

Households' Spending over the Life-Cycle:

What Drives Spending Declines in Retirement?

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Colophon

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Abstract

We have studied how household spending has evolved over the life cycle by using detailed longitudinal data for the Netherlands. Spending appears to have followed a pronounced hump-shaped profile subsequently leading to a gradual decline from age 55 onward. This decline continues throughout retirement and remains very substantial even after having controlled for labour market status, household structure, income, health, housing, cohort effects, and other unobserved fixed effects. We have observed the same decline across income and education groups. This decline does not appear to have been accompanied by increasing financial distress, which thus suggests that it is unlikely that it reflects liquidity constraints or inadequate pension resources. Disaggregated analyses show that falling mortgage expenditures and declines in the number of the holidays taken, amount of clothing purchased, transport used, and food consumed accounts for much of the total spending pattern, while some service categories have increased modestly. Interestingly, medical care spending does not increase significantly. The results indicate that the decline in spending during retirement is systematic and predictable, with implications for the design and timing of pension payouts in systems that possess limited liquidity.

Keywords: Consumption, Life-Cycle Model, Panel Data

JEL Codes: D12, D91, J26

Samenvatting

In het kader van de Wet toekomst pensioenen (Wtp) is een “koopkrachtig pensioen” en de inrichting van de uitkeringsfase opnieuw onderwerp van debat. Een centrale vraag is in hoeverre pensioenuitkeringen gericht moeten zijn op een stabiele koopkracht gedurende de pensioenperiode, of juist ruimte moet bieden voor meer flexibiliteit in de tijd, bijvoorbeeld via hoog-laag constructies of gedeeltelijke *lump-sum* opnames bij pensionering. Daarnaast beïnvloeden ook de keuze van het projectierendement binnen de solidaire premieregeling en de toepassing van een vaste daling binnen flexibele premieregelingen de ontwikkeling van pensioenuitkeringen gedurende de pensioenperiode. Deze studie levert nieuwe empirische inzichten die direct bijdragen aan deze beleidsdiscussie.

Empirische bevindingen Op basis van unieke longitudinale Nederlandse data over huishoudbestedingen laten wij zien dat de uitgaven een duidelijk bultvormig patroon volgen over de levensloop. De bestedingen nemen toe tot middelbare leeftijd, maar dalen vervolgens geleidelijk vanaf ongeveer 55 jaar en blijven dalen gedurende het pensioen. Deze daling is substantieel en houdt aan nadat wij controleren voor veranderingen in inkomen, arbeidsmarktpositie, huishoudsamenstelling, gezondheid, en cohorteffecten.

Belangrijk is dat de daling in bestedingen zich ook voordoet bij huishoudens met relatief hoge inkomens en substantiële (woning)vermogens. Bovendien neemt het aandeel huishoudens met betalingsproblemen af op hogere leeftijden. Dit suggereert dat de daling in bestedingen niet primair wordt veroorzaakt door liquiditeitsrestricties of ontoereikende pensioenopbouw.

Verklaringen voor de bestedingsdaling De uitsplitsing naar bestedingscategorieën laat zien dat verschillende structurele factoren bijdragen aan de daling. Een belangrijk deel hangt samen met afnemende hypotheeklasten door aflossing. Daarnaast dalen uitgaven aan onder andere vakanties, kleding, vervoer, en voeding. Tegelijkertijd stijgen sommige categorieën licht, zoals uitgaven aan schoonmaak en tuinonderhoud, mogelijk als substituuut voor eigen fysieke inspanning. Uitgaven aan medische zorg stijgen niet significant.

Het totale beeld wijst erop dat veranderende behoeften en voorkeuren met de leeftijd een belangrijke rol lijken te spelen. Naarmate mensen ouder worden, verandert de samenstelling van hun consumptie en neemt de vraag naar marktgoederen geleidelijk af, zonder dat dit noodzakelijkerwijs een daling in welzijn impliceert.

Implicaties voor de uitkeringsfase onder de Wtp De Nederlandse tweede pijler kenmerkt zich door beperkte liquiditeit: pensioenvermogen kan in beginsel niet vrij worden aange-

wend of vervroegd worden opgenomen. Dit betekent dat niet alleen de hoogte, maar ook de timing van pensioenuitkeringen van belang is voor het welzijn.

Onze bevindingen suggereren dat een strikt vlak uitkeringsprofiel mogelijk niet optimaal aansluit bij de feitelijke gemiddelde ontwikkeling van consumptiebehoeften tijdens het pensioen. Als bestedingen structureel dalen met de leeftijd, kan enige mate van flexibiliteit in de uitkeringsfase welvaartsverhogend zijn. In dat licht zijn de mogelijkheden van een hoog-laag uitkering of een lumpsum bij pensionering van maximaal 10% van het pensioenvermogen beleidsmatig relevant. Een dergelijke beperkte *front-loading* van inkomen kan beter aansluiten bij hogere bestedingen in de eerste jaren na pensionering.

Conclusie In dit onderzoek vinden we dat bestedingen van huishoudens afnemen gedurende pensionering, terwijl de ervaren financiële ruimte om rond te komen niet verslechtert. Dit betekent dat beleidsdiscussies over pensioenadequaatheid niet uitsluitend moeten worden gebaseerd op het streven naar koopkrachtbehoud op hoge leeftijd. Bij de vormgeving van de uitkeringsfase onder de Wtp verdient het aanbeveling rekening te houden met de levensloopdynamiek van consumptie. Beperkte flexibiliteit (met een hogere startuitkering) kan beter aansluiten bij het feitelijke bestedingspatroon van gepensioneerden. Het uitvoeren van een volwaardige simulatie die, voortbouwend op onze resultaten, het effect van dergelijke beleidsmaatregelen schat en de potentiële welvaartseffecten ervan meet, is een veelbelovende richting voor toekomstig onderzoek.

1. Introduction

“Wealth consists not in having great possessions, but in having few wants.” – Epictetus

The canonical life-cycle model (Modigliani and Brumberg, 1954) predicts that rational households smooth the marginal utility of consumption over a lifetime, saving during working years and drawing down assets in retirement. However, the empirical literature has established a series of stylized facts suggesting that actual behavior often does not align well with these predictions. For instance, the literature reports discontinuous spending drops at the time of retirement (Banks et al., 1998; Battistin et al., 2009; Been et al., 2021), although the existence and size of the discontinuity differ markedly across countries.¹ In addition, the literature consistently finds that the decline in savings during retirement is quite slow, as individuals often appear to continue saving even after retirement (De Nardi et al., 2016; Christensen et al., 2022; French et al., 2023; Olafsson and Pagel, 2024).

A related discussion that is less often addressed in the literature concerns the evolution of consumption spending over the life cycle. As mentioned above, the literature often focuses on how consumption changes at retirement, but less so on how it develops before and after this particular event. In the present study, we make a novel contribution by investigating the drivers of consumption during the life cycle, with a particular focus on the retirement years. Given the current context of population aging and pension system reforms, it is crucial to investigate consumption dynamics and their relation to consumption preferences and pension income. By gaining an understanding of this relationship, important implications for policies related to household spending capacity and pension adequacy can be implemented. In particular, it is relevant for policies that determine pension indexation and the timing and structure of the payout phase.

In order to carry out our analysis, we have employed unique and detailed longitudinal data on household consumption spending from the Longitudinal Internet Studies for the Social Sciences (LISS) for the Netherlands, covering a period of 12 years (from 2009 to 2021). Importantly, the data not only provide information on total consumption, but they are especially unique in containing rich information on a wide range of spending subcategories. We exploit this information to estimate life-cycle consumption profiles while accounting for the effects of relevant variables such as labour market status, household structure, income, and health, among others. Furthermore, the longitudinal structure of the data also allows us to control for cohort effects and other time-invariant unobserved heterogeneity.

¹ The estimated effect varies even within countries across studies using the same data source: based on the Consumer Expenditure Survey for the US, Laitner and Silverman (2005) find a drop of about 15%, while Fisher et al. (2008) find a drop of about 5%.

