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What Is in the Shopping Chart of Pensioners?

An Analysis on the Consumption Behavior of Dutch Pensioners and the Implications for the Indexation of Pensions

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An analysis on the consumption behavior of Dutch pensioners and the implications for the indexation of pensions

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Abstract

This paper investigates the consumption behavior of Dutch pensioners and its implications for the indexation of pensions. For this purpose we use data from the CBS Budgetonderzoek and an OLS and 2SLS framework. We present evidence for a drop in consumption of approximately 1.2% every year an individual becomes older starting from the age of 66 to 70 in the Netherlands. Furthermore, we do not find evidence for a tipping point after retirement from which on consumption growth becomes negligibly small. Examining the consumption bundle of pensioners, we notice that the top three expenditure categories are housing, food and transport. Moreover, in the course of life individuals attach more weight to expenditures on utility, care and housing. On the other hand, clothing, leisure and transport become less important. Expenditures on food remain equally important over ages. Continuing, comparing the consumption bundles of pensioners with workers only very small differences are found. In line, a comparison of the inflation rate of the pensioners' consumption bundle with workers', provides us evidence that there are no differences present between the two groups. In conclusion, there is no evidence to deviate from the current indexation scheme, where no distinction is made between pensioners and workers.

JEL codes:
Keywords: pensions, indexation, consumption behavior, CPI.

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1 Introduction

The pension system in the Netherlands is one of the best in the world according to the Mercer Global Pension Index (2013). The Dutch pension system is based on three pillars: the state pension Algemene Ouderdomswet (AOW), the supplementary collective pensions and the private individual products that each individual can arrange for himself. At this top position the Dutch pension system faces a couple of stumbling blocks. Amongst others things, one of the points is the indexation of pensions. The indexation of pensions is done in order to assure individuals the same purchasing power or income post retirement as pre retirement. The approach used in the pension world for the indexation is often based on the Dutch Consumer Price Index (CPI) for the total population. This CPI is derived from the consumption behavior of the whole Dutch population by the Statistics Netherlands (CBS). However, in the literature it is often documented that consumption patterns of pensioners or elderly differ significantly from the whole population. See for instance Börsch-Supan and Stahl (1991), Banks et al. (1998) and Miniaci et al. (2003). On top of that, evidence is presented that individuals experience a drop in consumption around retirement, see for instance, Banks et al. (1998), Bernheim et al. (2001) and Smith (2006). This phenomenon is referred to as the Retirement Consumption Puzzle (RCP). An interesting point of discussion is of course whether the indexation of pensions for pensioners should be different from the workers due to different consumption behaviors. This paper tries to find evidence whether this should happen or whether the current indexation, where no distinction between pensioners and workers is made, is already sufficient.

An analysis of the consumption behavior of pensioners is interesting for numerous reasons. To begin with, it provides quantitative insights on how well-off individuals are during retirement in comparison to when they were working. This insight provides individuals information on whether they have to save more or less for their pensions during their working career in order to experience the same level of consumption. Secondly, the AOW is based on a pay-as-you-go system, this means that it is paid by the workforce in the form of contributions. Approximately 17.9% of an individual's base income (up to a maximum income of approximately €33,000) contributes to the AOW premium. Additional funding of the AOW comes from government public funds. However, this pay-as-you-go system might not be sustainable in the future due to the diminishing working population that has to support the ever increasing population of retired individuals. Thus information on whether pensioners can maintain a sufficient level of consumption could provide the Dutch state a justification to consider lowering the state contribution to pensions. Thirdly, in the actuarial practice it is discussed that after approximately 15 years post retirement consumption growth declines substantially. As a consequence, it is interesting for actuaries to explore the possibility whether indexation could be stopped, reduced or made dependent on age after this point. Of course whether this is legislatively possible remains another question. Nevertheless, our analysis on the consumption behavior of pensioners could provide a confirmation on the existence of such a tipping point in consumption. Finally, an analysis of the consumption bundle of pensioners and a comparison with workers is interesting as well. In case we find evidence for a drop in consumption around retirement or evidence that pensioners have a different consumption bundle than workers, then this could provide insights for the actuarial practice to come up with a modified CPI for pensioners. As a next step, this CPI for pensioners could result into a different indexation of pensions than the current one. Investigating whether the consumption bundle of pensioners is susceptible to a different inflation rate could provide a confirmation for this as well. Since pensioners are responsible for a large part of the liability of a pension fund, a different indexation could result into a significant impact on its liabilities and/or coverage ratio.

In the literature the consumption behavior of pensioners and the elderly is examined extensively, see for instance Börsch-Supan and Stahl (1991) and Soede (2012). It is generally documented that the consumption behavior of pensioners differs significantly from the working individuals. For instance, pensioners spend more on healthcare and less on clothing or leisure in comparison to working individuals. Börsch-Supan and Stahl (1991) also document that absolute food expenditures decreases as individuals retire. However, for both pensioners and workers the share of food constitutes for a quarter of the consumption bundle. Moreover, for pensioners expenditures on housing becomes a more important part of the consumption bundle, whereas the shares of clothing and transport decrease. Soede (2012) provides evidence in the same line for the Netherlands: food remains for both pensioners and workers equally important and contributes to approximately 20% of the consumption bundle. Shares of clothing and transport become a smaller part of the consumption bundle as individuals retire.

Another difference between the consumption of pensioners and workers is that pensioners sometimes experience a drop in consumption around or after retirement. For instance, Hamermesh (1984) report that individuals experience a drop in consumption during retirement. Furthermore, Banks et al. (1998) analyze for the UK the income and expenditure patterns around time of retirement. They report a 2.0% fall in consumption as the household heads retire. Thirdly, Smith (2006) finds using the British Household Panel Survey (BHPS) a significant drop in food expenditures for men retiring involuntary. Evidence on the RCP in the US is mixed: Bernheim et al. (2001) report a decline in total food expenditure between pre and post retirement for the typical US household. On the other hand, Aguiar and Hurst (2005) document that although food expenditures fall, food consumption does not change around retirement. The RCP is also investigated in Italy; Miniaci et al. (2003) present evidence of a one-off drop in consumption at retirement of the household head. All of the above mentioned papers use different data sets and empirical models, however, all present evidence to some extent that the consumption behavior of pensioners are different from the workers, and on op top of that pensioners experience a RCP. The reader should however notice that this paper focuses mainly on the consumption bundles of pensioners instead of investigating the RCP.

The contribution of this paper to the literature is that we analyze the consumption behavior of pensioners in the Netherlands from multiple angles, and at the same instance try to examine what its implications are for the indexation of pensions. The first angle is that whereas in the literature often only consumption of food or non durable goods are analyzed, we will analyze on top of this, amongst others, the consumption of clothing, housing and leisure. In order to investigate the consumption bundle, we will utilize a 2SLS framework. Secondly, in this paper we will examine whether we can find a tipping point after retirement from which on consumption growth becomes negligibly small. Such a finding could contribute to the debate whether the indexation of pensions should be different after a certain age or whether pension benefits should be made dependent on age. Thirdly, not only do we examine the consumption bundles of pensioners and workers, we also investigate what the corresponding inflation rates of the two bundles are. For this purpose we will use OLS models. All of the above will help us to determine whether the consumption behavior of pensioners differ from workers and whether the indexation of pensions should be different from the current one. To sum up, we want to provide answers on the following research questions in this paper.

- Is there a drop in consumption around retirement in the Netherlands?

- How does the consumption bundle of Dutch pensioners look like?
- Is the consumption bundle of pensioners different from workers?
- Is there a tipping point in consumption growth after retirement that provides evidence that pension benefits or indexations could be lowered or made dependent on age?
- Is the consumption bundle of pensioners susceptible to a different inflation rate than workers?
- Are there reasons to deviate from the current procedure for the indexation of pensions?

The structure of the paper is as follows: in the next section we provide a literature review and elaborate on our hypotheses and expected findings. In the subsequent section we explain the indexation procedure in the Dutch pension system. In section 4 we present the data set we used and explain in detail the variables we utilize in our analysis. Furthermore, descriptive statistics along with prima facie insights on the consumption behavior of pensioners are present in this section as well. In the subsequent two sections, sections 5 and 6, we present our empirical models along with the empirical results. In section 6 we elaborate on the implications of our findings for the indexation of pensions as well. The paper concludes with a discussion and a conclusion where we provide answers on our research questions.

2 Literature review

2.1 Consumption behavior of pensioners

An extensive analysis of the consumption bundle of pensioners and a comparison with workers is given by Börsch-Supan and Stahl (1991). The paper extended the life cycle model with a constraint on the physical consumption opportunities of the elderly which imposed a consumption trajectory decreasing in age. The analysis was based on data from the West German Income and Expenditure Survey in 1983. This is a representative cross-section data set of all West-German households with annual gross income below 300,000 Deutsche Mark. For 1983 it provided detailed household characteristics of 43,050 households. In the paper consumption expenditures are examined in ten categories: food, clothing, other consumer durables, housing, energy, health, transportation, travel, leisure and other expenditures. The theoretical model presented in the paper was based on the following consumer's optimization problem:

$$\max \sum_{t=0}^{T-1} \beta_t u(c_t, h_t, a_t)$$

$$\begin{aligned} \text{s.t. } w_{t+1} - w_t &= r w_t + y - c_t \\ w_0 &\text{ given} \\ -w_t &\leq 0 \end{aligned}$$

where

$$\begin{aligned}
\beta_t &\equiv s_t/(1+\rho)^t \\
s_t &= \text{probability of having survived into period } t, \\
\rho &= \text{subjective discount rate}, \\
c_t &= \text{consumption during period } t, \\
h_t &= \text{level of health at time } t, \\
a_t &= \text{age at time } t, \\
w_t &= \text{wealth at the beginning of } t, \\
\bar{w}_0 &= \text{exogenous initial wealth}, \bar{w}_0 > 0, \\
r &= \text{interest rate}, \\
y &= \text{annuity income extending over the pensioner's lifetime.}
\end{aligned}$$

This model is based on two-stage budgeting: in the first stage for all individuals the total consumption is determined and in the second stage this total consumption is allocated to the ten different categories. Moreover, since the utility function depends op a_t, total consumption could differ across ages. Based on this framework the paper investigated the consumption bundle across different age groups. In table 1 we provide these results from Börsch-Supan and Stahl (1991) and notice that the expenditure categories are expressed in shares of total expenditures.

Age	50-54	55-59	60-62	63-65	66-69	70-74	75-79	80+
Food	25.6	25.1	24.9	24.1	24.0	24.9	25.2	23.7
Clothing	8.5	8.0	8.7	8.0	8.8	7.4	7.3	6.8
Durables	9.1	9.2	10.0	9.2	9.4	7.9	10.1	10.0
Housing	17.0	18.0	17.6	19.8	18.8	21.6	19.8	23.0
Energy	7.7	7.9	8.4	8.2	8.7	9.6	8.6	9.8
Health	3.9	4.2	4.5	4.8	5.4	5.7	5.5	6.3
Transport	15.0	13.7	12.7	12.2	10.3	8.7	9.1	5.8
Travel	4.8	5.3	5.2	5.5	5.9	6.0	5.3	5.0
Leisure	7.0	7.5	6.7	7.0	7.4	6.9	7.1	7.5
Other	1.3	1.1	1.3	1.3	1.4	1.2	1.9	2.0

Source: Börsch-Supan and Stahl (1991)

Table 1: Budget shares of West German households 1983

From table 1 we notice that for a 50-54 years old individual, the top three shares for total expenditures are food, transport and housing. For a 63-65 years old the same categories are the most important, however, in terms of shares of total expenditures their importance is different. On the other hand, we do observe that for these two age groups shares of housing and health expenditures on total expenditures increased with respectively 2.8 and 0.9 percentage points. Especially health expenditures seemed to become continuously more important as age goes up. This is in contrast to, for instance, clothing and transport expenditures. Furthermore, the budget shares of food seem to be equally important in the course of life: they contribute to a quarter of the consumption bundle for all age groups. In conclusion, from Börsch-Supan and Stahl (1991) we can conclude that the consumption bundle differed across ages in West-Germany.

Soede (2012) investigated consumption and income patterns over ages for the Netherlands. For the analysis with respect to income, data from the Inkomenspanelonderzoek 1990-2008 was used.

This data set provided information of 90,000 households. The paper reported using their descriptive statistics that individuals in the age group 55-64 experiences a median income increase per year of 0.67% ($p < 0.05$), whereas for the 35-44 group this was 1.90% ($p < 0.05$) per year. Secondly, for the analysis on consumption behavior the paper used data from the CBS Budgetonderzoek 1980-2004 and an Almost Ideal Demand system framework. In table 2 we provide the results with respect to the consumption bundles from Soede (2012).

	1980-1982				2003-2004			
Age	35-54	55-64	65-74	75+	35-54	55-64	65-74	75+
Total expenditures (in €)	34,800	28,100	20,500	16,000	36,300	31,100	23,100	20,000
Rent value (in % of TE)	16	17	20	24	19	21	27	31
Utility	7	8	9	12	6	6	7	8
Insurance	2	2	2	3	3	4	4	4
Food	18	18	19	20	12	12	13	12
Clothing	9	9	8	6	7	6	5	5
House	9	10	9	9	8	8	8	7
Transport	11	10	8	3	13	12	9	6
Communication	1	2	2	2	3	3	3	3
Leisure	15	13	12	10	16	14	11	8
Alcohol/tobacco	3	3	3	3	3	3	2	2
Restaurant	3	3	2	1	4	4	3	3
Other	5	4	5	6	6	5	6	9
Other health expenses	1	1	1	1	1	2	2	2

Source: Soede (2012)

Table 2: Budget shares of Dutch households 1980-2004

For the 1980-1982 time period the paper documented that individuals in the age group 35-54 have an average total expenditures equal to €34,800. The four most important categories of this consumption bundle were the following: 16.0% was spent on rent value, 18.0% on food, 15.0% on leisure and 11.0% on transport expenditures. Notice however that in the rent value, imputed rent for house owners is not included. Furthermore, as age moved towards retirement, it was observed that the shares of expenditures on rent value and utility increased, while the shares of clothing, transport and leisure decreased. To illustrate, an individual in the age group 65-75 spent respectively 3.0 and 1.0 percentage points more on rent value and utility in comparison to a 55-64 years old. At the same time, he spent 2.0 percentage points less on transport expenditures. Comparing the 1980-1982 time period with the 2003-2004 one, provided some interesting insights. The total expenditures increased with approximately €3,000 for all ages. Moreover, the shares of expenditures on rent value increased with roughly 4.0 percentage points for all age groups when comparing 1980-1982 to 2003-2004. A similar, but smaller, increase was present for the share of transport expenditures. On the other hand, the shares of food and utility expenditures decreased with roughly 6.0 and 2.0 percentage points for the respective categories. From Soede (2012) it can be concluded that consumption bundles differed over ages and time periods. The paper ended with a discussion on the current pensions indexation scheme.

