.98 (70.927)	108.78 (72.455)	152.15 (75.303)	56.73 (41.528)	109.14 (59.446)	51.59 (71.632)	40.84 (21.052)	73.76 (34.127)
1989	68.86 (45.096)	102.94 (53.913)	122.23 (63.554)	183.74 (82.305)	124.29 (60.573)	150.18 (74.579)	108.96 (80.411)	159.34 (85.316)	61.83 (47.473)	113.13 (62.508)	46.15 (28.960)	40.89 (21.522)	78.07 (44.306)
1990	71.44 (45.111)	104.17 (54.830)	124.53 (70.168)	172.85 (70.980)	123.97 (69.555)	149.94 (77.720)	105.53 (64.310)	157.18 (84.069)	56.69 (38.394)	121.64 (72.262)	46.08 (36.007)	41.07 (21.825)	76.73 (48.825)
1991	69.04 (43.145)	104.47 (71.777)	117.64 (57.198)	173.42 (76.684)	134.05 (83.728)	148.51 (68.714)	99.21 (64.299)	153.83 (87.305)	55.24 (37.096)	109.72 (68.258)	50.36 (34.631)	40.86 (22.109)	79.77 (43.477)
1992	69.94 (48.152)	103.74 (50.735)	114.43 (57.243)	180.05 (85.584)	130.28 (65.814)	145.95 (69.278)	105.97 (66.669)	155.64 (81.394)	7.90 (15.116)	104.63 (53.092)	54.03 (51.061)	43.75 (25.811)	81.73 (42.987)
1993	71.69 (45.446)	106.46 (54.349)	126.81 (80.203)	181.52 (78.538)	132.79 (80.243)	156.40 (79.507)	103.62 (67.708)	145.91 (76.552)	66.48 (55.297)	116.71 (71.709)	49.25 (28.113)	44.23 (24.684)	86.25 (50.877)

Table A.9: Descriptive statistics of total for subgroups