The existing literature that estimates life-cycle consumption profiles does this, in most cases, by using data from the Consumer Expenditure Survey for the US (Gourinchas and Parker, 2002; Aguiar and Hurst, 2013; Pagel, 2017; Banks et al., 2019). An important drawback to using these data is their repeated crosssectional structure. In our data, we follow households over time and we are better able to control for cohort effects and other unobserved heterogeneity that is fixed over time. Furthermore, as explained in depth by Banks et al. (2019), the particular institutional setting in the US implies that the consumption patterns observed there cannot be easily extrapolated to the European context, especially when it comes to spending patterns during retirement. To our knowledge, the only other study of consumption trajectories using longitudinal data is Hurd and Rohwedder (2023). The latter employ the Consumption and Activities Mail Survey, a supplemental study to the US Health and Retirement Study. This is the only source available, other than the LISS, with longitudinal micro data on disaggregated spending. However, Hurd and Rohwedder (2023) do not exploit the subcategories of consumption and they only focus on individuals aged 65+, which does not allow for a full life-cycle perspective.²

This current study makes a substantial contribution by exploiting longitudinal variation over a long period and it does this by disaggregating total expenditure into a large number of subcategories. Our analysis clarifies that the unique panel structure of the data is crucial for identifying consumption patterns before and after retirement while disentangling age and cohort effects. We also show that understanding economic well-being requires observing not just how much households spend, but how they adjust the composition of their spending in response to aging, health, income, labour market transitions, and changing family circumstances. To our knowledge, we are the first to estimate life-cycle spending patterns by fully exploiting variation within households and across spending categories, while at the same time accounting for the effect of relevant economic and demographic factors at the household level. In doing so, we are not only contributing to the academic literature, but we are also drawing attention to important implications for pension income adequacy and the optimal design of the pension payout phase.

Our empirical results show a pronounced and economically meaningful hump-shaped life-cycle profile in household spending. Spending increases during young adulthood, then it plateaus around 40 and 50, and then begins a gradual but persistent decline from approximately age 55 onward. This downward trajectory continues throughout retirement. When we estimate profiles using pooled OLS, the decline appears substantial; however,

2 Christensen et al. (2022) also carried out a longitudinal study of the evolution of consumption after retirement, in this case using Danish administrative data. However, their data do not offer direct information on consumption spending; instead, they estimate consumption using information on wealth and income. As explained by Suari-Andreu (2021), this method cannot easily distinguish between changes in wealth due to consumption, and the changes due to capital gains and losses.

once we have exploited the panel structure of the data and control for cohort effects and other unobserved heterogeneity across households, we can then observe an even steeper decline starting at age 55. This indicates that a considerable part of the spending reduction occurs within households over time, rather than reflecting differences across birth cohorts.

The decline in spending persists after controlling for a comprehensive set of observable factors, including labour market transitions such as retirement and unemployment, family structure changes such as divorce and widowhood, net household income quartiles, educational attainment, health status, housing tenure, and housing wealth. While retirement itself is associated with a modest discrete reduction in spending, this effect is slight in relation to the overall life-cycle decline. Moreover, the age profile remains strongly downward sloping even after accounting for income changes and retirement status, suggesting that the decline is not driven by income reductions at or during retirement. Complementary analyses provide further evidence against income and liquidity constraints as they are viewed as being relevant factors in explaining declining consumption. Household net income declines only moderately at an older age, and reported financial distress as measured by difficulties making ends meet falls rather than rises after retirement. In addition, the downward spending profile is observed across income tertiles and diverse education groups, indicating that the pattern is not confined to lower-income households.

Disaggregating total spending into detailed subcategories provides additional insight into the mechanisms underlying the aggregate pattern. Mortgage-related expenditures decline strongly at an older age, reflecting mortgage redemption. We also observe sizeable declines in spending on holidays, clothing, transport, and food consumed at home. By contrast, some categories, such as spending on cleaning and gardening services, increase modestly with age, consistent with substitution away from own physically demanding activities at older ages. Interestingly, we could not find any empirical evidence that expenditures increase in the category of medical care. The broad-based but category-specific nature of the decline suggests that changes in preferences, needs, and time allocation over the life cycle play a central role.

All things considered, the evidence we provide indicates that the decline in retirement spending is large, systematic, and largely predictable. It reflects gradual within-household adjustments in spending patterns rather than abrupt changes. These findings are directly relevant for pension design, particularly in systems with illiquid pension wealth and flat payout profiles. They are in line with prior evidence provided by Bonekamp and van Soest (2022) concerning the preferences stated regarding income and spending during retirement. Importantly, they indicate that alternative arrangements such as 10% of pension wealth as a lump sum at retirement or a high-low pension income profile could be a better fit with households' preferences.

2. Institutional Context

The Dutch pension system is composed of three pillars. The first pillar consists of a public pension that is capped at a monthly amount equal to 70% of the minimum wage. Individuals accumulate 2% of the maximum amount for each year that they have worked or lived in the Netherlands. The payments start at the statutory retirement age. The second pillar consists of occupational private pensions. They are managed at the sectoral level and about 90% of employees have a mandatory scheme. The third pillar consists of private pension plans offered by banks and insurance companies. The third pillar is typically very small, with the majority of individuals relying mostly on the occupational pension.³

When combining all three pillars together, Knoef et al. (2016) showed that the net replacement rate is close to 100%. They concluded that poverty and income uncertainty are less often a problem among retirees than among the working age population. Regarding the evolution of household consumption and wealth during retirement, Been and Goudswaard (2023), and Koopmans et al. (2025) report no major changes at the time of retirement while van Ooijen et al. (2015) and Suari-Andreu et al. (2019) show very limited wealth decumulation afterwards. What is worth noting is that out-of-pocket medical expenses are limited (Bakx et al., 2016; Kools and Knoef, 2019) and (non-medical) spending responses to health changes are relatively small (van Ooijen et al., 2018). These prior findings suggest that potential changes in spending during retirement is unlikely to reflect income constraints. Nevertheless, it is important to note that future developments may make the present replacement rates less generous and more uncertain. Therefore, the institutional framework in which our study takes place may not be representative for future cohorts operating in a reformed context.

One potential key drawback of the system is the limited liquidity of pension wealth. Pension entitlements cannot be used as a collateral for borrowing and there is no scope for lump-sum withdrawals at retirement. This implies that households cannot currently shift resources intertemporally to accommodate their preferred consumption path during retirement. This characteristic of the pension system does hedge individuals against longevity risk. However, it also implies that modifications in the timing of pension income can potentially be conducive to increasing welfare.

3 For more details on the Dutch pension system, see Knoef et al. (2016) and Jensen et al. (2020).

3. Empirical Model

The empirical literature identifies several drivers of consumption over the life-cycle. The most important are retirement (Been et al., 2021; Koopmans et al., 2025), unemployment (Been et al., 2024), marriage (Blow et al., 2009), having children (Browning and Ejrnæs, 2009), divorce (Bonnet et al., 2021), widowhood (van der Vaart et al., 2020), (un)expected income changes (Jappelli and Pistaferri, 2010; Misra and Surico, 2014), health (Finkelstein et al., 2013; Kools and Knoef, 2019), and housing (Berger et al., 2018; Suari-Andreu, 2021). In this section, we estimate the life-cycle profile of household consumption spending while at the same time, controlling for the factors mentioned and identified in the literature.

To do so, we have set up the following regression equation:

$$c_{jit} = \delta_j + \beta' \text{Age}_{it} + \gamma' R_{it} + \theta' F_{it} + \kappa' I_{it} + \zeta' H_{1it} + \pi' H_{2it} + \alpha_{ji} + \lambda_{jt} + \varepsilon_{jit}, \quad (1)$$

where c_{jit} denotes spending in consumption category j by household i in period t , Age_{it} is a vector containing a set of age dummy variables, R_{it} is a vector of job market dummies (capturing retirement and unemployment transitions among others), F_{it} is a vector with family structure indicators (measuring family transition such as divorce and widowhood among others), I_{it} is a vector with income quartile and educational level dummies,⁴ and H_{1it} and H_{2it} are vectors including general health indicators (that is, a set of dummies capturing general self-reported health starting from poor to moderate, good, and very good) and housing variables (a dummy variable for home ownership and a numerical variable measuring net housing wealth) respectively. Finally, $\alpha_{ji} + \lambda_{jt} + \varepsilon_{jit}$ is the composite error term, where the first element captures unobserved variation between households, the second captures unobserved variation over time, and the last element captures all of the unobserved factors that vary both between individuals and over time.

This empirical specification allows us to investigate the life-cycle profile of household consumption spending by estimating the coefficients in the β_j vector. To do so, we first estimate Equation 1 for total spending and for each subcategory by OLS, thus pooling variation between households and over time. We then estimate the same coefficients, but we include household fixed effects in the specification, which allows us to control for any endogeneity caused by a likely correlation between α_{ji} and the regressors. This method controls for unobserved cohort effects, i.e. differences in consumption across birth cohorts that are likely to correlate with age and other regressors included in the specification. We do not include year dummy variables in our estimation since, as explained by Bell and

4 We include educational level as well because it correlates with income whereas it is more stable than the latter throughout the life-cycle.