2.2 Retirement consumption puzzle

Another important evidence that the consumption behavior of pensioners differs from the workers is the RCP. One should however, notice that we will not elaborate too much on this topic since the main aim of this paper is the consumption bundle of pensioners, and not the RCP. Nonetheless,

we will provide a brief review of this topic. In order to investigate the RCP, in the literature often the theoretical models are based on Blundell and Macurdy (1999). In this framework consumers are assumed to choose consumption according to the value function given by

$$V(A_t, t) = \max\{U(C_t, -H_t, \boldsymbol{X}_t) + \delta \mathrm{E}[V(A_{t+1}, t+1)]\},$$

subject to the following budget constraint

$$A_{t+1} = (1 + r_{t+1})(A_t + W_t H_t - C_t),$$

where A_t is net wealth at the beginning of period t, C_t is consumption, H_t is the number of hours worked, $\boldsymbol{X}_t$ is a vector of demographics, δ is the consumer's discount rate, r_{t+1} is the interest rate and W_t is the wage rate. Taking the first order condition of this optimization problem implies a so-called Euler equation. This Euler equation says that after discounting the marginal utility of consumption it behaves like a Random Walk. In the paper of Banks et al. (1998) the models are a log-linearized version of this Euler equation. They tried to address whether households saved enough for their retirement. The data used is from the Family Expenditure Survey (FES), which is an annual cross section survey of approximately 7,000 British households that collects detailed information on household characteristics, income and expenditures. Since this data set is not a panel data set, a "pseudo-panel" is created in order to link the data over time and enable examination of dynamic relationships. The paper estimated consumption growth by the following equation using age of the household head as an indicator for retirement (in the UK the retirement age was in 1998 65 and 60 years, respectively for men and women)

$$\begin{aligned}\Delta \ln C_{it} = \beta_0 &+ \beta_1 \Delta \textit{Multiple adults}_{it} + \beta_2 \Delta \ln a_{it} - \beta_3 \Delta \textit{Head out of labor market}_{it} \\ &+ \beta_4 \Delta \textit{Head unemployed}_{it} + \varepsilon_{it},\end{aligned}$$

where C_{it} is consumption, a_t is the survival probability and $\mathrm{E}_{t-1}(\varepsilon_{it}) = 0$. This is a log-linearized version of an Euler equation. Banks et al. (1998) found a fall in consumption as the household heads retire. To be more precise, the anticipated fall in consumption growth is around 2.0% and actual consumption growth at retirement falls by as much as 3.0%. The paper concluded with other explanations within the life cycle model that could explain the remaining dip in consumption growth. One of them is that early (unexpected) retirement could be associated with a reduced income until the full pension age. On the whole, the paper reported a drop in consumption around retirement that cannot be explained by the life cycle hypothesis.

We will use insights from the first two papers for our analysis. The paper of Börsch-Supan and Stahl (1991) provided us an initial glance on the consumption bundle of pensioners and the difference with workers. We will make similar expenditure categories to compare our results with the ones from Börsch-Supan and Stahl (1991). Moreover, Soede (2012) used the same data set as we do, on top of that they relate their findings to the indexation of pensions. This is interesting for our analysis, since it provides us ideas how to transform our models to the implications for the indexation of pensions. Our models are to some extent in line with those from Soede (2012) as well.

2.3 Our hypotheses and expected findings

The primary hypothesis of this paper is that the consumption behavior of Dutch pensioners is only slightly different from workers. However, whether this difference is large enough to perform

a different indexation for pensioners remains a question that we can only answer later on. Furthermore, we do not expect to observe a substantial drop in consumption around retirement or a major change in the consumption bundle. Instead we expect a smooth decline and small changes in the consumption bundles. This statement could be supported by several explanations and all of them are based on the idea that the Dutch have a proper foresight of their expected pension payments, and thus the consumption they can afford in the future. To begin with, a part of the pension, for some individuals a large part, in the Netherlands is provided by the state; the AOW. As a consequence, pensioners have already certainty to some extent about their post retirement pension payments. More details about the Dutch AOW pension can be found in Guardiancich (2010) and Reichert (2010). Secondly, unemployment rates are low in the Netherlands, see Nickell and Van Ours (2000). Thus most pensioners have built up a collective pension during their working career and have a good indication on the magnitude of this pension. Thirdly, due to the extensive social security system in the Netherlands, for most individuals timing of retirement could be uncertain, however the financial consequences are not. This is due to the fact that most pension funds have a regulation that in case the participant experiences a health shock that results in, for instance disability, then the remaining years of pension build-up until retirement is funded by the pension fund itself. The Dutch disability pension is explained in more detail in OECD (2007). Finally, for the current generation pensioners most pension funds try to provide their participants around 70% of the last earned gross yearly salary as pension. This is especially the case in our sample since it ranges from 1978-2004 where no major changes in pension fiscal legislation have been made. Hence, a large part of our Dutch population does not experience a large drop in income post retirement. As a consequence of these explanations, we expect that Dutch pensioners do not have to reduce or change their consumption substantially around retirement.

The expected findings of our paper are to begin with, that we will encounter only a small drop in consumption around retirement. Furthermore, we expect to find evidence that around retirement individuals attach more weight to consumption of food, utility, house or healthcare and less on clothing, leisure and transport. Hence, we expect to find a slightly different consumption bundle for pensioners in comparison to workers. Fourthly, we anticipate that around the age of approximately 75 years, individuals will have a tipping point from which their consumption growth will become negligibly small. Finally, we also expect that the inflation rate of the consumption bundle of pensioners will be slightly higher than workers. This is because we anticipate that the major expenditures categories of pensioners are more susceptible to inflation in comparison to workers. From our point of view, these two findings could provide reasons to explore the possibilities of decreasing or increasing the indexation percentage of pensioners or make it dependent on age. On the other hand, in case the differences are very small, then the current indexation system might already be sufficient.

3 Indexation in the Dutch pension system

Since one of our research questions is what the implications of our analysis are for the indexation of pensions, it is important to provide an overview of the current procedure for the indexation of pensions. An extensive description on the Dutch pension legislation and indexation of pensions can be found in Alsma et al. (2013). The indexation of pension comes in two forms: indexation based on income inflation or price inflation. In the first form the aim is to provide pensioners the same level of income, whereas in the other form the aim is to provide the pensioners with the same level of consumption. However, pension funds are not legislatively obliged to perform an indexa-

tion of the pensions. To be more precise, pension funds can choose from four approaches for their indexation. The first one is not to perform any indexation of pensions at all. Secondly, conditional indexation can be executed by pension funds, and in this form often the indexation percentage is linked to the amount of excess interest and to a lesser degree the available pension premium. Thirdly, unconditional indexation of pensions is possible too. In this approach the indexation is related to an external measures like price/income inflation. With this approach pension funds perform an indexation of the pensions every single year. However, because the option of unconditional indexation leads to an increase of the pension provisions of the pension fund with more than 30%, most pension funds apply the conditional form of indexation. Finally, a combination of conditional and unconditional indexation also belongs to one of the possibilities. The reader should notice that in the current indexation scheme there is no distinction present between pensioners and workers.

Although pension funds can choose which approach they choose, the Dutch politics is becoming more and more involved in the pension indexation debate. In 2010 former minister Donner asked three commissions to investigate the Dutch pension system and its future. The commission Don was responsible to investigate the coverage ratios of Dutch pension funds, the commission Goudswaard examined whether the current system was future proof and the third commission Frijns inspected the investment policies of pensions funds. With respect to the indexation of pensions Goudswaard et al. (2010) and Frijns et al. (2010) state the following: "Een nominaal pensioen is geen pensioen". Translated they state that a pension that has not been indexed cannot be seen as an actual pension. Nevertheless, due to the financial crisis many pension funds were not able to perform any indexation of the pensions at all for the past couple of years. With our paper we try to investigate which individuals need the indexation of pension the most: the workers or the pensioners? As mentioned, we investigate how the consumption behavior of pensioners relate to the indexation of pensions. In case we find evidence that the substantial part of the consumption of pensioners is sensitive to price inflation, then this could provide insights that pensions must be indexed with a higher percentage. On the other hand, in case their consumption behavior is mostly insensitive to price inflation, then indexation could be perhaps ceased. The same holds in case we find evidence that after a certain age post retirement consumption growth becomes negligible small: this provides insights on whether after this age indexation could be ceased, reduced or made dependent on age.

4 Data

In this paper we use data from the CBS Budgetonderzoek 1978-2004 (except 2001 and 2002) provided by the Data Archiving and Networked Services (DANS). The CBS Budgetonderzoek is a survey that is executed yearly among a population of approximately 2,000 Dutch households from 1978 to 2004. It is a diary based household survey that takes a random sample from all Dutch households and collects for one calender year information on their expenditures (notice that we disorderly use the terms consumption and expenditures in the remainder of the paper). Apart from expenditures, detailed information on household characteristics, education and income is collected as well. One should notice that from 1978 to 2000, individual's financial information, like income and expenditures, is expressed in terms of Dutch Guilders. For these years we convert the financial information into Euros using the official fixed exchange rate from the De Nederlandsche Bank (DNB), where 1 Euro $= 2.20371$ Dutch Guilders. Furthermore, for our analysis we restrict ourselves to only 21 years or older individuals and delete all missing values. Using this

approach we lose less than 4.1% of our data. Another important remark is that the initial data is not representative for the average Dutch household. However, by using sample weights we are able to make our data set representative for the average Dutch household. For the remainder of this paper we take these sample weights into account. Furthermore, our data set does not have a longitudinal format. Although individuals were asked to participate for subsequent years in the surveys, it is not possible to determine which individuals participated multiple years from the raw data set. Therefore, it is not possible to examine the dynamic relationships over time. On the whole, we are left with a data set of 30,589 head of households that provide 54,280 observations.

4.1 The questionnaire

The questionnaire consists of two parts: the first part collects information on the household characteristics and the second part information on expenditures. In the first part the individuals are asked to provide details in a questionnaire on their age, gender, employment, household composition, pension etc. The second part is the more extensive part of the survey. In order to investigate the expenditures in a detailed way, individuals are provided three diaries: Huishoudboekje I, Huishoudboekje II and Vakantieboekje. In the Huishoudboekje I individuals have to write down all their expenditures above €11.34-€15.88 (25-35 Dutch Guilders), depending of the survey year, for approximately one year. Secondly, in Huishoudboekje II individuals have to write down all their expenditures, independent from the amount. They have to do this for 10-15 days depending on the survey year. Furthermore, in the Vakantieboekje individuals have to write down their expenditures during the holidays, like for instance travel costs, accommodation, meals in restaurants and all other expenditures above €22.69 (45 Dutch Guilders). One should notice that in the course of time some questions of the questionnaires have changed. For readers interested in these details of the questionnaires, we recommend the paper of Soede (2012).

4.2 Consumption

4.2.1 Categories

In our data set detailed information is available on the consumption of households. We choose to focus on eight expenditure variables, namely expenditures on food, clothing, utility, care, leisure, transport, house and other expenditures. *Food* is a very broad measure and covers everything between bread and fruit to chocolate. The variable *clothing* includes both the expenditures on clothing and footwear. Moreover, *utility* represents the expenditures on heating and lighting, and *care* the expenditures on household services and healthcare expenses (except for health insurance). Furthermore, *leisure* expresses the expenditures on development (education or books), sports, holidays and other leisure expenditures. In the variable *transport* expenditures on public transport, fuel and bicycles are included. Expenditures on the imputed rent for house owners, rent for renters, furniture and household appliances are included in the variable *house*. Notice, however, that expenditures on mortgage are not included here due to the fact that this was not observable for all years. Moreover, our definition of housing expenditures differs from Soede (2012) in the sense that they do not take into account imputed rent in the rent value/housing expenditures. All remaining expenditures are assigned to *other* expenditures. Finally, we construct a variable *total* expenditures which is the sum of all the separate expenditure categories.

4.2.2 CPI time series

Since we are comparing expenditures across different years, we adjust the expenditures with the CPI per expenditure group. Using this approach the expenditures on, for instance, clothing in 1990 are comparable with those from 2000. These CPIs are obtained from two time series from the CBS and all expenditures are computed by taking 2004 as the base year. These CPI time series can be found in figure 1.

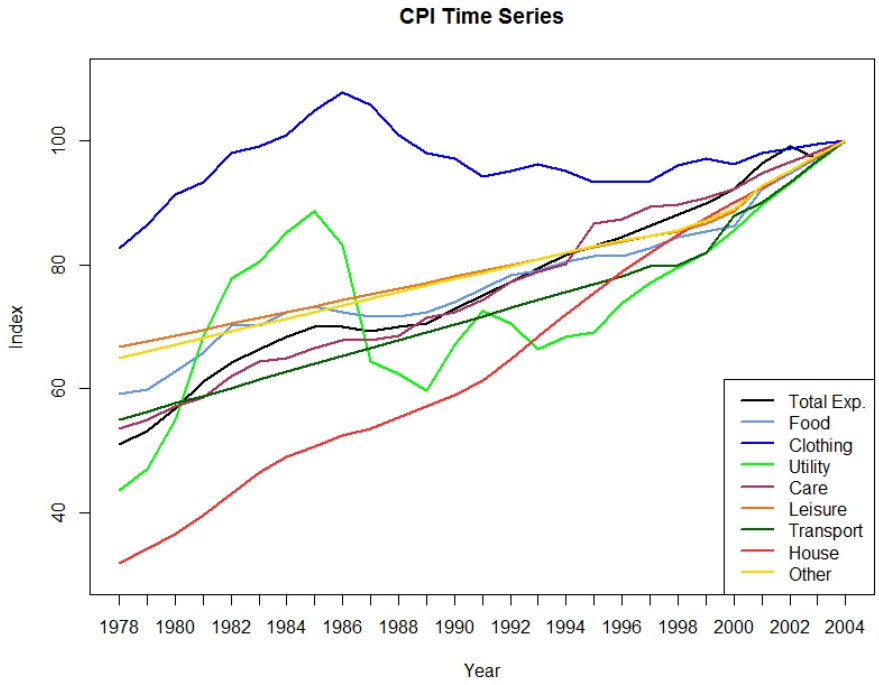

Figure 1: CPIs expenditure categories

From eyeball inspection of figure 1, we notice that especially the costs of housing increased enormously: in 2004 this category became 3.1 times more expensive in comparison to 1978. Furthermore, the costs on utility expenditures goes up and down throughout the course of time. We see that it increases steeply from 1978 to 1985, went down from that point and moves in a upward trending fashion to 2004. Moreover, we see a somewhat similar bell shape for the clothing category. In the eighties it was quite expensive and starting from 1990 the prices remain relatively stable. The remaining expenditure categories become more expensive in an up warding trending pattern towards 2004.

4.3 Covariates of interest

To begin with, we have the variable *income* which represents the net household income. Notice that in the original data set this variable was censored from above at 125,000 Dutch Guilders. We tackle this issue by taking the sum of all separate income components which was also present in the data set, and use this as a measure for the income. Moreover, for the years 1978 to 2000 health insurance is subtracted from income and mortgage interest is not. However, for 2003 and 2004 both components are subtracted from income. Since for all years no information on the mortgage rent was present as a separate component, we are not able to subtract mortgage interest manually

from income. As a result of this, the income levels of 2003 and 2004 are smaller in comparison to the other years. Furthermore, we modify the income of each year by using the CPI from the CBS and taking 2004 as the base year. Secondly, we have the variables *household size* and *marital status*. The latter variable is a dummy variable which is equal to 1 in case someone is married or has been married and 0 otherwise. Continuing, *education* is a variable that is equal to 0 for primary education, 1 for secondary education, 2 for HBO (higher vocational) and 3 for WO (university). The variable *male* is a dummy variable that is equal to 1 in case the individual is a male and 0 if female. *Age* is also included in our data as the age of the individual on the date of the survey. For our theoretical model, we transform this variable in line with Harrell (2001) into five age groups that contain a linear spline of the primary variable age. To be precise, the first age group is for the 55-60 years old, the second one for 61-65, the third one for the 66-70, the fourth one for 71-75 and the final group is for those older than 75. Furthermore, we have the variable *interview years* which tells us in which year the survey was taken. From the latter two variables we compute the variable *birth year* which is the interview year minus the age. As a next step, we transform this variable into five birth year groups containing a linear spline as we have done for age. The groups are the following: 1890-1902, 1903-1914, 1915-1926, 1927-1938 and 1939-1950. Moreover, we have *employment*, this variable is equal to 0 for the unemployed, 1 for employed individuals, 2 for students and housewives and 3 for pensioners. Continuing, we have the variable *home owners*, which is a dummy equal to 1 for home owners and 0 for renters. Finally, based on our data set we compute for each individuals the shares of the expenditure categories of the total expenditures. As a next step, we follow the approach of Gardner and Lluberas (2013) and compute for each household the inflation rate of the consumption bundle. We define the inflation rate for household i at time t as

$$IR_{it} = \sum_{j=1}^{J} w_{it}^{j} \Delta \ln(p_t^j),$$

where w_{it}^{j} is the share of expenditure of household $i = 1, ..., N$ in good $j = 1, ..., 8$ at time $t = 1978, ..., 2004$ and $\Delta \ln(p_t^j)$ is the year-on-year inflation rate of good j at time t. We compute IR_{it} for each individual and refer to this variable as the *inflation rate*. This variables provides us information on how the consumption bundles of individuals are influenced by inflation.

4.4 Descriptive statistics and prima facie evidence

In table 3 we present the descriptive statistics of our data. Since consumption can differ across interview years (henceforth time periods), i.e. pensioners in the eighties have different characteristics and needs than pensioners in the zeros, we distinguish between four time periods in table 3. Moreover, in order to get more insights on the consumption over age, we divide each time period into six age groups. The table should be read as follows: the variables income, household size and total expenditures are expressed in terms of means. The general dummy variables are given in percentages, for instance percentage male individuals or employed. Furthermore, the other expenditure variables are expressed as shares of total expenditures. We compute first for each household these corresponding shares, and then take the mean for each age and time period.

Let us first analyze the oldest time period. The 61-65 years old individuals in this group have on average an income equal to €25,664.60, their household consists of 2 persons, 91.1% of them are married and their average household inflation rate is 3.9%. Furthermore, their average total expenditures for one year is €22,368.90, from which 41.1% is spent on house, 19.1% on food, 10.0% on leisure and 10.5% on transport. Expenditures on clothing, care and other expenditures contribute

	1978-1986						1987-1995					
Age	21-55	56-60	61-65	66-70	71-75	75+	21-55	56-60	61-65	66-70	71-75	75+
General variables												
Equivalized income (in €)	31656.6	31497.3	25664.6	23331.7	20061.2	18725.6	31749.2	30265.0	26280.7	21562.7	18951.4	16869.0
HH size	3.2	2.4	2.0	1.8	1.6	1.5	2.8	2.1	1.9	1.6	1.5	1.4
Married (in %)	82.2	91.2	91.1	91.0	92.5	92.8	71.4	88.6	90.9	90.9	91.1	93.4
HBO or WO	17.6	10.7	11.2	11.9	12.3	11.0	28.1	21.6	17.0	17.5	13.5	10.4
Male	86.5	75.2	69.9	69.3	61.0	59.6	80.1	77.9	71.9	67.0	59.4	50.2
Employed	82.5	45.6	19.0	3.9	2.1	1.0	82.2	41.0	10.0	4.2	2.3	0.1
Home owners	46.7	41.9	37.9	33.2	29.8	22.7	49.7	46.8	43.9	34.9	26.8	23.8
HH inflation rate	3.7	3.9	3.9	4.0	4.2	4.1	1.9	1.9	1.8	1.9	2.0	1.9
Spending variables												
Total spending (in €)	26961.7	26068.7	22383.8	20164.8	16638.0	14831.1	26704.0	26456.1	22939.1	19809.0	17344.6	15017.0
Food (in % of TS)	20.3	19.7	19.1	19.6	19.5	19.5	19.2	18.3	18.5	18.8	18.2	18.7
Clothing	5.3	5.3	4.9	4.8	4.2	3.7	5.4	5.1	5.0	4.4	4.4	4.1
Utility	5.8	6.3	6.9	7.4	8.3	9.1	5.1	5.6	6.0	6.5	7.4	8.6
Care	3.1	3.3	3.6	4.1	4.9	5.7	3.4	3.6	3.6	4.3	5.2	6.1
Leisure	12.3	10.8	10.0	9.6	8.5	8.3	14.0	11.7	11.4	9.9	8.9	8.3
Transport	12.4	11.8	10.5	9.7	7.7	6.1	12.8	12.3	11.5	10.2	9.1	7.3
House	36.9	39.0	41.1	41.4	43.8	44.3	35.4	38.7	39.8	41.2	42.0	42.9
Other	4.0	3.8	3.7	3.4	3.1	3.2	4.7	4.6	4.2	4.7	4.8	4.1
	1996-2000						2003-2004					
Age	21-55	56-60	61-65	66-70	71-75	75+	21-55	56-60	61-65	66-70	71-75	75+
General variables												
Equivalized income (in €)	33451.2	31045.1	25229.4	23132.2	19712.8	18733.4	30833.0	29721.4	26729.3	21501.9	21474.3	22105.0
HH size	2.6	1.9	1.8	1.6	1.4	1.4	2.6	1.9	1.8	1.5	1.4	1.3
Married (in %)	64.9	91.8	91.8	93.9	94.6	94.7	63.5	92.0	93.7	93.8	93.7	87.1
HBO or WO	31.1	26.4	19.8	15.3	15.8	13.9	36.2	29.3	25.2	14.0	14.3	22.0
Male	74.1	72.4	71.2	58.7	48.6	51.0	72.1	78.7	78.7	58.2	47.3	49.5
Employed	84.4	46.4	13.9	6.8	1.8	1.5	85.1	64.2	21.9	5.0	3.2	4.9
Home owners	53.3	58.6	51.5	45.2	31.0	30.8	56.9	62.7	50.7	33.4	27.1	19.3
HH inflation rate	2.4	2.4	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Spending variables												
Total spending (in €)	28433.3	28821.9	24675.2	22022.5	18518.5	16808.2	30637.9	29390.2	26285.5	20569.3	19800.1	17197.8
Food (in % of TS)	17.6	17.0	18.0	17.5	18.0	16.9	17.4	16.8	18.5	17.6	17.4	16.8
Clothing	6.0	5.6	5.3	5.1	4.8	4.1	6.7	5.8	5.1	4.9	5.3	4.4
Utility	4.7	5.2	5.3	6.0	6.5	7.1	5.0	5.5	5.7	6.2	6.3	7.1
Care	3.3	3.2	3.1	3.5	4.7	5.4	3.8	3.5	3.7	4.1	5.4	5.8
Leisure	15.5	12.6	12.0	11.4	9.0	8.5	15.5	14.4	12.0	11.2	9.1	9.1
Transport	15.6	14.7	13.5	12.3	10.4	9.3	16.7	16.1	13.8	11.6	11.2	7.9
House	32.0	36.2	37.2	38.3	40.7	42.7	28.7	31.5	35.0	38.7	39.5	40.6
Other	5.2	5.4	5.5	5.8	5.8	6.0	6.0	6.4	6.2	5.8	5.8	8.4

Table 3: Descriptive statistics by time periods and ages groups

for the smallest shares of total expenditures with respectively 4.9%, 3.6% and 3.7%. Comparing the different age groups in this time period we find some interesting trends. Firstly, we see that income decreases as individuals become older. Secondly, the household size, percentage males and house owners become smaller over ages as well. Thirdly, the inflation rate increases over ages with approximately 0.1 percentage point. With respect to the consumption bundle, we find that the budget share of food remains relatively stable across ages: it is approximately 19.5% of the total expenditures. Moreover, shares of clothing, leisure and transport become less important as individuals become older. On the other hand, shares of utility, care and house expenditures become more important over ages.

For the comparison of the consumption bundles across time periods and ages, we use simultaneously table 3 and figure 2 and find some remarkable insights. Let us first analyze the graphs of the oldest time period. From the first graph we observe that total expenditures have an inverted U shaped relationship with age, however no substantial drop around retirement is visible. We notice that total expenditures becomes relatively stable after 75 years: the growth in total expenditure is there negligibly small. Expenditures on house and food have a much flatter inverted U

shaped relationship with age. Thirdly, expenditures on leisure and transport also increase toward midlife and decrease towards retirement. Comparing this graph to the second one provides some interesting insights. To begin with, we saw in the left graph that starting from midlife absolute expenditures on house becomes smaller as age goes up. However, relating this to the left graph we can see that the share on house expenditures becomes larger. Hence, although absolute house expenditures decrease over age, they do become more important in the consumption bundle of individuals. For food, we observe a different trend: absolute expenditures decreases in an inverted U shaped pattern over age, however it contributes steadily for 20.0% of the total expenditures throughout the course of life. Thirdly, the contribution of clothing, leisure, transport and other expenditures to the total expenditures decreases as age goes up. This in contrast to utility and care, these two categories become more important for the consumption bundle starting from the retirement age.

Comparing the graphs over the four different time periods we observe some differences. To start with, we notice that the absolute total expenditures increase for the newer time periods, however, the inverted U shaped relationship with age is still present. Expenditures on house and food remains comparable across the time periods, whereas leisure and transport expenditures increase. Focusing on the consumption bundle, we roughly see the same age trends for all spending categories. However, the share of house and food becomes a bit smaller towards the newer time periods. Nonetheless, the other part of the consumption bundle is roughly the same across the different time periods.

Since one of our research questions is whether the consumption bundle of pensioners is different from workers, it is interesting to compare directly the consumption bundles of these two groups. We present in table 4 for pensioners and workers the shares of expenditures for the four different time periods. Notice that for the remainder of this paper we define pensioners as those who are 55 years or older and indicate their employment status as pensioner. Moreover, Δ represents the difference between the shares of pensioners and workers in terms of percentage points.

From investigating the first time period, we notice differences between the consumption bundles of pensioners and workers. Pensioners spend more on utility, care and housing and less on clothing, leisure and transport in comparison to workers. Shares of food expenditures seems to be approximately the same for both types. Comparing the four different time periods, one can conclude that the consumption bundles differs and becomes even more different over years. We notice that pensioners continue to have house expenditures as the most important category and on top of that the difference with workers increases as well. This could be caused by the increasing price of house rent over years. The difference in shares of food remains throughout the time periods relatively stable, whereas the difference is shares of utility and care become smaller. In contrast, the difference between pensioners and workers in shares of leisure and transport increase towards the newer time periods.