Jones (2013) among others, that would create a so-called age-period cohort identification problem. This is because there is perfect collinearity between these three factors, which means that they cannot be identified separately. We will be returning to this issue in Section 4.2, where we provide descriptive evidence on age, period, and cohort effects supporting the decision to exclude year dummies from the specification.

Another important caveat to take into consideration is that variables, such as health and income, are potentially endogenous with respect to consumption and/or age. Therefore, it is important to note that our study has more of a descriptive character. Nevertheless, the age profiles we employ as estimates provide useful information so that we can understand which factors, directly or indirectly, might explain how consumption evolves over the life cycle. These correlational findings still represent valuable input that can be employed in order to evaluate and inform existing and future policy.

4. Data

4.1 The LISS Panel

To implement the empirical strategy, we have used data from the Longitudinal Internet Studies for the Social Sciences (LISS), administered by CentERdata at Tilburg University. The LISS Core Study provides information on a wide range of topics for a sample representative of the Dutch population and has been running each year since 2007. The 2009, 2010, 2012, 2015, 2017, 2020, and 2021 waves have been supplemented by a module on household spending. In 2020, two waves of the module were fielded, one in April and the other one in November. Importantly, these data are unique in providing a large list of expenditure categories that have been integrated into one longitudinal dataset.⁵ By unpacking consumption into subcategories, we are subsequently able to conduct an unprecedented detailed analysis regarding spending behaviour. With this analysis, we can better identify and explain the mechanisms behind the observed patterns in total household consumption, hence helping us to understand better the age profiles we wish to estimate.

The LISS collects data on spending by means of retrospective questions asking respondents to report the amount of euros spent on average per month taking the past 12 months as a period of reference. For the waves from 2009 until 2017, respondents have been asked about their spending categories at the household level and at the individual level separately. The household level categories are house cleaning and gardening, daycare, transport, utilities, holidays, mortgage, rent, insurance, alimony, debt (other than mortgage), food at home, and other.⁶ The individual level categories are food outside the home, leisure, tobacco, clothes, personal care, medical care, schooling, donations, and other. The categories reported at the individual level are only available for the 2009, 2010, and 2012 waves. For the 2015, 2017, and 2019 waves, the LISS only provides the total of individual expenditures for each household member without the breakdown by category.⁷ Since the line separating individual level from household level expenditures is rather arbitrary, we have added up all of the responses to the individual categories within a household, and therefore we have considered them at the household level as well.

As for the waves from 2019 until 2021, the survey no longer distinguishes between spending at the household level and at the individual level. In these waves, respondents were asked about all the categories considered at the household level from 2009 until 2017 plus food consumed outside the home, clothes, medical care, schooling, and donations.

5 Comparable data for the US are provided by the Consumption and Activities Mail Survey (CAMS) as a supplement to the Health and Retirement Study. However, the CAMS provides information on spending only for those aged 50 and above.

6 Spending on holidays is not included for the first of the two 2020 waves.

7 Only medical care is still included separately in the 2015, 2017, and 2019 waves.

However, this time the latter has been added to the list at the household level.⁸ The changes mentioned in the survey have left us with a list of categories that has slightly changed over time. Nevertheless, since the category *other* is included in all of the waves, we can add up all the categories available in order to calculate a measure of total household spending per wave. To be able to compare spending categories over different waves, we have deflated all of the categories by using the consumer price index.

Finally, given that in order to make our analysis all of the spending categories have been considered at the household level, we have only selected heads of households to avoid double counting. This means that all individual level variables in our analysis, such as age and labour market status, refer to the head of the household.⁹ This leaves us with a sample for the total spending variable containing 8,467 household heads and 32,628 household-year observations. Tables A.1 and A.2 in Appendix A provide a summary of the statistics for all the variables we have employed in the analyses, i.e. all spending variables and all of the control variables we have included in the analysis as well. Table A.1 also provides the sample size for each specific spending category and it refers to the waves for which each spending category is included. We have adjusted to allow for inflation in all of the variables expressed in euros. We have indeed used the CPI to express all amounts in terms of 2015 prices.

4.2 Descriptive Statistics

Figure 1 shows the average monthly household spending by age, period, and cohort. It does so by providing average spending for 13 different five-year birth cohorts born between 1930 and 1999. Consumption appears to follow a hump-shaped profile over the life cycle, with a steep increase from ages 24 to 35 followed by a plateau (at about € 2,300 per month) and a persistent decline from ages 55 onward (to about €1,600 per month). Interestingly, within most age categories, average spending is lower for younger cohorts, indicating that younger cohorts tend to spend less than older cohorts. Furthermore, Figure 1 suggests that there are no clear time effects influencing consumption for all of the cohorts that are simultaneously pointed in the same direction. This is because it appears that, over time (which in Figure 1 correlates with age), consumption increases for some cohorts whereas for others it declines or it does not clearly change. Therefore, Figure 1 supports our methodological decision, explained in Section 3, which is to control for cohort effects while at the same time excluding time effects from the specification. Nevertheless, note that the summary statistics in Figure 1 do not control for any of the variables included in Equation 1, thus meaning that the

⁸ Spending on leisure has also been added again to the list of categories, but only in the 2021 wave.

⁹ The LISS defines the household head as the highest earner in a household. If the household head has responses missing for consumption spending, then we have taken those that belong to the partner of the household head. This is the case regarding 17.42% of household-year observations in our sample.

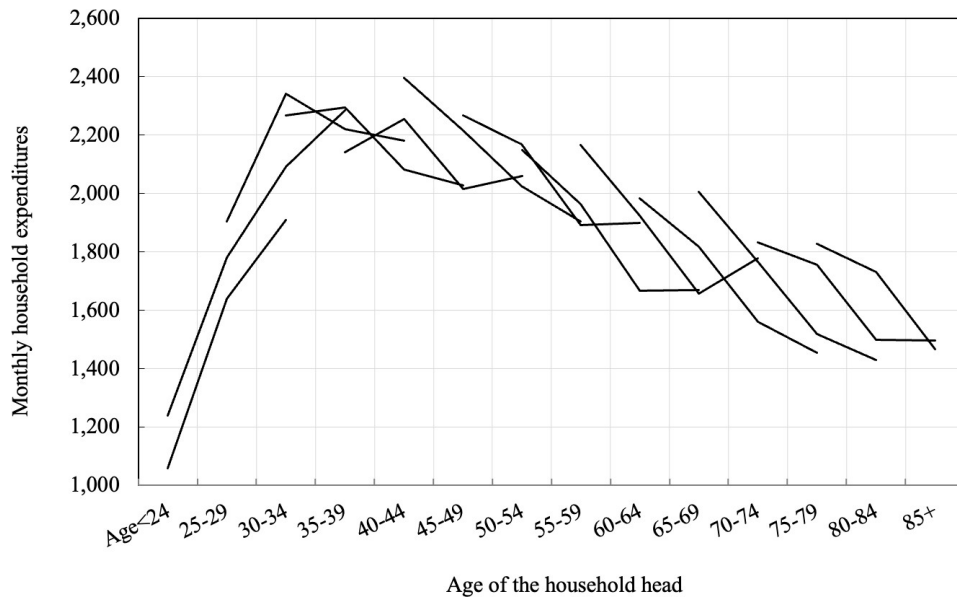
observed decline after age 55 might be explained by changes in factors such as income, health, or household structure.

A relevant question that appears when looking at Figure 1 is whether the decline in consumption we observed in the final decades of the life cycle is due to the drop in income that individuals experience at and/or during retirement. It could simply be that households have not saved enough to maintain their consumption level, which means that they may be constrained by a lower income later in life. Knoef et al. (2016) show that, on average, in the Netherlands, the net individual income remains largely unchanged when individuals retire. However, this is not necessarily the case at the household level. In addition, real income may decline during retirement because inflation erodes purchasing power and private pension benefits are not always fully indexed to price increases. Figure 2 shows the same age, period, and cohort structure as Figure 1, but in this case it represents monthly net-household income. Moreover, we see a hump-shaped profile, but it shows a smoother decline during the later decades starting somewhat later in life (ages 60+). This time no directly observable cohort effects can be seen and, again, there do not seem to be any clear time effects.