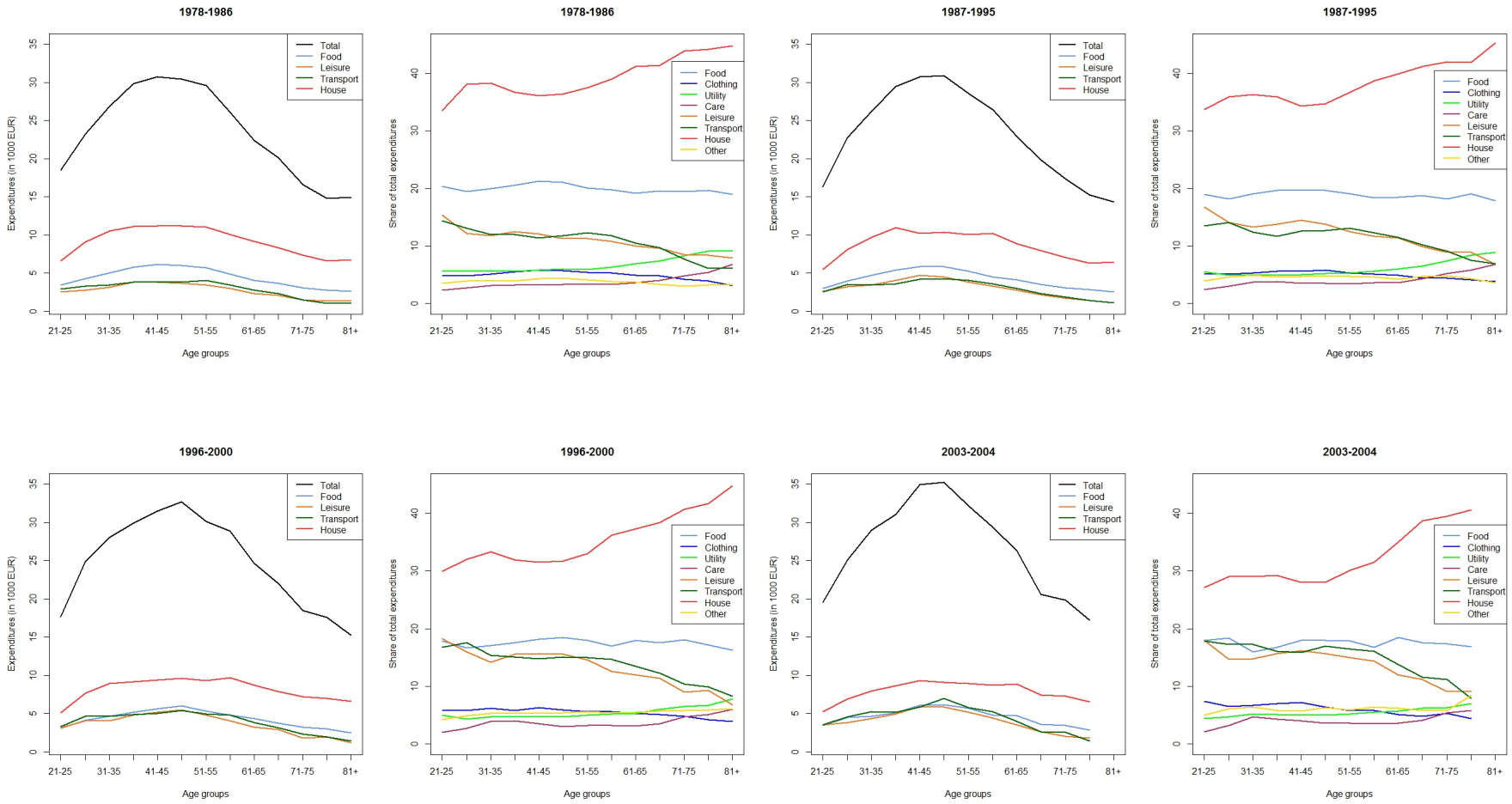

Figure 2: Expenditures and shares of expenditures across time periods/ages

	1978-1986			1987-1995		
	Pensioners	Workers	Δ	Pensioners	Workers	Δ
Food	19.8	20.3	-0.5	18.9	19.2	-0.3
Clothing	4.3	5.3	-1.0	4.5	5.4	-0.9
Utility	7.4	5.8	1.6	6.5	5.1	1.4
Care	4.6	3.1	1.5	4.6	3.4	1.2
Leisure	9.6	12.3	-2.7	10.3	14.0	-3.7
Transport	9.4	12.4	-3.0	10.5	12.8	-2.3
House	41.5	36.9	4.6	40.2	35.5	4.7
Other	3.4	4.0	-0.6	4.4	4.7	-0.3
	1996-2000			2003-2004		
	Pensioners	Workers	Δ	Pensioners	Workers	Δ
Food	17.9	17.6	0.3	17.5	17.5	0.0
Clothing	4.9	6.0	-1.1	5.1	6.7	-1.6
Utility	5.8	4.7	1.1	6.0	5.1	0.9
Care	4.2	3.3	0.9	4.7	3.8	0.9
Leisure	11.0	15.5	-4.5	10.9	15.5	-4.6
Transport	12.4	15.5	-3.1	12.2	16.7	-4.5
House	38.1	32.1	6.0	37.3	28.8	8.5
Other	5.7	5.2	0.5	6.3	6.0	0.3

Table 4: Consumption bundles of pensioners vs. workers

One of our research questions is whether the pensioners' consumption bundle experience a different inflation rate than workers. In figure 3 we have the inflation rates of pensioners and workers by year. On top of that, we include the inflation rates of the CBS. This figure shows how much more or less expensive the consumption bundle has become relative to the previous year. The reader should notice that we leave out the CBS inflation rates starting from 2001. We do this to avoid wrong comparisons: our data set does not include observations for the years 2001 and 2002. Investigating figure 3, we notice that all three curves have to a large extent the shame shape. To me more precise, we see a similar behavior of both pensioner and worker curves, however, the curve for pensioners seems to be positioned slightly above the workers. This implies that pensioners experience slightly higher inflation rates than workers. Examining this in more detail provides us that pensioners experience on average for the whole period 2.9% inflation, whereas for workers this is equal to 2.7%. The finding that pensioners have higher inflation rates than workers is in line with Gardner and Lluberas (2013): they report 3.7% for pensioners and 3.6% for workers. One should notice however, that the difference is very small. The slightly higher inflation rate might be caused by the fact that pensioners attach more weight to expenditure categories in their consumption bundle that are subject to higher inflation rates.

Concluding our descriptive statistics, we find an inverted U shaped relationship between total expenditures and age. Secondly, we notice that the consumption bundle of pensioners differs from workers. For instance, pensioners attach more weight to utility and care, and less to clothing, leisure and transport. Furthermore, we also observe that consumption bundles differ across ages and time periods. Fourthly, starting from about 75 years, growth in total expenditures becomes negligibly small. Finally, we notice that pensioners experience slightly higher inflation rate with respect to workers. On the whole, our descriptive statistics support to a large extent our initial expectations.

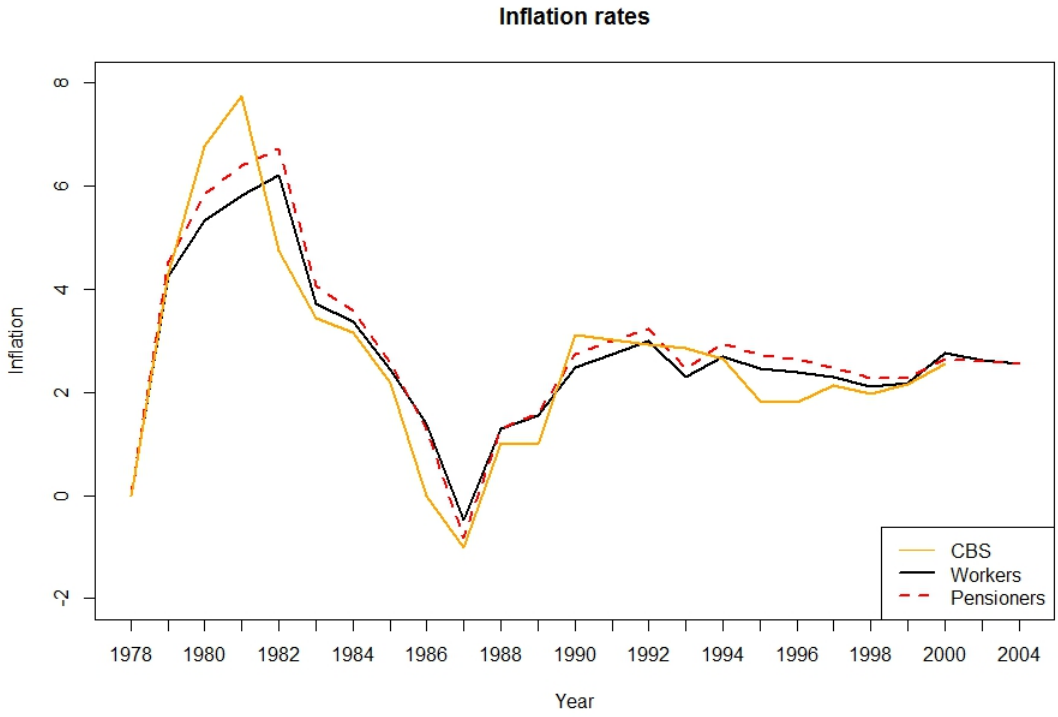

Figure 3: Inflation rates pensioners vs. workers

5 Empirical models

5.1 Age and cohort effects

In this section we elaborate on our empirical models. The reader should notice that from this point onwards we focus only on individuals older than 55 year. We make this choice since we are mainly interested in the consumption behavior of pensioners. Moreover, from our descriptive statistics we cannot state anything about the statistical significance of the time and age effects. It is however of interest to examine whether the consumption bundles change statistically significant across age and time. However, instead of focusing on the interview years, we now focus on birth years (cohorts). In case we find evidence that the consumption bundles differ across ages and birth years, then this will provide us confirmation whether we have to include these effects in our empirical models. We start with investigating the statistical significance of the birth years. Let us first consider only the budget share of food for individual i

$$w_i^{food} = \phi_0 + \phi_1 \textit{Birth 1903-1914}_i + \phi_2 \textit{Birth 1915-1926}_i + \phi_3 \textit{Birth 1927-1938}_i + \phi_4 \textit{Birth 1939-1950}_i + u_{food,i},$$

where cohort 1890-1902 is the reference category and the other four variables are dummies indicating whether someone is part of this cohort. Moreover, we compute heteroskedasticity-consistent standard errors for this model. Now we test if $\phi_1 = 0$ and obtain a p-value equal to 0.08, thus we cannot reject the null hypothesis. Hence, the budget shares of food for cohort 1903-1914 do not differ statistically from 1890-1902 at a 5% level. In a similar fashion, we test the parameters of the other three cohorts and find statistical evidence that the budget shares of food for the latest

two cohorts differ from the reference cohort. Furthermore, testing $\phi_1 = \phi_2 = \phi_3 = \phi_4$ provides us information whether the budget shares of the second, third and fourth cohort differ from each other. We obtain a p-value of 0.00. Hence, the budget shares of food differ across cohorts. We estimate the remaining categories of the consumption bundle by means of OLS. Using the same testing procedure as above, we obtain evidence that for most categories the budget shares differ across cohorts.

We also want to test whether the entire consumption bundle differs across cohorts. Thus we want to determine cross equation relations. For this purpose we use a seemingly unrelated estimation framework as described in Cameron and Trivedi (2005). We estimate for each individual i the budget share of expenditures using the following model

$$\begin{pmatrix} w_i^{food} \\ w_i^{clothing} \\ \vdots \\ w_i^{house} \end{pmatrix} = \begin{pmatrix} \boldsymbol{Y}_{food,i} & & \mathbf{0} & \\ & \boldsymbol{Y}_{clothing,i} & & \\ & & \ddots & \\ & \mathbf{0} & & \boldsymbol{Y}_{house,i} \end{pmatrix} \begin{pmatrix} \boldsymbol{\phi}_{food} \\ \boldsymbol{\phi}_{clothing} \\ \vdots \\ \boldsymbol{\phi}_{house} \end{pmatrix} + \begin{pmatrix} u_{food,i} \\ u_{clothing,i} \\ \vdots \\ u_{house,i} \end{pmatrix},$$

where each matrix $\boldsymbol{Y}$'s first column is a vector of ones and the other four vectors are dummies indicating from which cohort the individual is from. Hence, all equations have the same right hand side variables. We estimate this model by means of equation by equation OLS and then utilize the seemingly unrelated estimation framework. The starting point of this framework is that we have fit k different models on the same data. Because we want to test cross-estimator hypotheses, we want to derive the simultaneous distribution of these k estimators. We consider the vector estimator $\widehat{\boldsymbol{\phi}}_i$ to be defined as "the" solution of the estimation equations $\boldsymbol{G}_i$,

$$\boldsymbol{G}_i(\boldsymbol{b}_i) = \sum_j w_{ij} \hat{\boldsymbol{u}}_{ij}(\boldsymbol{b}_i) = \mathbf{0} \quad \text{for } i = 1, ..., k$$

where we refer to $\hat{\boldsymbol{u}}_{ij}$ here as the "scores". Moreover, specifying some weights $w_{ij} = 0$ accommodates for partially overlapping or even disjoint data. Furthermore, under "suitable regularity conditions" as explained in White (1982), the $\widehat{\boldsymbol{\phi}}_i$ are asymptotically normally distributed, with the variance estimated consistently by the following sandwich estimator

$$V_i = \widehat{\text{Var}}(\widehat{\boldsymbol{\phi}}_i) = \boldsymbol{D}_i^{-1} \sum_j w_{ij} \hat{\boldsymbol{u}}_{ij} \hat{\boldsymbol{u}}_{ij}' \boldsymbol{D}_i^{-1},$$

where $\boldsymbol{D}_i$ is the Jacobian of $\boldsymbol{G}_i$ evaluated at $\widehat{\boldsymbol{\phi}}_i$. Moreover, in case the model is also well specified, the sandwiched term $\sum_j w_{ij} \hat{\boldsymbol{u}}_{ij} \hat{\boldsymbol{u}}_{ij}'$ converges in probability to $\boldsymbol{D}_i$, therefore, V_i might be consistently estimated by $\boldsymbol{D}_i^{-1}$. Furthermore, to derive the simultaneous distribution of the estimators, we consider the stacked estimation equation

$$\boldsymbol{G}(\widehat{\boldsymbol{\phi}}) = \left\{ \boldsymbol{G}_1(\widehat{\boldsymbol{\phi}}_1)' \quad \boldsymbol{G}_2(\widehat{\boldsymbol{\phi}}_2)' \quad ... \quad \boldsymbol{G}_k(\widehat{\boldsymbol{\phi}}_k)' \right\}' = \mathbf{0}.$$

Under the suitable regularity conditions of White (1982), $\widehat{\boldsymbol{\phi}}$ is asymptotically jointly normally distributed. Readers interested in the technicalities on how to compute the Jacobian and scores of the simultaneous equation are encouraged to review STATA (2013). We now test the following null

hypothesis

$$\begin{aligned}\phi_{food,1903-1914} &= \phi_{food,1915-1926}\\ \phi_{clothing,1903-1914} &= \phi_{clothing,1915-1926}\\ \vdots &= \vdots\\ \phi_{house,1903-1914} &= \phi_{house,1915-1926}.\end{aligned}$$

We obtain a p-value equal to 0.00 for this test and thus reject the null hypothesis at a 5% significance level. Therefore, we can conclude that the entire consumption bundle differs between cohorts 1903-1914 and 1915-1926. We perform a similar test for the remaining cohorts and obtain in the same line evidence that the entire consumption bundles differ across cohorts. When considering the age effects we use the same approach as above and obtain evidence that the consumption bundles differ across the five age groups. We can conclude from this that the consumption bundles differ statistically significant across cohorts and age groups, therefore, we have to taking into account these effects in our empirical models.

5.2 Consumption bundle and inflation rates

The first part of our empirical models focuses on the estimation of the consumption bundles. Let us start with picking a random individual from our sample and assume that his budget share of food could be influenced by household characteristics such as whether he is a pensioner, unemployed, his household size, marital status, education, gender and whether he is a house owner. Secondly, we found evidence that the budget shares of food differ statistically significantly over cohorts and ages. Therefore, we include these effects in our model in the following way: we have five age groups and five cohorts groups. Now let us write the budget share of food in the following way

$$\begin{aligned}w_i^{food} &= \beta_0 + \beta_1 \ln(C_i) + \beta_2 \textit{Pensioner}_i + \beta_3 \textit{Unemployed}_i + ... + \beta_9 \textit{House owner}_i\\ &\quad + \beta_{10} \textit{Age I}_i + ... + \beta_{14} \textit{Age IV}_i + \beta_{15} \textit{Cohort I}_i + ... + \beta_{19} \textit{Cohort V}_i + \varepsilon_{food,i}\\ &= \boldsymbol{\beta}_{food} \boldsymbol{X}_{food,i} + \varepsilon_{food,i} \qquad (1)\end{aligned}$$

where C_i denotes the total expenditures of individual i and we allow that $\varepsilon_{food,i}$ is not i.i.d. The benefit of including the natural logarithm of C_i in the model is that we can derive from this the budget share elasticity of the expenditure categories as explained in Deaton and Muellbauer (1980). Following this approach the elasticity of the budget share of food is given by

$$\frac{\widehat{\beta}_1 + w^{food}}{w^{food}}.$$

In case $\widehat{\beta}_1$ is positive we speak of food as a luxury good and in case it is negative we say it as a necessary good. The nice feature of this approach is that we can determine for each expenditure category whether it is perceived as a necessary or a luxury good. On top of that, estimating (1) separately for pensioners and workers, we can determine whether this perception differs between pensioners and workers. Notice however that in (1) $\ln(C_i)$ is an endogenous right hand side variable since $\mathrm{E}[\ln(C_i)\varepsilon_{food,i}] \neq 0$. In order to deal with this, we have to estimate this equation with two-stage least squares (2SLS): in the first stage for all individuals the total expenditures are

determined and in the second stage we allocate the total expenditures for the different expenditure categories. In the first stage we estimate the following equation

$$\begin{aligned}\ln(C_i) = \psi_0 &+ \psi_1 \ln(\textit{Income}_i) + \psi_2 \ln^2(\textit{Income}_i) + \psi_3 2003_i + \psi_4 2004_i + \psi_5 \ln(\textit{Income}_i) \times 2003_i \\ &+ ... + \psi_8 \ln^2(\textit{Income}_i) \times 2004_i + \psi_9 \textit{Pensioner}_i + ... + \psi_{16} \textit{House owner}_i + \psi_{17} \textit{Age I}_i \\ &+ ... + \psi_{21} \textit{Age IV}_i + \psi_{22} \textit{Cohort I}_i + ... + \psi_{26} \textit{Cohort V}_i + v_i, \end{aligned} \tag{2}$$

and in the second stage equation (1). We include dummies for 2003 and 2004 and interact them with income because for these years mortgage rent was subtracted from income whereas for the other years it was not. Due to this fact, the definition of income in 2003 and 2004 differs from the other years. Furthermore, we compute for (2) White's standard errors in order to take into account heteroskedasticity. For more technical details on the 2SLS estimator the reader is encouraged to consult Cameron and Trivedi (2005). In a similar way, we write down the equations for the remaining budget shares, however, we leave out the budget share of other expenditures. We do this since this share can be computed by taking one minus the sum of the other budget shares. Stacking all the seven equations for the i-th individual we write

$$\begin{pmatrix} w_i^{food} \\ w_i^{clothing} \\ \vdots \\ w_i^{house} \end{pmatrix} = \begin{pmatrix} \boldsymbol{X}_{food,i} & & \mathbf{0} & \\ & \boldsymbol{X}_{clothing,i} & & \\ & & \ddots & \\ & \mathbf{0} & & \boldsymbol{X}_{house,i} \end{pmatrix} \begin{pmatrix} \boldsymbol{\beta}_{food} \\ \boldsymbol{\beta}_{clothing} \\ \vdots \\ \boldsymbol{\beta}_{house} \end{pmatrix} + \begin{pmatrix} \varepsilon_{food,i} \\ \varepsilon_{clothing,i} \\ \vdots \\ \varepsilon_{house,i} \end{pmatrix}, \tag{3}$$

where one should notice that all the equations have the exact same right hand side variables. Moreover, with respect to total expenditures we do not only focus on of the first stage regression (2), we also estimate similar equations as (2) by means of OLS.

Using the above models we are able to investigate the consumption bundles of Dutch individuals. However, in this paper we want to examine how the inflation rates of these consumption bundles differ between pensioners and workers, and how they behave over time as well. We assume that the inflation rate is influenced by the set of household characteristics and time. Moreover, we also include a dummy for pensioner, so we can directly examine the difference in inflation rates between pensioners and workers. We also interact the pensioner dummy with the time dummies to expose any time effects for pensioners. We write for individual i the inflation rate in the following way

$$\begin{aligned} IR_i &= \tau_0 + \tau_1 \textit{Pensioner}_i + ... + \tau_8 \textit{House owner}_i + \tau_9 1979_i + ... + \tau_{32} 2004_i \\ &\quad + \tau_{33} \textit{Pensioner}_i \times 1979_i + ... + \tau_{56} \textit{Pensioner}_i \times 2004_i + w_i \\ &= \boldsymbol{\tau} \boldsymbol{R}_i + w_i. \end{aligned} \tag{4}$$

We estimate (4) by means of OLS as explained in Cameron and Trivedi (2005) and compute heteroskedasticity-consistent standard errors.

6 Empirical results

6.1 Total expenditures

In this section we perform our empirical analysis. We start with estimating a model similar to (2). To be more precise, we estimate an equation with $\ln(C)$ as the left hand side variable and the

household characteristics, age and cohort effects as the right hand side variables. Secondly, we extend the model with $\ln(Income)$ and $\ln^2(Income)$, and as a third step we include a dummy for pensioner to the set of right hand side variables. The above three models are presented in the first three columns of table 5. In the last column of this table we present the first stage results of our 2SLS model.

	$\ln(C)$	$\ln(C)$	$\ln(C)$	$\ln(C)$
Constant	-1.714	-18.33	-17.97	-17.97
	(17.76)	(14.71)	(14.69)	(14.69)
Unemployed	-0.137***	-0.0631***	-0.0567***	-0.0567***
	(0.0133)	(0.0138)	(0.0146)	(0.0146)
HH size	0.195***	0.0691***	0.0692***	0.0692***
	(0.00642)	(0.0104)	(0.0104)	(0.0104)
Married	0.0527***	0.0792***	0.0818***	0.0818***
	(0.0170)	(0.0131)	(0.0133)	(0.0134)
Middle education	0.174***	0.103***	0.103***	0.103***
	(0.00919)	(0.0109)	(0.0109)	(0.0109)
High education	0.432***	0.213***	0.212***	0.212***
	(0.0121)	(0.0224)	(0.0224)	(0.0224)
Male	0.102***	0.0244**	0.0173	0.0173
	(0.0112)	(0.0120)	(0.0133)	(0.0133)
House owner	0.300***	0.227***	0.228***	0.228***
	(0.00824)	(0.00968)	(0.00965)	(0.00966)
Age 55-60	-0.00542	-0.00547	-0.00625	-0.00625
	(0.00401)	(0.00412)	(0.00409)	(0.00409)
Age 61-65	-0.0200***	-0.00455	-0.00598*	-0.00598*
	(0.00354)	(0.00326)	(0.00338)	(0.00338)
Age 66-70	-0.0242***	-0.0119***	-0.0123***	-0.0123***
	(0.00362)	(0.00318)	(0.00318)	(0.00318)
Age 71-75	-0.0181***	-0.00817**	-0.00816**	-0.00816**
	(0.00378)	(0.00323)	(0.00323)	(0.00323)
Age 75+	-0.00791**	-0.000403	-0.000553	-0.000553
	(0.00330)	(0.00290)	(0.00290)	(0.00290)
Cohort 1890-1902	0.00596	0.0127*	0.0125	0.0125
	(0.00934)	(0.00771)	(0.00770)	(0.00770)
Cohort 1903-1914	-0.00139	0.00585***	0.00587***	0.00587***
	(0.00195)	(0.00179)	(0.00180)	(0.00180)
Cohort 1915-1926	-0.00510***	-0.000141	-0.000333	-0.000333
	(0.00145)	(0.00131)	(0.00131)	(0.00131)
Cohort 1927-1938	-0.00317	-0.000855	-0.000875	-0.000875
	(0.00200)	(0.00198)	(0.00198)	(0.00198)
Cohort 1939-1950	0.0201	0.0111	0.0118	0.0117
	(0.0533)	(0.0322)	(0.0322)	(0.0324)
$\ln(Income)$		0.302***	0.302***	0.302***
		(0.0254)	(0.0255)	(0.0255)
$\ln^2(Income)$		0.00939***	0.00939***	0.00939***
		(0.000729)	(0.000729)	(0.000730)
Pensioner			0.0157*	0.0157*
			(0.00931)	(0.00931)
2003				-4.513
				(4.837)
2004				10.36**
				(4.956)
$\ln(Income) \times 2003$				0.949
				(0.924)
$\ln(Income) \times 2004$				-1.986**
				(1.013)
$\ln^2(Income) \times 2003$				-0.0490
				(0.0441)
$\ln^2(Income) \times 2004$				0.0951*
				(0.0525)
p-values Wald test joint significance				
Age effects	0.00	0.00	0.00	0.00
Cohort effects	0.00	0.01	0.01	0.01
F-statistic of exclusion restrictions				
Income, 2003, 2004	-	-	-	32.72
Observations	16,191	16,191	16,191	16,191

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Total expenditures OLS and first stage 2SLS model

Interpreting the first column of table 5, we notice that unemployed individuals have 13.7% (p = 0.00) lower total expenditures than workers, ceteris paribus. Moreover, holding all other factors constant, in case household size increases with one person or in case someone is married, then his total expenditures increase with respectively 19.5% (p = 0.00) and 5.3% (p = 0.00). Education seems to have a substantial positive effect on total expenditures as well. To be more precise, individuals with middle education have 17.4% (p = 0.00) higher total expenditures in comparison to their low educated peers, ceteris paribus. For high educated individuals this effect is even larger. Furthermore, we observe that males and house owners have a higher total expenditures in comparison to females and renters. Before we interpret the age effects we first test whether they are jointly significant. For this test we have the following null hypothesis

$$\psi_{Age55-60} = \psi_{Age61-65} = ... = \psi_{Age75+} = 0$$

We obtain a p-value equal to 0.00, therefore we reject the null hypothesis and conclude they are jointly significant. When interpreting the age effects, we observe a negative relationship with total expenditures. The cohort effects are jointly significant as well and exhibit an erratic relationship with total expenditures.

As a next step, we include the two income variables to the set of right hand side variables. We immediately notice from the second column of table 5 that the household characteristics, age and cohort effects change: the coefficients seem to become much smaller in magnitude. At the same instance, testing the coefficients of the income variables provides us the insight that they are jointly significant. Continuing, we extend the model by including a dummy for pensioners. We observe once again the coefficients of the other right hand side variables change, however, this time they only change slightly. To elaborate, pensioners tend to have 1.6% (p = 0.09) higher total expenditures in comparison to workers, ceteris paribus. Furthermore, interpreting the coefficients of the two income variables we notice that the effect of a 1% increase in income on total expenditures is, ceteris paribus, the following percentage

$$0.302 + 2 \cdot 0.00939 \cdot \ln(\textit{Income}).$$

Hence, there is a positive relationship between income and total expenditures, however for each income level the effect is different. Moreover, holding all other factors constant unemployed individuals have 5.7% (p = 0.00) lower total expenditures than workers. In case household size increases with one person, then the total expenditures increase with 6.9% (p = 0.00), ceteris paribus. Moreover, married persons' total expenditures are 8.2% (p = 0.00) higher than non married persons, ceteris paribus. Education seems to have a positive relationship with expenditures as well. To be more precise, holding all other factors constant individuals with middle or high education have respectively 10.3% (p = 0.00) and 21.2% (p = 0.00) higher total expenditures in comparison to low educated individuals. A similar large positive effect is visible for house owners, they have 22.8% (p = 0.00) higher total expenditures than renters, ceteris paribus. Continuing, we find evidence that the age effects are jointly significant and have a negative relationship with total expenditures. Especially from the age group 66-70 this is remarkably high: total expenditures of the individuals in this group declines with 1.2% (p = 0.00) for each year they become older, ceteris paribus. Comparing this to the previous age group, this effect was only 0.6% (p = 0.08) for each year they become older, ceteris paribus. Hence, we find evidence of a small drop in total expenditures of 1.2% each year starting from the age of 66 until 70. After the age of 75 years, the age effect on total expenditures becomes very small, namely 0.1% (p = 0.85) for every year individuals become older, however this estimates is not significant. Hence, we do not find statistical evidence

for a tipping point from which on growth in total expenditures becomes negligibly small. Continuing, we have the cohort effects and testing them provides us evidence that they are jointly significant at a 1% level. However, interpreting the coefficients provides us the insight that the relationship between cohorts and total expenditures behave erratically. Finally, we do not interpret the coefficients of the first stage of the 2SLS model presented in the fourth column of table 5. We do however use this model to test the validity of our instruments by means of the F-test on the exclusion restrictions. We obtain an F-statistic equal to 32.72, and following Bound et al. (1995) we can state that our instruments are indeed valid.