It could be that the decline we can observe in income is partially driving the decline in consumption. However, note that average income declines from over €3,000 to about €2,500, while Figure 1 shows that consumption for the corresponding age groups is significantly lower. Therefore, when comparing Figures 1 and 2 we perceive that the average household is unlikely to be liquidity constrained for ages 50+. ¹⁰ To further understand the relationship between income and consumption spending at a descriptive level, Figure 3 provides the same statistics as the two previous figures, but this time it refers to a variable measuring whether households are able to make ends meet. Each year, the LISS asks respondents whether they have any trouble making ends meet at the end of the month, to which they can answer yes or no. We have constructed a dummy variable taking value one if the answer is yes, and we have used it to create Figure 3.

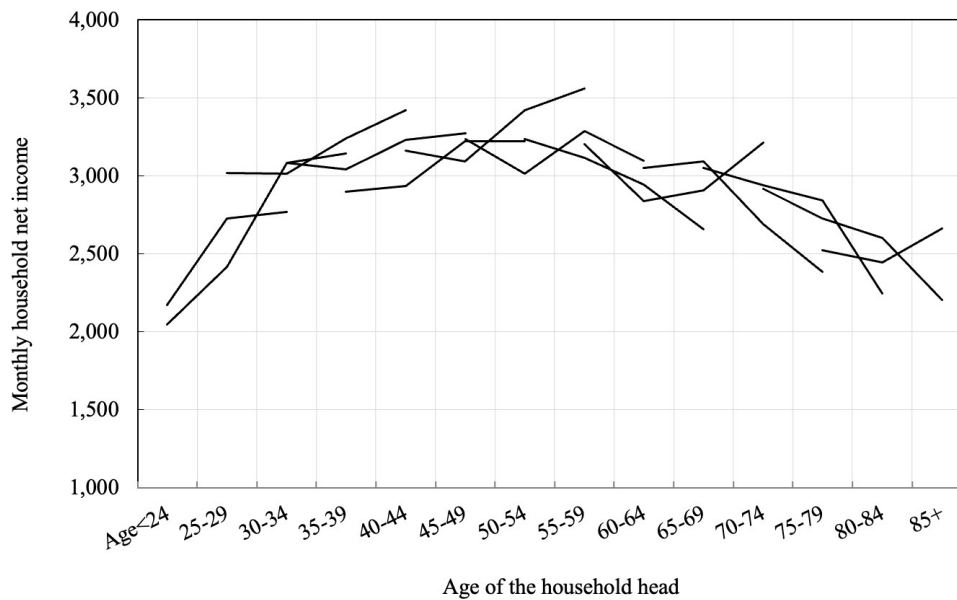
¹⁰ Note that for younger ages (below 40) average consumption does appear closer to average income, thus indicating that younger households are more likely to be liquidity constrained.

Figure 1: Monthly Household Spending by Age, Period, and Cohort



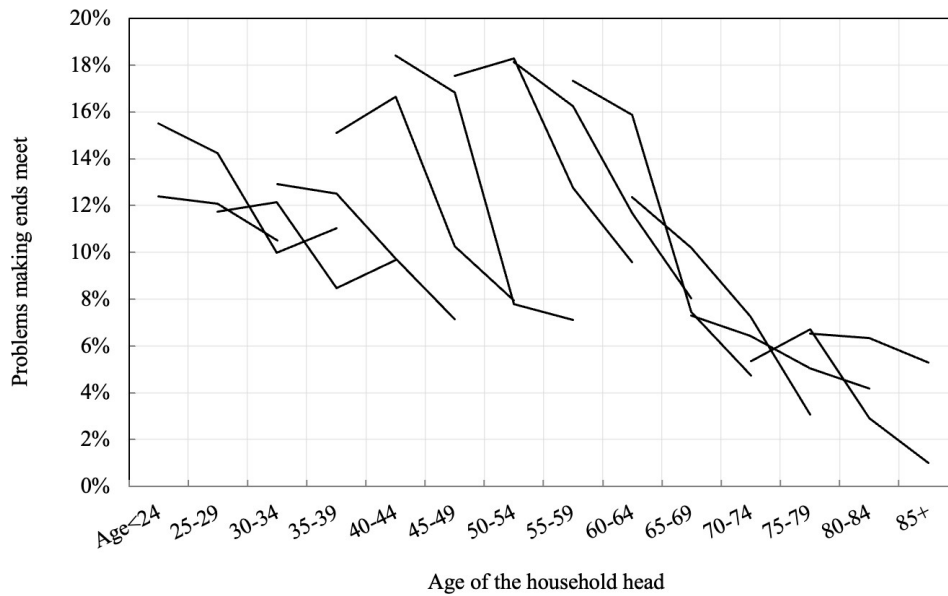
Note: Each data point refers to average monthly household spending for a particular age group, period, and cohort. There are 13 five-year birth cohorts born between 1935 and 1999. For more details, see the main text.

Figure 2: Monthly Household Income by Age, Period, and Cohort



Note: Each data point refers to the average monthly household net income for a particular age group, period, and cohort. There are 13 five-year birth cohorts that were born between 1935 and 1999. For more details, see the main text.

Figure 3: Probability of Problems Making Ends Meet by Age, Period and Cohort



Note: Each data point refers to the percentage of households which reported that they had problems making ends meet for a particular age group, period, and cohort. There are 13 five-year birth cohorts born between 1935 and 1999. For more details, see the main text.

Figure 3 shows a clear decline for ages 50+ with what appear to be strong cohort effects for ages between 35 and 60, with older cohorts having more trouble making ends meet than younger ones. Nevertheless, Figure 3 shows that the share of households having trouble making ends meet clearly declines during the last decades of the life cycle. The share of households answering yes decreases to below 10% for the 65-69 age group and then it falls further to below 5%. Combined with the evidence presented in Figure 2, this would suggest that the decline in consumption spending observed in Figure 1 is unlikely to be due to liquidity constraints.

5. Estimation Results

In this Section 5, we turn to the estimation of Equation 1 to investigate the role of the different mechanisms mentioned in Sections 3 and 4.2 that could potentially explain the consumption path that we have observed. We proceeded in four steps: (i) pooled OLS without controls, (ii) fixed effects without controls, (iii) pooled OLS with controls, and (iv) fixed effects with controls.

We started first by looking at the total consumption spending and then we turned to the different spending categories that we could observe. After that, we conducted an analysis using income and the problem of making ends meet as dependent variables and we also carried out a heterogeneity analysis.

5.1 Total Consumption Spending

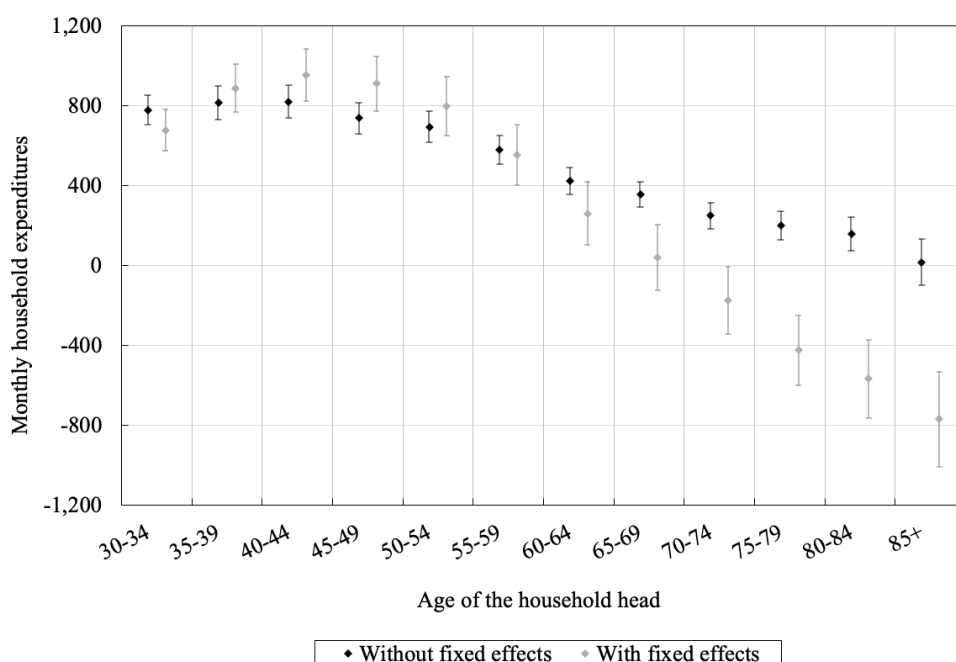
Figures 4 and 5 show the life-cycle profiles we obtained when estimating Equation 1 by using total consumption spending as the dependent variable. Figure 4 provides the results without control variables, while Figure 5 provides the results when we included control variables in the specification. In both cases, we show results with and without including fixed effects to control for cohort effects and other time-invariant unobserved heterogeneity. The point estimates in all of the resulting figures correspond with the age-group dummies included in the vector Age in Equation 1. These are five-year age-group dummy variables. Households with a head of household under 30 years of age have been used as the reference group. Figure 4 shows that without control variables and without fixed effects we can estimate a hump-shaped profile with a smooth decline in spending that becomes more substantial from ages 55 onward. At peak spending ages, households spend about €800 more on monthly consumption compared to households under the age of 30. The subsequent decline has brought consumption back, by age 85+, to a level that is not significantly different from that of the reference group.