6.2 Consumption bundle

In order to get insights on the consumption bundle we estimate model (3) and present the results in table 6. To begin with, we notice that being a pensioner or unemployed does not statistically significant influence the budget share of food. Continuing, we observe that an increase of the household size with one person increases its share with 3.1% (p = 0.00), ceteris paribus. Furthermore, marriage and being a male also has a positive effect on the budget share of food with respectively 0.8% (p = 0.00) and 3.6% (p = 0.00), ceteris paribus. Higher education seems to have a small negative, but statistically significant effect on the budget share of food. A similar negative effect is noticeable for house owner, they tend to spend 2.0% (p = 0.00) less on food in comparison to renters, ceteris paribus. Continuing, we focus on the age effects and test whether they are jointly significant. We obtain a p-value equal to 0.00, therefore we can state that the age effects are jointly significant. Interpreting the estimates provides us the insight that as people become older they tend to reduce the budget share of food. However, the effects are very small. Continuing, when we test whether the coefficients of the age groups are equal to each other, we obtain a p-value equal to 0.00. Therefore, we can state that the effect of age on the budget shares of food differs significantly across the five different age groups. Furthermore, the cohorts effects are jointly significant as well, however the relationship between cohorts and the budget share of food behave erratically.

Focusing on the remaining budget shares, we notice that being a pensioner has a negative effect on the budget shares of clothing and utility with respectively 0.1% (p = 0.07) and 0.3% (p = 0.00), ceteris paribus. For the budget shares of care, leisure, transport and house it has a positive effect. However, notice that only for care and leisure these effects are statistically significant: 0.2% (p = 0.04) for care and 0.4% (p = 0.01) for leisure. Furthermore, we observe that household size has a positive effect on the shares of clothing and utility. For the other shares it has a negative effect. Similarly marriage has a positive relationship with the budget shares of utility, transport and housing, and a negative relationship with the budget shares of clothing, care and leisure. Moreover, house ownership seems to have a negative effect on all the budget shares except for utility and housing. Proceeding, testing the joint significance of the age effects we find evidence that this is the case for all budget shares, except for leisure. Hence, for most of the budget shares we can state that they differ across age groups. To be more precise, for clothing we notice that its budget share becomes smaller as age goes up. For an individual in the age group 66-70, his budget share of clothing decreases with 0.1% (p = 0.00) every year that he becomes older, ceteris paribus. A similar negative trend around retirement is visible for the budget share of transport. On the other hand, for utility, care and housing, we observe an increasing relationship with budget shares as age goes up. For example, holding all other factors constant, in case an individual becomes one year older in the age group 66-70, then his budget share of care increases with 0.2% (p = 0.00) per year. Moreover, focusing on the cohort effects, we notice that they are jointly significant, however the relationship between the different budget shares and cohorts behave erratically.

As a next step, we perform the Sargan test for over identifying restrictions. For this test the null hypothesis states that the over identifying restrictions are valid. We obtain for all budget shares a p-value higher than 0.95, therefore, we reject the null at a 1% level. Thus we conclude that our over identifying restrictions are valid. Furthermore, performing the Durbin-Wu-Hausman endogeneity test we can determine whether our 2SLS model is less efficient, but still consistent, than an OLS model. In this test the null hypothesis states that the variables are endogenous. Performing this test we obtain evidence that for the budget share models of clothing, care, leisure and housing our two 2SLS models are more efficient than OLS. Finally, relating the above findings to our research questions, we found evidence of differences in the consumption bundle between pensioners and workers or different age groups, however, the differences seem to be very small. These findings are in line with our initial expectations.

	Food	*Clothing*	*Utility*	*Care*	*Leisure*	*Transport*	*House*
Constant	3.333	-3.387***	0.750	0.447	-3.617	-3.984	4.433
	(2.648)	(1.248)	(0.997)	(1.409)	(2.599)	(3.199)	(4.198)
ln(C)	-0.0665***	0.0128***	-0.0454***	0.0137***	0.0657***	0.0702***	-0.0585***
	(0.00290)	(0.00137)	(0.00109)	(0.00154)	(0.00285)	(0.00350)	(0.00460)
Pensioner	-0.00128	-0.00131*	-0.00314***	0.00171**	0.00408***	0.000678	0.000760
	(0.00152)	(0.000715)	(0.000571)	(0.000807)	(0.00149)	(0.00183)	(0.00240)
Unemployed	0.00230	-0.00368***	-0.00269***	0.00165	-0.00538***	0.00740***	0.000433
	(0.00208)	(0.000981)	(0.000784)	(0.00111)	(0.00204)	(0.00252)	(0.00330)
HH size	0.0310***	0.00598***	0.00341***	-0.00517***	-0.00472***	-0.00238**	-0.0279***
	(0.000950)	(0.000447)	(0.000358)	(0.000505)	(0.000932)	(0.00115)	(0.00151)
Married	0.00814***	-0.00298***	0.00371***	-0.00969***	-0.00803***	0.00140	0.00979***
	(0.00206)	(0.000970)	(0.000775)	(0.00109)	(0.00202)	(0.00249)	(0.00326)
Middle education	-0.00793***	-0.00236***	-0.000499	0.00455***	0.00425***	0.00405**	-0.000656
	(0.00139)	(0.000655)	(0.000523)	(0.000740)	(0.00136)	(0.00168)	(0.00220)
High education	-0.00627***	-0.00699***	0.00246***	0.0135***	0.00771***	-0.00597**	-0.00137
	(0.00217)	(0.00102)	(0.000816)	(0.00115)	(0.00213)	(0.00262)	(0.00344)
Male	0.0356***	-0.0132***	-0.00149**	0.000449	-0.00829***	0.00965***	-0.0234***
	(0.00161)	(0.000757)	(0.000605)	(0.000854)	(0.00158)	(0.00194)	(0.00255)
House owner	-0.0196***	-0.00993***	0.00825***	-0.00831***	-0.0294***	-0.0214***	0.0873***
	(0.00147)	(0.000693)	(0.000554)	(0.000783)	(0.00144)	(0.00178)	(0.00233)
Age 55-60	0.000237	0.000750***	-0.000736***	-0.000398	0.00159***	0.000279	-0.00217**
	(0.000594)	(0.000280)	(0.000224)	(0.000316)	(0.000583)	(0.000718)	(0.000942)
Age 61-65	0.000117	-0.000205	-0.000284	0.000152	-0.000499	0.000803	-0.00183**
	(0.000524)	(0.000247)	(0.000197)	(0.000279)	(0.000514)	(0.000633)	(0.000830)
Age 66-70	-0.000434	-0.000700***	-0.000803***	0.00151***	0.000119	0.000795	-0.00183**
	(0.000512)	(0.000241)	(0.000193)	(0.000273)	(0.000503)	(0.000619)	(0.000812)
Age 71-75	-0.00145**	-0.000523*	0.000276	0.00247***	0.0000166	-0.00104	-0.00165*
	(0.000569)	(0.000268)	(0.000214)	(0.000303)	(0.000559)	(0.000688)	(0.000902)
Age 75+	-0.00151***	-0.000661***	0.00000202	0.00236***	-0.000262	0.00153**	-0.00236***
	(0.000507)	(0.000239)	(0.000191)	(0.000270)	(0.000498)	(0.000613)	(0.000804)
Cohort 1890-1902	-0.00135	0.00172***	-0.0000980	-0.000271	0.00158	0.00176	-0.00170
	(0.00139)	(0.000656)	(0.000524)	(0.000741)	(0.00137)	(0.00168)	(0.00221)
Cohort 1903-1914	-0.000633**	-0.000221	-0.000522***	0.000920***	-0.000149	0.00172***	-0.00304***
	(0.000298)	(0.000141)	(0.000112)	(0.000159)	(0.000293)	(0.000360)	(0.000473)
Cohort 1915-1926	-0.000229	-0.000243**	-0.000904***	-0.000257**	0.000789***	0.00111***	-0.00177***
	(0.000211)	(0.0000994)	(0.0000794)	(0.000112)	(0.000207)	(0.000255)	(0.000334)
Cohort 1927-1938	-0.000454	0.000572***	-0.000590***	-0.000451***	0.00105***	0.000493	-0.00170***
	(0.000318)	(0.000150)	(0.000120)	(0.000169)	(0.000312)	(0.000384)	(0.000504)
Cohort 1939-1950	0.0202	0.00872	-0.00162	0.00635	0.00682	-0.00287	-0.0368
	(0.0154)	(0.00727)	(0.00581)	(0.00821)	(0.0151)	(0.0186)	(0.0245)
p-values Wald test joint significance							
Age effects	0.00	0.00	0.00	0.00	0.17	0.05	0.00
Cohort effects	0.04	0.00	0.00	0.00	0.00	0.00	0.00
p-values test of over identifying restrictions							
Sargan χ^2	0.98	0.99	0.99	0.99	0.99	0.99	0.95
p-values test of endogeneity							
Durbin χ^2	0.06	0.00	0.97	0.00	0.00	0.58	0.00
Observations	16,191	16,191	16,191	16,191	16,191	16,191	16,191

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Consumption bundle 2SLS model

In order to investigate the budget share elasticities, we estimate model (3) for three different samples: once for the whole sample, once for pensioners only and once for workers only. For sustainability purposes we only report the estimates of the entire model in the appendix. We report in table 7 the budget share elasticities of the expenditure categories. From this table we notice that for the whole sample food, utility and housing are perceived as necessary goods. At the same instance, clothing, care, leisure and transport are seen as luxury goods. From our point of view it is remarkable that care is perceived as part of luxury goods, we would have expected it to be a necessary good. Furthermore, for pensioners and workers we notice the same perceptions of the categories, however, there are differences present in terms of budget share elasticities. For instance, the budget share elasticity of clothing for workers is twice the magnitude of the pensioners'. In words this means that workers perceive clothing as luxury good, whereas pensioners perceive it only as a "weak" luxury goods. Similar differences are present for the budget shares of leisure and transport as well. This provides the insight that the perception of the expenditure categories between pensioners and workers differ only slightly.

	All	Pensioners	Workers
Food	-0.067	-0.071	-0.061
Clothing	0.013	0.007	0.019
Utility	-0.045	-0.045	-0.046
Care	0.014	0.017	0.011
Leisure	0.066	0.075	0.056
Transport	0.070	0.064	0.077
House	-0.059	-0.053	-0.064

Table 7: Budget share elasticities pensioners vs workers

6.3 Inflation rates

We have now obtained insights on the consumption bundle of pensioners and workers. As a next step, we want to investigate the inflation rates of the consumption bundle and compare whether it differs between pensioners and workers. For this purpose we estimate model (4) and report the results in table 8. We start with regressing a full set of time dummies on the inflation rates and present these results in the first column of table 8. In the second column, we extend the model with a dummy for pensioners. Thirdly, we extend the model once again by interacting the pensioner dummy with the time dummies. Subsequently, in the last column of table 8 we present the model where we include the household characteristics to the set of right hand side variables as well. The benefit of our approach is that in this way we can reproduce an inflation rate curve over years as we have done in figure 3. On top of that, since we have a dummy variable for pensioners and interacted this with the time dummies, we are able to come up with two inflation curves: one for pensioners and one for workers. Using these graphs we can provide (graphical) statistical evidence whether the consumption bundle of pensioners is susceptible to a higher inflation rate in comparison to workers. Such an analysis will be presented in the section where we translate our models to the implications for the indexation of pensions.

Let us start with interpreting the first column of table 8. We start with a test on the joint significance of the time dummies. We obtain a p-value equal to 0.00, therefore we can conclude that they are indeed jointly significant. Moreover, we notice that for the time period 1979 to 1984 the inflation rates are around 3.6-6.6%, then they decrease towards 1987 and from that on it increases again

	IR	IR	IR	IR		
Constant	0.000	-0.000192***	0.000	0.00263***	Unemployed	0.000241
	(0.000)	(0.0000601)	(0.000)	(0.000303)		(0.000229)
1979	0.0462***	0.0462***	0.0468***	0.0465***	HH size	-0.00161***
	(0.000322)	(0.000323)	(0.000428)	(0.000391)		(0.0000897)
1980	0.0573***	0.0573***	0.0562***	0.0564***	Married	0.000589**
	(0.000272)	(0.000271)	(0.000382)	(0.000385)		(0.000276)
1981	0.0632***	0.0632***	0.0626***	0.0624***	Middle education	-0.000583***
	(0.000330)	(0.000329)	(0.000481)	(0.000473)		(0.000154)
1982	0.0662***	0.0661***	0.0650***	0.0650***	High education	-0.000813***
	(0.000337)	(0.000336)	(0.000468)	(0.000473)		(0.000191)
1983	0.0408***	0.0407***	0.0407***	0.0406***	Male	-0.000794***
	(0.000281)	(0.000282)	(0.000456)	(0.000419)		(0.000204)
1984	0.0356***	0.0356***	0.0355***	0.0352***	House owner	0.00248***
	(0.000133)	(0.000134)	(0.000208)	(0.000242)		(0.000125)
1985	0.0258***	0.0258***	0.0259***	0.0255***		
	(0.000115)	(0.000118)	(0.000179)	(0.000230)		
1986	0.0135***	0.0134***	0.0140***	0.0136***		
	(0.000202)	(0.000203)	(0.000255)	(0.000309)		
1987	-0.00895***	-0.00898***	-0.00988***	-0.0103***		
	(0.000459)	(0.000460)	(0.000741)	(0.000787)		
1988	0.0130***	0.0130***	0.0131***	0.0130***		
	(0.000161)	(0.000162)	(0.000236)	(0.000275)		
1989	0.0158***	0.0158***	0.0155***	0.0152***		
	(0.000167)	(0.000168)	(0.000265)	(0.000312)		
1990	0.0273***	0.0272***	0.0269***	0.0263***		
	(0.000177)	(0.000178)	(0.000263)	(0.000291)		
1991	0.0297***	0.0296***	0.0292***	0.0288***		
	(0.000236)	(0.000236)	(0.000439)	(0.000414)		
1992	0.0322***	0.0321***	0.0320***	0.0315***		
	(0.000198)	(0.000200)	(0.000344)	(0.000350)		
1993	0.0249***	0.0248***	0.0251***	0.0244***		
	(0.000234)	(0.000235)	(0.000333)	(0.000377)		
1994	0.0299***	0.0298***	0.0303***	0.0293***		
	(0.000210)	(0.000212)	(0.000352)	(0.000370)		
1995	0.0273***	0.0273***	0.0276***	0.0267***		
	(0.000227)	(0.000229)	(0.000374)	(0.000370)		
1996	0.0272***	0.0271***	0.0282***	0.0272***		
	(0.000250)	(0.000253)	(0.000457)	(0.000459)		
1997	0.0250***	0.0250***	0.0251***	0.0241***		
	(0.000147)	(0.000149)	(0.000213)	(0.000255)		
1998	0.0229***	0.0228***	0.0232***	0.0221***		
	(0.000152)	(0.000155)	(0.000259)	(0.000303)		
1999	0.0227***	0.0227***	0.0227***	0.0219***		
	(0.0000800)	(0.0000822)	(0.000127)	(0.000219)		
2000	0.0264***	0.0263***	0.0263***	0.0255***		
	(0.000242)	(0.000243)	(0.000355)	(0.000429)		
2003	0.0263***	0.0262***	0.0265***	0.0257***		
	(0.0000649)	(0.0000709)	(0.0000988)	(0.000236)		
2004	0.0257***	0.0256***	0.0257***	0.0250***		
	(0.0000605)	(0.0000643)	(0.0000890)	(0.000219)		
Pensioner		0.000420***	0.000	-0.000343*		
		(0.000130)	(0.000)	(0.000194)		
Interactions	No	No	Yes	Yes		
p-values Wald test joint significance						
Time effects	0.00	0.00	0.00	0.00		
Interactions	-	-	0.00	0.00		

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Inflation rates OLS model

to 3.2% for 1992. For the remaining years the inflation rates show a stable rate of approximately 2.6%. This pattern of the inflation rates is similar to the one we observed in figure 3. Secondly, we add a dummy for pensioner, and notice that the consumption bundles of pensioners have 0.04% (p = 0.00) higher inflation rates in comparison to workers, ceteris paribus. Of course, this effect is very small. Thirdly, we add the interaction terms to our model, however for sustainability reasons

we do not present the coefficients of the interaction terms. Furthermore, performing a Wald test we obtain statistical evidence that the interaction terms are jointly significant. Hence, there is a time effect present for pensioners. Notice however that the coefficient of the pensioner dummy becomes close to zero. Fourthly, we add the household characteristics to the set of right hand side variables. We notice that the time, interaction and household effects are all jointly significant. On the other hand, the effect of being a pensioner seems now to be negatively related to the inflation rates. However, this effect is only weakly significant and very small: -0.04% (p = 0.08). Moreover, holding all other factors constant, if household size increases with one person, then the inflation rate decreases with 0.2% (p = 0.00). Education is negatively related to inflation rate as well. To illustrate, in case someone is middle or high educated, then his consumption bundle exhibits roughly 0.1% (p = 0.00) lower inflation rates in comparison to low educated individuals, ceteris paribus. Continuing, being a house owner or married increases the inflation rates ceteris paribus with respectively 0.2% (p = 0.00) and 0.1% (p = 0.03) in comparison to renters or singles. On the whole, from table 8 we can state that although pensioners experience statistically significant different inflation rates than workers, the effect is very small. This is contrary to our initial expectations where we stated to expect significantly higher inflation rates for pensioners. Finally, the household characteristics have a very small effect on the inflation rates as well.

6.4 Implications for the indexation of pensions

In order to translate our models in terms of implications for the indexation of pensions the best approach would be to estimate a complete demand system and come up with two modified CPIs for the consumption bundles of pensioners and workers. However, since such an analysis is out of the scope of this paper we use an alternative approach to translate our models into the implications. The explanation of our approach is as follows: the starting point is estimating model (3) without the age and cohort effects. The nice feature of this model is that it contains a dummy for pensioners, therefore we can directly compute and compare the consumption bundles of pensioners with workers. Moreover, we leave out the age effects since the pensioner dummy already captures a part of the age effect. An argument why we leave out the cohort effects is because they behaved very erratically. As a next step, we define a "standard" male pensioner that has total expenditures equal to €22,409.67 (mean of the variable for pensioners), household size of 2, is married, has middle education and owns a house. Simultaneously, the "standard" male worker is defined as someone that has the same characteristics as above except for the fact that he is not retired and his total expenditures are equal to €24,040.70 (mean of the variable for workers). The reader should of course notice that above definitions are subjective, however, for comparison reason justified from our point of view. As a next step, we put the above information in a model similar to (3) and compute for pensioners and workers separately their budget shares of each expenditure category. This provides us two consumption bundles which only differ because one is for a pensioner and the other is for a worker. In figure 4 we provide two pie charts for "standard" pensioners and workers with their respective consumption bundles.

From figure 4 we notice that pensioner spend 0.5 percentage points more on housing in comparison to workers. Similarly, they spend respectively 0.3 and 0.4 percentage point more on food and care than workers. On the other hand, pensioners spend 0.8 and 0.4 percentage point less on respectively transport and leisure. The difference in budget shares of utility and clothing are only 0.1 percentage points. Hence, it is clear that the difference in budget shares between pensioners and workers are very small. Therefore, we can conclude that as expected the consumption bundle of pensioners differs only slightly from workers.

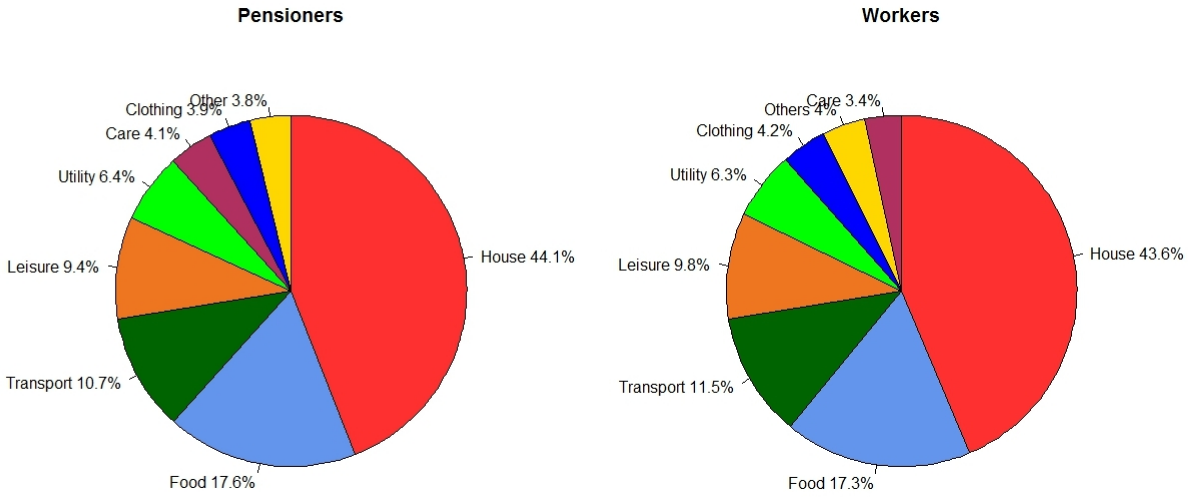

Figure 4: Consumption bundles of "standard" pensioners and workers

As a next step, we want to obtain graphical insights on the inflation rates of these consumption bundles. For this purpose, we turn to model (4). As explained before in section 6.3, we can obtain from this model inflation rate curves separately for pensioners and workers. We present the curves in figure 5.

From eyeball inspection of figure 5, we can observe that the inflation rates we compute show the same patterns, i.e. similar peaks and troughs, as the CBS inflation rates. Furthermore, the difference between pensioners and workers seems to be very small. Nevertheless, it is visible that pensioners experience slightly higher inflation rates in comparison to workers. Moreover, except for the first peak, both pensioners and workers seem to have higher inflation rates than the CBS. Computing the mean inflation rate for the entire interval from 1979 to 2004 supports this finding: we obtain an average inflation of 2.63% for CBS, 2.87% for pensioners and 2.86% for workers. These are very small differences, therefore, we can conclude that the consumption bundle of pensioners is not susceptible to a higher inflation rate than workers.

Armed with the above figures, we state that the pensions of pensioners do not need to be indexed differently from workers. Nonetheless, since pensioners had slightly higher inflation rates, the critical reader could argue that pensioners need to be indexed with a higher percentage than workers. From our point of view, there are a couple of arguments for such a statement. Firstly, in case the pensions or workers are indexed with a lower percentage, then they can continue to work for a longer time and reduce the size of their pension gap. Pensioners on the other hand, do not have this possibility. The probability that pensioners will return to the labor market to generate additional income to finance the pension gap is almost zero. Secondly, pensioners cannot turn to financial institutions to reduce their pension gap as a result of lower indexation. This is due to the fact that banks often apply age limits before they provide a loan. Pensioners obviously do not meet this requirement. Thirdly, as individuals become older, they need more healthcare and this is also supported in our models of section 6. Thus, we can state that pensioners are more exposed

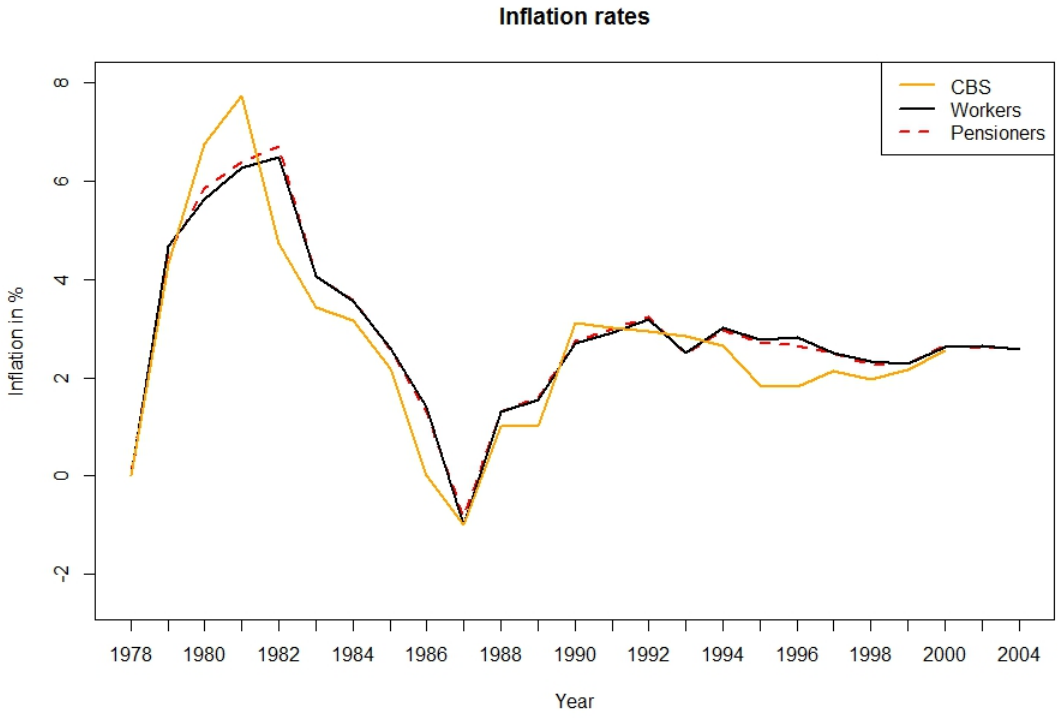

Figure 5: Model inflation rates pensioners vs. workers

to uncertainty of healthcare cost. On the other hand, healthcare contributes to only 4.1% of the entire consumption bundle for pensioners.

Of course there are also arguments why instead of pensioners workers should be provided a higher indexation of their pensions. To begin with, we observed from our model that as individuals become 66 years old, their total expenditures drop by approximately 1.2% each year they become older until the age of 70. Therefore, one could state that pensioners have lower expenditures than workers and thus need less money to provide themselves in their needs. Secondly, pensioners have to pay considerable less income tax and on top of that they do not have to contribute to the AOW system anymore. The final argument is that the Dutch system is based on solidarity. However, in case only the pensioners get a indexation, or a higher one than workers, then this could deteriorate the solidarity feeling of the workers. Taking into account the ever increasing pension age, it could give workers the idea that they are prejudiced in comparison to workers. It should be clear that there is no straightforward solution for the indexation of pensions, however, we argue that given our analysis the current indexation is already sufficient to a large extent.

6.5 Comparing our findings to the literature

The papers of Börsch-Supan and Stahl (1991) and Soede (2012) investigated consumption patterns over ages, therefore it is interesting to compare our findings with theirs. One of the similarities is that we found no evidence for a drop in food expenditures as individuals retire. Also the age effect on the budget shares of food were very small. Moreover, we also found in line with these

two papers evidence that as individuals become older they increase their budget shares of utility/energy, healthcare and housing. Similarly, the budget shares of clothing, leisure and transport decreased over ages. Focusing on the consumption bundle, we observed that we all report housing, food, transport and leisure as the most important categories of the bundle. The magnitudes of the shares of food, transport and leisure were comparable, however, housing was not. To be more precise, for our population housing expenditures contributed approximately with 40% to the consumption bundle. This seems quite large since the other two papers reported this share around 20%. An explanation for this difference could be that our definition of housing costs differ from theirs. Moreover, our study documented that for pensioners food contributed to 17.6% of the consumption bundle and this is comparable to the 19.0% reported by Soede (2012). For pensioners we reported the budget shares of utility, leisure and transport equal to respectively 6.4%, 9.4% and 10.7%. Soede (2012) presented these shares to be equal to 9.4%, 12.0% and 8.0%. Finally, we presented evidence that there are only very small differences in the consumption bundle and pensioners in comparison to workers. The differences presented in the literature are slightly larger.