Interestingly, when controlling for cohort effects by including fixed effects in the specification, we obtained a profile that is similarly hump-shaped but which has a steeper decline after age 55. For the early decades in the life cycle, the two profiles shown in Figure 4 are not significantly different from one another. It is only from ages 65 onward that the fixed effects estimation yields a profile with a steeper decline. This profile shows how during the retirement years spending steadily decreases to end up at a level about €800 below the reference category, which is a very significant decline. The difference between the two profiles in Figure 4 can be related to what we see in Figure 1. That is, in Figure 1 we have already observed a decline in consumption spending in the later phase of the life cycle, but we also see that older generations tend to spend more than younger ones. This is particularly the case for ages over 60. Therefore, it should be no surprise that the spending profile

becomes steeper when we control for cohort effects in Figure 4, since part of the decline in spending at older ages takes place within cohorts instead of between them. Note that some of the coefficients reported in Figure 4 (and also in the figures that follow) are negative. That is because, as we mentioned in the previous paragraph, all age-group coefficients are estimated by using households whose heads of household are younger than 30 as a reference group. A negative coefficient means a lower consumption compared to that group.

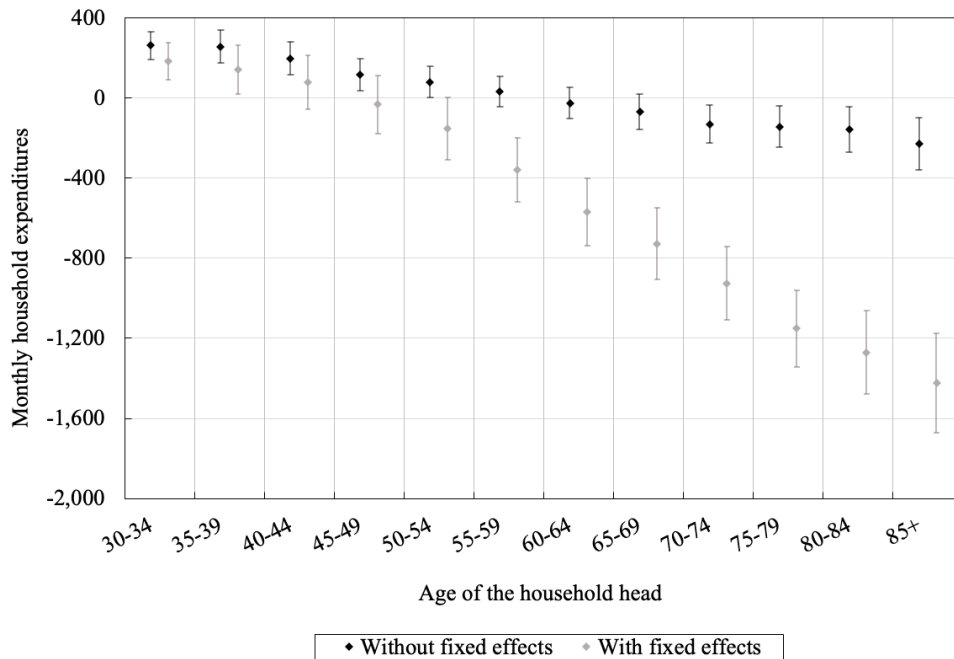
However, Figure 4 still does not account for the background variables in Equation 1. Therefore, it could still be that the decline we have observed can be attributed to health deterioration and/or for instance, changes in family structure. Figure 5 shows that when we include control variables but exclude fixed effects, the consumption profile becomes significantly flatter. There is no hump-shape and we still observe a decline, but that is not great (compared to the average spending levels observed in Figure 1) and it is significantly smaller than the declines observed in Figures 1 and 4. This indicates that the control variables we have included in the specification might account for the decline in spending later in life. Nonetheless, when we add fixed effects to the specification with control variables Figure 5 an even steeper decline than the one in Figure 4 is shown. In this case, the decline becomes clearly significant at age 55, and it steadily brings consumption spending down to a level that, by ages 85+ is about €1,500 lower than the reference category. Compared to the average levels in Figure 1 this is a very significant decline, both statistically and economically.

Figure 4: Monthly Total Household Spending (Without Controls)



Note: Results are obtained by estimating Equation 1 without control variables. They are based on 32,628 household-year observations. Younger than 30 is the reference group.

Figure 5: Monthly Total Household Spending (With Controls)



Note: Results have been obtained by estimating Equation 1 with control variables. They are based on 32,628 household-year observations. Younger than 30 is the reference group.

Table 1 shows the results we obtained for the control variables in the specification. It is interesting to study these coefficients since they shed light on the mechanisms pointed out in the literature. The coefficient estimates for the labour market dummy variables show that households with a self-employed household head tend to spend more. However, the estimate for self-employment becomes statistically insignificant once we control for fixed effects, suggesting that self-employment partly captures time-invariant individual characteristics. Transitions to unemployment do decrease consumption somewhat (about €150 per month, compared to being an employee, i.e. the reference category). For the student and not active categories we estimate as well significant negative coefficients, which become even greater when using only within-household variation in the estimation. For being disabled, we estimate a smaller and not significant coefficient, whereas for retirement we find a significant decrease. Namely, the transitions of heads of households into retirement lead to a drop of about €100 in household spending. The negative coefficient is in line with the literature studying the size of the change in spending at retirement (Banks et al., 1998; Battistin et al., 2009; Been et al., 2021). However, the effect we estimate is comparatively small: under 5% of the average consumption spending of employees and the self-employed, i.e. €2,145 per month. The small effect is likely due to the close to 100% average replacement rate in the Netherlands documented by Knoef et al. (2016). Important to note is that the retirement transition effect is economically small (about €100) relative to the cumulative age gradient (about €1,500), implying that gradual aging effects predominate

discrete retirement effects. This is in line with the preferences for the smoothing of leisure and consumption of Dutch retirees, as suggested by Kantarcı et al. (2025).

Marital status transitions also appear to be relevant. We estimated a statistically insignificant coefficient for being separated, but we also estimated clear negative coefficients of divorce, widowhood, and never married.¹¹ The estimates become considerably larger when including fixed effects in the specification. We estimated the largest coefficients for widowhood (a drop of about €350) and for never married (a drop of about €300).¹² The negative effects of divorce, widowhood, and never married indicate that, as argued by Blow et al. (2009) and Mansour and McKinnish (2014) among others, consumption spending is complementary to having a partner. As expected, Table 1 also shows that income appears to be positively associated with spending. Interestingly, the coefficient estimate consistently doubles when moving up a quartile in the household net income distribution. This is the case for both estimations reported in Table 1, even though the estimates are significantly smaller for all quartile dummies when using only within-household variation.¹³ This result is in line with the findings presented by Jappelli and Pistaferri (2010). Note, however, that even if we are able to control for fixed effects, our study does not account for the persistence of income changes or for expectations regarding such changes.

11 In this case, the reference category is married couples. We include all types of couple cohabitation under the married label.

12 In the latter case, the coefficient estimate in Column 2 has been obtained by using variation from never married to married households, since that is the only possible direction for within-household variation. This implies that the negative effect we estimate implies a positive effect of being married.

13 The fixed effects point estimates are consistently about a quarter of the OLS estimates.

Table 1: Results - Monthly Total Household Spending

	(1) OLS	(2) FE
Labour market status		
<i>Self-employed</i>	203.46*** (52.48)	67.98 (67.13)
<i>Unemployed</i>	-76.43** (35.73)	-149.91*** (39.71)
<i>Student</i>	-305.99*** (39.96)	-508.09*** (61.64)
<i>Not active</i>	-80.06** (35.20)	-127.86*** (44.98)
<i>Disabled</i>	-85.97** (36.55)	-76.68 (48.71)
<i>Retired</i>	22.31 (35.58)	-101.17*** (39.26)
Marital status		
<i>Separated</i>	9.11 (127.38)	-161.03 (169.78)
<i>Divorced</i>	-80.04*** (30.47)	-174.02** (70.46)
<i>Widowed</i>	-154.40*** (34.76)	-357.33*** (68.20)
<i>Never married</i>	-165.98*** (31.64)	-295.99*** (61.01)

Table 1: Results - Monthly Total Household Spending (Continuation)

	(1) OLS	(2) FE
No. children in household	70.61*** (26.20)	21.54 (43.91)
No. household members	24.33 (21.50)	192.04*** (37.22)
Household income		
<i>2nd quartile</i>	268.65*** (19.08)	88.44*** (23.42)
<i>3rd quartile</i>	586.04*** (24.87)	167.90*** (31.02)
<i>4th quartile</i>	1,033.41*** (32.19)	251.62*** (39.72)
Health		
<i>Moderate</i>	121.45** (49.19)	113.63** (46.31)
<i>Good</i>	113.58** (50.03)	137.88*** (49.62)
<i>Very good</i>	139.59*** (52.73)	131.05** (53.34)
Home ownership	29.76 (19.82)	17.20 (36.24)
Net housing wealth	0.77 (0.62)	0.23 (0.72)

Note: The reference categories are employee for labour market status, married for marital status, and poor for health. Net housing wealth is measured in e10,000s. The regressions include also a variable controlling for the household position of the respondent (in 82.58% of cases the head of households) and the gender of the respondent (in 56.78% of cases it is a male). The estimation is based on 32,628 household-year observations.

Regarding the effect of health status, we find that households which have a head of household with moderate, good, or very good health (all compared to poor health, which is the reference category) spend significantly more. The estimates are statistically significant but not very large. Interestingly, we have obtained similar estimates for all three health states, and the estimates have not changed significantly when we included fixed effects. Finally, for both home ownership and net housing wealth we have estimated very small coefficients that are not significantly different from zero. This is in line with Suari-Andreu (2021) who has found no effect of housing wealth shocks on consumption.

To sum up, the coefficients we estimated for the control variables in Equation 1 are in line with several of the mechanisms reported by literature. This was true even when in some cases, the effects we found were relatively small. Nevertheless, Figure 5 shows that even after controlling for these mechanisms, we still have estimated that there is a very significant decline of spending with age. To further investigate the role of income, Figures B.1 and B.2 in Appendix B show the results we obtained when using household net income and problems making ends meet (the same dummy variable is in Figure 3) as dependent variables. Figure B.1 shows that income increases throughout the life cycle and then decreases later in life by less than what consumption does.¹⁴ Figure B.2 shows that for 'problems making ends meet' we have estimated a very significant and steady decline over the life cycle. These results, together with those in Figure 5 and Table 1, imply that there must be time-varying unobserved factors that account for the clear pattern in Figure 5. We will return to this in the remainder of the results section and in the conclusion below.

5.2 Spending Categories

We now move on to reporting the estimation results we obtained when using the different subcategories of spending as dependent variables. This analysis allows us to shed further light on the mechanisms mentioned in Sections 3 and 5.1. In addition, the richness of the data allows us to provide more detailed results and to understand better why we observed a decline in consumption spending even after having controlled for the mentioned mechanisms. Figure 6 provides 20 different panels with the life-cycle profiles we estimated for each separate category. As in Figures 4 and 5, we provide results with and without fixed effects. The control variables are included in all the estimations.

Panels (a) and (b) show the results we obtained for the mortgages and rent categories. It appears that spending on mortgages (which includes interest and mortgage repayment) declines very significantly with age, especially after controlling for fixed effects. What is worth noting here is that the decline in mortgage spending reflects a balance sheet

¹⁴ Note that the estimated decrease in income is not statistically significant since for ages 60+ the standard errors and the size of the confidence intervals has increased very significantly, and it has expanded so much that it is difficult to draw a clear conclusion.

evolution rather than a reduction in discretionary consumption. Just as in the case for total spending, we find a hump-shaped profile with a strong decline from ages 50 onward. This gradual decline leads to a consumption level by ages 85+ that is almost €600 lower than that of the reference group. Note that Table 1 shows that we have not found a significant estimate for home ownership or net housing wealth. The latter does not have an effect on total spending in all likelihood because the most popular types of mortgages in the Netherlands (interest only and annuity mortgages) are structured in such a way that monthly mortgage-related spending remains constant throughout the loan period.¹⁵ Therefore, the decline we observed in Panel (a) most likely reflects full mortgage redemption during the last decades of the life cycle. For monthly rental payments, Panel (b) initially shows a slight decline followed by a plateau and an increase that has reached a level not significantly different from that of the reference category. The initial decline may have to do with house purchase at ages 30 and 40. In addition, the lack of an effect during retirement is most likely related to a low level of transitions from home ownership to renting later in life.¹⁶

Panels (c) and (d) show significant declines in spending on utilities and transport. The decline in utilities only became clear once we had included the fixed effects in the specification. We used within-household variation, and in both cases we see significant gradual declines without a hump-shaped curve. For both spending categories, consumption declined to a level €150 below the reference category. The decline in transport may partially be due to it being a work-related spending category. Nevertheless, we have controlled for labour market status. Therefore, it must be that there is other transport spending (not work-related, and thus this is most likely linked to leisure activities) a decline with age. Panels (e) and (f) show again significant declines, in this case for spending on insurance and debt other than mortgages. In the former case, we see once again a decline only when using within-household variation. Nevertheless, in this case the declines are rather small and not economically significant. As a result, they are unlikely to play a role in explaining the results we provide in Figure 5.

Interestingly, Panel (g) shows the only category for which we have estimated an increase in spending with age, *i.e.* cleaning and gardening. The increase we observe for this category is probably due to age-dependent health limitations that create an incentive for hiring cleaning and/or gardening services. This is in line with the findings by Kools and Knoef (2019), who argue that health dependency of the marginal utility of consumption could have a positive sign for spending categories that substitute physical work. We have

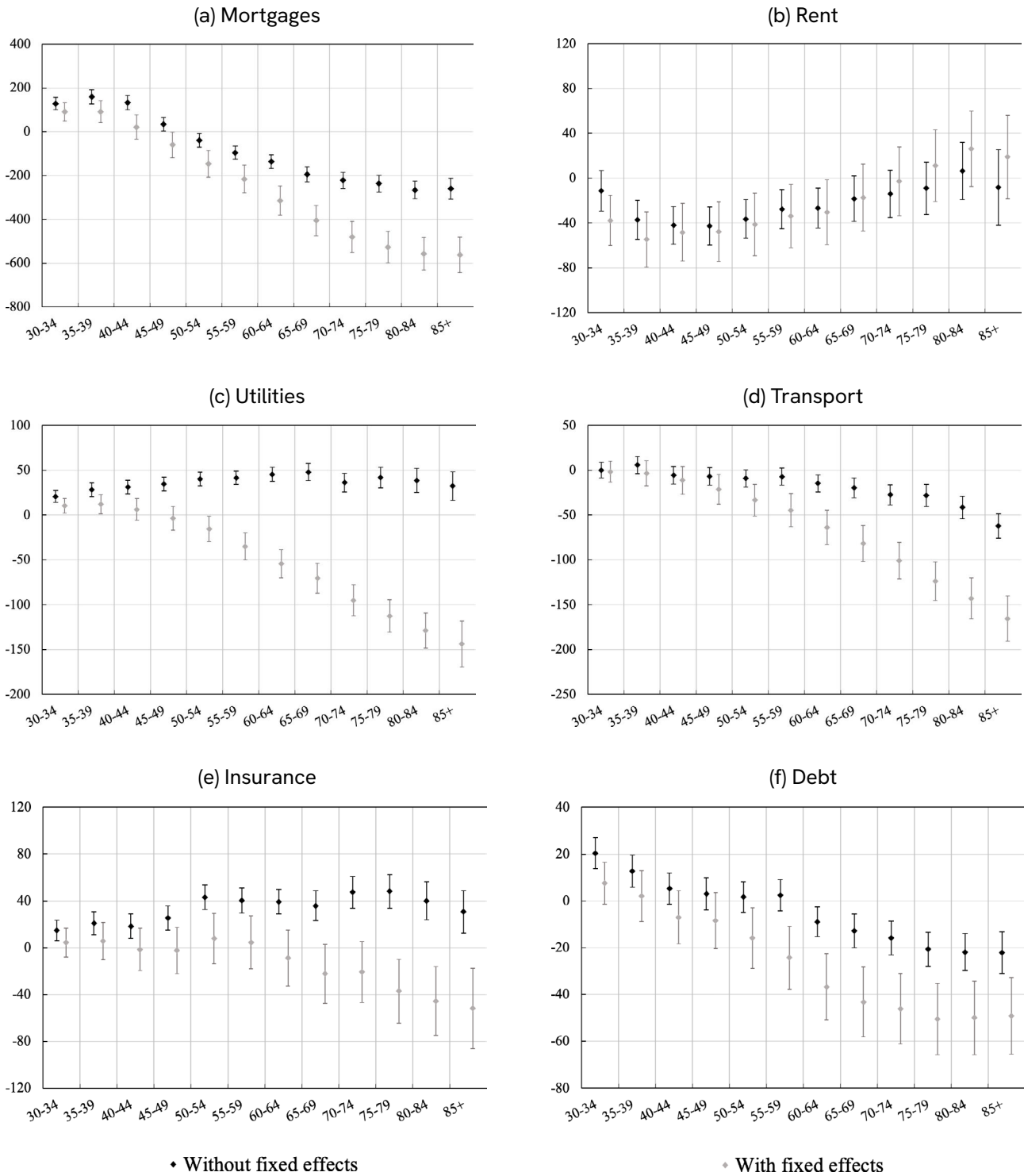
15 Monthly expenditures may change if the interest rate is not fixed. In the case of an annuity mortgage, monthly spending can actually increase over time in the presence of a tax deduction in mortgage interest rate payments.