6.6 Summarizing our empirical results

Taking everything together, we found evidence that individuals experience a small drop in consumption of approximately 1.2% every year an individual becomes older starting from the age of 66 until 70. Total consumption also seemed to decrease as age went up, however, these effects were very small. On top of that, there was no tipping point visible from which on consumption growth became negligibly small. Moreover, we noticed that the consumption bundle of pensioners did not differ substantially from workers. However, it was clearly visible that as people became older, they attached more importance to expenditures on utility, care and housing. On the other hand, importance of clothing, leisure and transport was reduced. These findings were in line with those documented in the literature and our initial expectations. Translating our empirical results to the implications for the indexation of pensions, we found, in contrast to our expectations, evidence that the inflation rates of the consumption bundles of pensioners did not differ substantially from workers. From our point of view, we can conclude from this that the current procedure for the indexation of pensions, where no distinction is made between pensioners and workers, is sufficient.

7 Discussion

After performing our analysis, we are able to answer all our research questions in a satisfying way. Nevertheless, there is always room for improvement or interesting insights for future research. To begin with, our data set does not have a longitudinal format. As a result of this, we are not able to examine the dynamic relationships over time. However, in case we could use a longitudinal data set for future research and follow an individual both in the role of a worker and pensioner, then we could investigate the transition from worker to pensioner in more detail. This would provide more accurate results on how the consumption bundle of the same individual changes as he retires. Secondly, in the course of the survey years, questions, and thus from our point of view variables, are removed from and added to the questionnaires. As a consequence, it is cumbersome to compare information over time. For instance, the definition of income differed across years, therefore, it made it hard to compare it over years in an adequate way. This point could have contributed to more noisy data. Thirdly, from our analysis we are not able to come up with a modified CPI based on a complete demand system model, since such an investigation is

out of the scope of this paper. Nonetheless, it would be interesting to explore the possibilities to construct such a CPI and transform this into inflation rates. This could provide a more powerful confirmation that the inflation rates do not differ significantly between pensioners and workers. If this is the case, then it provides again evidence that the current indexation of pensions is sufficient. Finally, we focused in our analysis mainly on the consumption patterns around retirement. However, it is interesting for future research to investigate the consumption patterns of working individuals around the age of 30 or 40 years, and compare these with pensioners. It might be possible that their consumption bundle differs substantially from the pensioners, and on top of that is susceptible to a different inflation rate. This could result into a different conclusion than our study with respect to the indexation of pensions.

8 Conclusion

The main aim of this paper was to investigate the consumption behavior of Dutch pensioners and examine the implications for the indexation of pensions. Using a large data set from the CBS and an OLS and 2SLS framework, we are able to answer our first research question: is there a drop in consumption around retirement in the Netherlands? We obtained statistical evidence that individuals experience a drop in consumption of approximately 1.2% every year they become older starting from the retirement age until the age of 70 in the Netherlands. The subsequent two research questions where the following: how does the consumption bundle of Dutch pensioners look like and is it different from workers? We noticed that the top three expenditure categories from the pensioners' consumption bundle are housing, food and transport. Together they contributed to more than 2/3 of the entire consumption bundle. Expenditures on clothing and others were of much lesser importance. Moreover, in the course of life, budget shares of food remained relatively stable, whereas utility, care and housing became more important. In contrast, budget shares of clothing, leisure and transport became less important over ages. These findings are in line with those presented in the literature. Furthermore, we found statistical evidence that the budget shares differed over cohorts, however this relationship behaved very erratically. Continuing, we found evidence that the consumption bundle of pensioners did not differ substantially from workers. With respect to our fourth research question, no evidence was found for a tipping point after retirement from which on consumption growth becomes negligibly small. Therefore, there is no reason to make pension benefits lower or dependent on age for pensioners. Moreover, one of our model investigates the inflation rates of the consumption bundle of pensioners and workers in order to answer the question: is the consumption bundle of pensioners susceptible to a different inflation rate than workers? Contrary to our initial expectations, we noticed that being retired did not statistically influence the inflation rate of the consumption bundle. Translating our models to implications for the indexation of pensions we found evidence that the consumption bundle of pensioners is not more susceptible to inflation rates than workers'. In conclusion, combining the findings that both the consumption bundles and the inflation rates do not differ substantially between pensioners and workers, we can provide an answer to our final research question: are there reasons to deviate from the current procedure for the indexation of pensions? We can state that we did not find evidence to deviate from the current procedure, where no distinction is made between pensioners and workers, for the indexation of pensions.

9 Appendix

	Food	*Clothing*	*Utility*	*Care*	*Leisure*	*Transport*	*House*
Constant	2.749	-4.344***	-0.512	2.065	-4.838*	-4.848	5.891
	(2.877)	(1.272)	(1.082)	(1.584)	(2.861)	(3.349)	(4.455)
ln(*C*)	-0.0714***	0.00705***	-0.0451***	0.0169***	0.0749***	0.0639***	-0.0534***
	(0.00380)	(0.00168)	(0.00143)	(0.00209)	(0.00377)	(0.00442)	(0.00588)
HH size	0.0353***	0.0101***	0.00281***	-0.00935***	-0.00839***	-0.000893	-0.0299***
	(0.00161)	(0.000711)	(0.000605)	(0.000886)	(0.00160)	(0.00187)	(0.00249)
Married	0.00945***	-0.00350***	0.00476***	-0.0107***	-0.0125***	0.00189	0.0142***
	(0.00298)	(0.00132)	(0.00112)	(0.00164)	(0.00296)	(0.00347)	(0.00461)
Middle education	-0.00729***	-0.00267***	-0.000323	0.00507***	0.00369**	0.00469**	-0.00172
	(0.00189)	(0.000834)	(0.000709)	(0.00104)	(0.00188)	(0.00220)	(0.00292)
High education	-0.00124	-0.00620***	0.00227**	0.0136***	0.00164	-0.00511	-0.00232
	(0.00288)	(0.00127)	(0.00108)	(0.00158)	(0.00286)	(0.00335)	(0.00445)
Male	0.0348***	-0.0160***	-0.00341***	0.00281**	-0.00666***	0.0137***	-0.0256***
	(0.00230)	(0.00102)	(0.000864)	(0.00127)	(0.00229)	(0.00268)	(0.00356)
House owner	-0.0227***	-0.00820***	0.00866***	-0.00965***	-0.0323***	-0.0152***	0.0872***
	(0.00202)	(0.000892)	(0.000758)	(0.00111)	(0.00200)	(0.00235)	(0.00312)
Age 55-60	0.0000377	0.00142*	-0.000166	0.000402	0.00211	0.00279	-0.00604**
	(0.00174)	(0.000770)	(0.000655)	(0.000959)	(0.00173)	(0.00203)	(0.00270)
Age 61-65	0.000834	0.000818**	-0.000748**	-0.000380	-0.00168**	-0.000825	-0.000812
	(0.000829)	(0.000367)	(0.000312)	(0.000456)	(0.000824)	(0.000965)	(0.00128)
Age 66-70	-0.00103*	-0.000626**	-0.000667***	0.00136***	0.000422	0.00134*	-0.00181*
	(0.000623)	(0.000276)	(0.000234)	(0.000343)	(0.000620)	(0.000726)	(0.000965)
Age 71-75	-0.000843	-0.000322	0.0000641	0.00212***	-0.000439	-0.00108	-0.00165
	(0.000664)	(0.000294)	(0.000250)	(0.000366)	(0.000660)	(0.000773)	(0.00103)
Age 75+	-0.00212***	-0.000311	-0.0000562	0.00221***	0.0000924	0.00209***	-0.00219**
	(0.000586)	(0.000259)	(0.000221)	(0.000323)	(0.000583)	(0.000683)	(0.000908)
Cohort 1890-1902	-0.00102	0.00223***	0.000548	-0.00116	0.00217	0.00217	-0.00237
	(0.00151)	(0.000668)	(0.000568)	(0.000832)	(0.00150)	(0.00176)	(0.00234)
Cohort 1903-1914	-0.000783**	0.0000315	-0.000814***	0.000831***	0.000186	0.00233***	-0.00330***
	(0.000353)	(0.000156)	(0.000133)	(0.000194)	(0.000351)	(0.000411)	(0.000547)
Cohort 1915-1926	-0.000128	-0.0000321	-0.000821***	-0.000484***	0.000333	0.00104***	-0.00150***
	(0.000271)	(0.000120)	(0.000102)	(0.000149)	(0.000270)	(0.000316)	(0.000420)
Cohort 1927-1938	-0.0000692	0.00141***	-0.000766***	-0.000929**	0.00138*	-0.000322	-0.00219**
	(0.000716)	(0.000317)	(0.000269)	(0.000394)	(0.000712)	(0.000834)	(0.00111)
Cohort 1939-1950	0.000764	-0.00195	0.00108	0.000940	0.000777	0.0111	-0.0123
	(0.348)	(0.154)	(0.131)	(0.192)	(0.346)	(0.406)	(0.540)
Observations	8,943	8,943	8,943	8,943	8,943	8,943	8,943

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Pensioners' consumption bundle 2SLS model

	Food	*Clothing*	*Utility*	*Care*	*Leisure*	*Transport*	*House*
Constant	12.21*	-1.435	9.889***	-8.396**	6.301	-2.991	-7.440
	(7.260)	(3.659)	(2.736)	(3.678)	(7.025)	(9.165)	(11.86)
ln(*C*)	-0.0607***	0.0185***	-0.0464***	0.0108***	0.0561***	0.0769***	-0.0645***
	(0.00447)	(0.00225)	(0.00169)	(0.00227)	(0.00433)	(0.00565)	(0.00731)
Unemployed	0.00401*	-0.00327***	-0.00350***	0.00106	-0.00590***	0.00934***	-0.00177
	(0.00221)	(0.00112)	(0.000834)	(0.00112)	(0.00214)	(0.00279)	(0.00362)
HH size	0.0284***	0.00346***	0.00375***	-0.00306***	-0.00258**	-0.00289*	-0.0263***
	(0.00121)	(0.000611)	(0.000457)	(0.000615)	(0.00117)	(0.00153)	(0.00198)
Married	0.00675**	-0.00226	0.00326***	-0.00848***	-0.00338	-0.000668	0.00588
	(0.00288)	(0.00145)	(0.00108)	(0.00146)	(0.00278)	(0.00363)	(0.00470)
Middle education	-0.00879***	-0.00154	-0.000601	0.00366***	0.00421**	0.00335	0.000938
	(0.00206)	(0.00104)	(0.000777)	(0.00104)	(0.00199)	(0.00260)	(0.00337)
High education	-0.0128***	-0.00695***	0.00276**	0.0129***	0.0138***	-0.00606	-0.000228
	(0.00328)	(0.00166)	(0.00124)	(0.00166)	(0.00318)	(0.00415)	(0.00537)
Male	0.0342***	-0.0121***	0.000922	-0.000568	-0.00699***	0.00473	-0.0203***
	(0.00238)	(0.00120)	(0.000896)	(0.00121)	(0.00230)	(0.00300)	(0.00389)
House owner	-0.0157***	-0.0114***	0.00779***	-0.00710***	-0.0268***	-0.0280***	0.0870***
	(0.00214)	(0.00108)	(0.000806)	(0.00108)	(0.00207)	(0.00270)	(0.00350)
Age 55-60	0.000279	0.000711**	-0.000959***	-0.000192	0.00122*	-0.000135	-0.00170
	(0.000676)	(0.000341)	(0.000255)	(0.000342)	(0.000654)	(0.000853)	(0.00110)
Age 61-65	-0.000718	-0.000900**	0.000129	0.000489	0.000484	0.00165*	-0.00227*
	(0.000745)	(0.000375)	(0.000281)	(0.000377)	(0.000721)	(0.000940)	(0.00122)
Age 66-70	0.000977	-0.000861*	-0.000815**	0.00144***	-0.000743	-0.000513	-0.00166
	(0.000927)	(0.000467)	(0.000349)	(0.000470)	(0.000897)	(0.00117)	(0.00151)
Age 71-75	-0.00318***	-0.000955*	0.000716*	0.00322***	0.00148	-0.000866	-0.00153
	(0.00112)	(0.000566)	(0.000423)	(0.000569)	(0.00109)	(0.00142)	(0.00183)
Age 75+	0.000328	-0.00162***	-0.000213	0.00274***	-0.00116	0.000286	-0.00306*
	(0.00103)	(0.000519)	(0.000388)	(0.000522)	(0.000996)	(0.00130)	(0.00168)
Cohort 1890-1902	-0.00605	0.000677	-0.00490***	0.00438**	-0.00358	0.00123	0.00456
	(0.00382)	(0.00192)	(0.00144)	(0.00193)	(0.00369)	(0.00482)	(0.00624)
Cohort 1903-1914	-0.000283	-0.000991***	0.000293	0.00113***	-0.000772	0.000147	-0.00243***
	(0.000573)	(0.000289)	(0.000216)	(0.000290)	(0.000554)	(0.000723)	(0.000936)
Cohort 1915-1926	-0.000359	-0.000544***	-0.00107***	0.0000557	0.00136***	0.00130***	-0.00215***
	(0.000341)	(0.000172)	(0.000128)	(0.000173)	(0.000330)	(0.000430)	(0.000556)
Cohort 1927-1938	-0.000541	0.000355*	-0.000505***	-0.000286	0.000804**	0.000627	-0.00148**
	(0.000363)	(0.000183)	(0.000137)	(0.000184)	(0.000351)	(0.000458)	(0.000593)
Cohort 1939-1950	0.0203	0.00932	-0.00256	0.00597	0.00859	-0.00439	-0.0372
	(0.0154)	(0.00777)	(0.00581)	(0.00782)	(0.0149)	(0.0195)	(0.0252)
Observations	7,248	7,248	7,248	7,248	7,248	7,248	7,248

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Workers' consumption bundle 2SLS model

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