16 Using a very similar Dutch representative survey for the Netherlands, Suari-Andreu et al. (2019) report a very small level of house transitions in old age and an even smaller level of transitions from owning to renting. In our sample, we observed that fewer than 1% of households transition from owning to renting between consecutive waves.

indeed controlled for self-reported general health level in our specification, which is likely to have captured this mechanism. However, it may be that it does not fully correlate with age-dependent physical limitations. Nevertheless, even though the coefficient we estimate is positive and statistically significant, it is rather small in economic terms; spending only rises up to €60 above the level of the reference category.

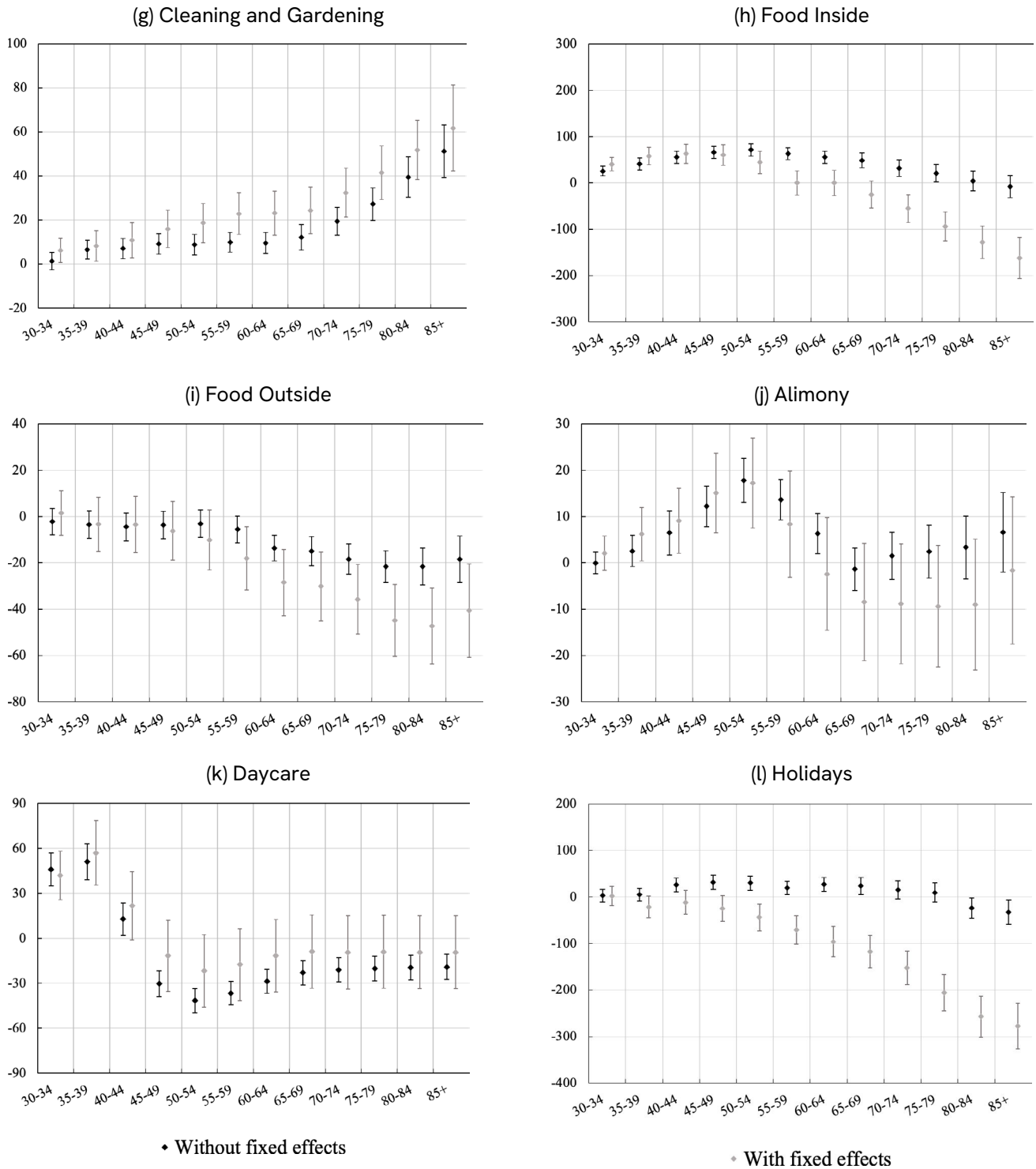
Panels (h) and (i) show the results we obtained for the food categories, i.e. food inside and outside of the household respectively. For food outside the door we found a rather slight decline (of about €40 compared to the reference category), while the downward trend appears to be more sizable for food inside the household. In the latter case, we found a clear hump-shaped pattern that (only when including fixed effects) leads to a significant decline for ages 55+. The gradual decline results in a level of spending that is about €150 lower than that of the reference category.

Figure 6: Monthly Household Spending by Age Group and Spending Category



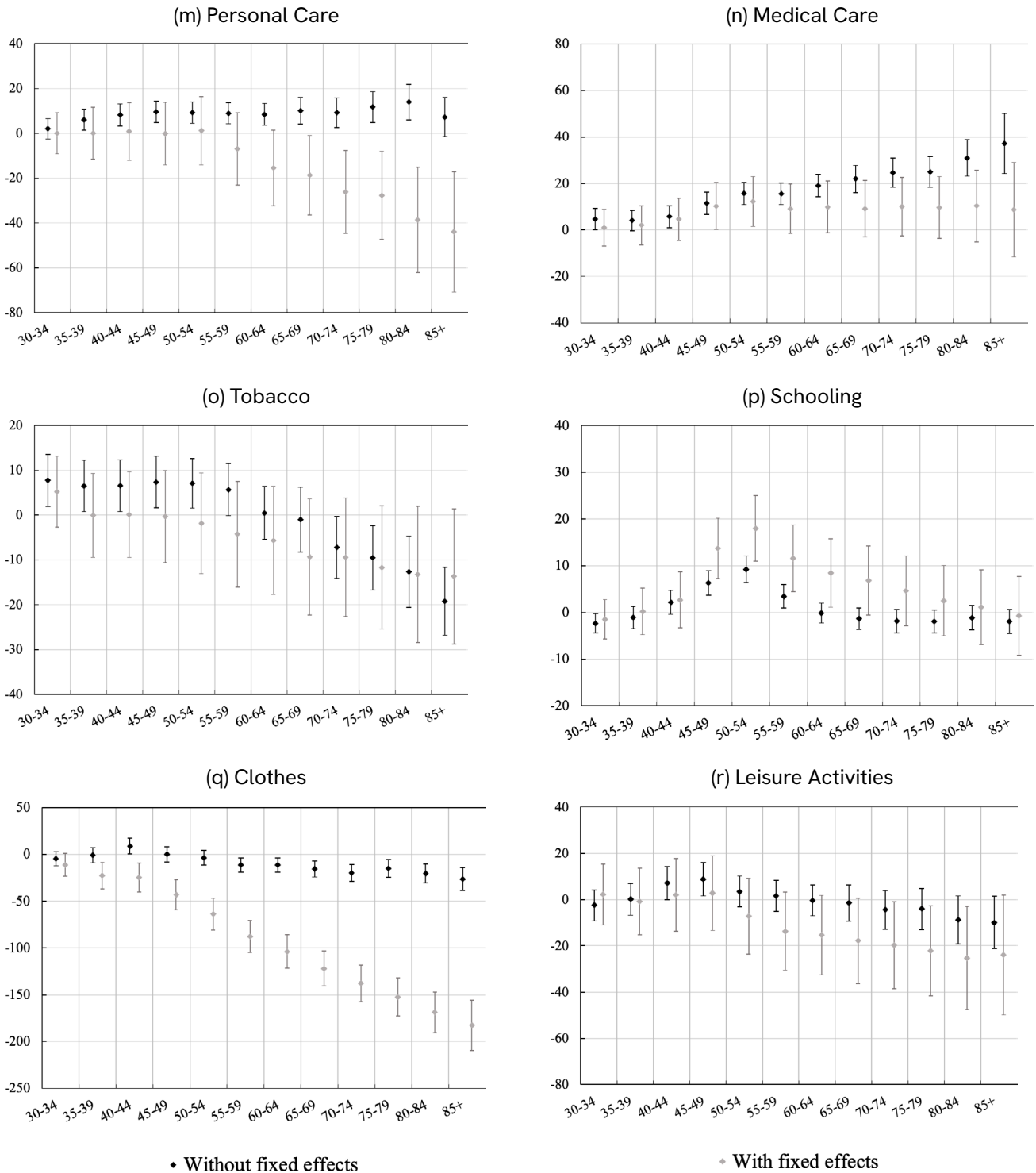
Note: All results have been obtained using Equation 1. The vertical axis measures household monthly spending, while the horizontal axis measures age. Point estimates are surrounded by the 95% confidence intervals.

Figure 6: Monthly Household Spending by Age Group and Spending Category (Continuation)



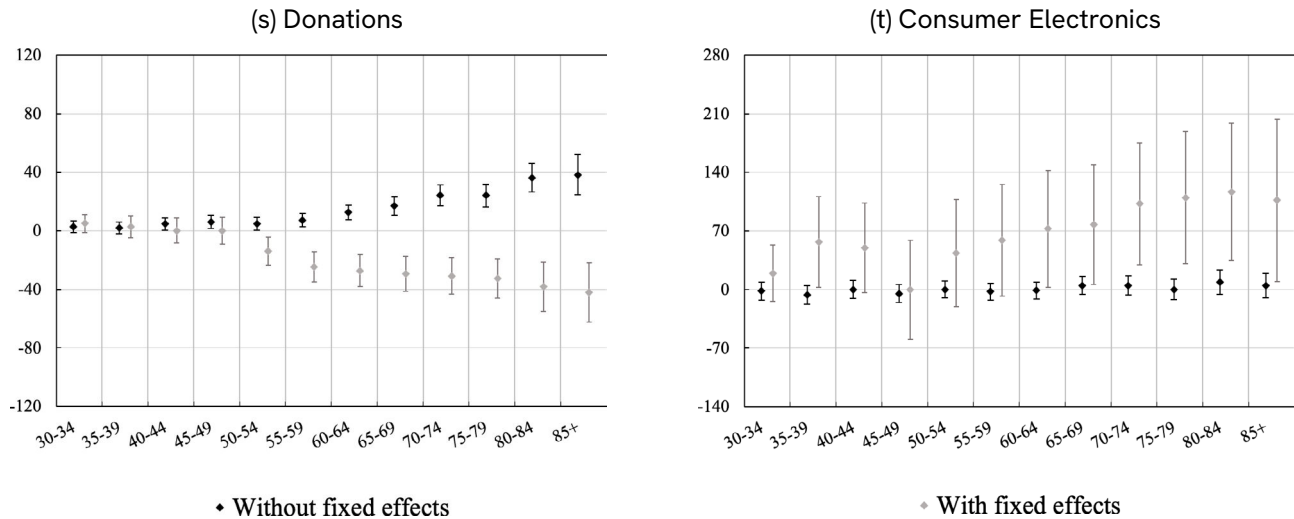
Note: All results have been obtained using Equation 1. The vertical axis measures household monthly spending, while the horizontal axis measures age. Point estimates are surrounded by the 95% confidence intervals.

Figure 6: Monthly Household Spending by Age Group and Spending Category (Continuation)



Note: All results have been obtained using Equation 1. The vertical axis measures household monthly spending, while the horizontal axis measures age. Point estimates are surrounded by the 95% confidence intervals.

Figure 6: Monthly Household Spending by Age Group and Spending Category (Continuation)



Note: All results have been obtained using Equation 1. The vertical axis measures household monthly spending, while the horizontal axis measures age. Point estimates are surrounded by the 95% confidence intervals.

Regarding the categories alimony and daycare, in Panels (j) and (k), we find again rather small effects. However, we can see increases in daycare spending at ages in which households are likely to have children (30 to 45), and increases in alimony spending at ages in which individuals are more likely to be divorced with children (40 to 60).¹⁷

Very interestingly, we find a significant decline for spending on holidays, as seen in Panel (l). When including fixed effects to the specification, we see that holiday spending gradually declines between ages 55 to 85+. The observed decrease leads to a level of spending almost e300 below the level of spending of the reference category. This is a strong decline, indicating that it very likely significantly contributes to the decrease in total spending in Figure 5. Spending less on holidays at an older age is likely to reflect poorer health, which would be in line with the results by Finkelstein et al. (2013). It could also be that widowhood decreases spending on holidays as there may be a connection between this category of spending and the presence of a partner. Nevertheless, we have already included the general level of health and family structure in our specification, which, at least to some extent, will control for these mechanisms. Therefore, the pattern we observe is likely to involve other unobserved factors.

Panels (m) and (n) show rather slight changes in spending on personal and medical care over the life cycle. For medical care, we find an increase in spending that is no longer statistically significant once we have included the fixed effects in the specification. The

¹⁷ The spending category for alimony includes here also child support payments.

absence of rising out-of-pocket medical expenditures suggests that health-related spending shocks do not drive the aggregate decline. The small age-effect in medical care spending that we have estimated is likely due to the lion's share of coverage (by either private or public insurance) in medical spending in the Netherlands (Bakx et al., 2016). For tobacco and schooling, Panels (o) and (p), we have estimated once again very small coefficients that are not economically significant and which are subsequently unlikely to play a role in explaining the pattern we have observed regarding total consumption. However, we have again found a rather strong and significant decline in spending on clothes. In this case, there is no hump-shaped pattern and the decline has led to a level that is close to €200 lower compared to the reference group.

Finally, for leisure activities, donations, and consumer electronics we find again rather small effects that are unlikely to play a role in explaining the results we reported in Figure 5. Panel (r) shows that spending on leisure activities does not significantly change over the life cycle. We have observed a decline, but it is not significantly different from zero. This is probably the case because having excluded holidays and food outside of the household (both captured in separate categories), spending on leisure is likely to be little on average. Panel (s) shows an interesting reversal for donations once we control for fixed effects. Nevertheless, both with and without fixed effects the size of the estimated age coefficient does not exceed €40 in absolute terms. An important caveat for donations is that, even though studies such as Suari-Andreu et al. (2024), among others, indicate that they can be relevant at the end of life, it is possible that individuals under-report them in survey data. This can either be because they do not consider them to be consumption or because they prefer not to disclose them for fear of their information being shared with the tax authorities (Meyer et al., 2009). Panel (t) shows that expenditures on consumer electronics increases with age once we include fixed effects to the specification. However, this category is only included in two of the LISS waves that we employed for this study. Therefore, the confidence intervals are very general when only using within-household variation, which makes it difficult to draw a clear conclusion.

In summary, the results in this section show declines in spending over the life cycle for almost all of the categories considered. The largest negative age coefficient we found is for spending on mortgages, which is likely to reflect a combination of mortgage redemption and a decrease in monthly mortgage-related spending. However, this is not the only category that accounts for the decline of nearly €1,600 in household monthly spending that we reported in Figure 5. We also see relatively large declines in utilities, transport, food inside of the household, holidays, and clothes. For almost all of these categories, we have observed a gradual decline of about €200 compared to the spending level of the reference category. It appears that this decrease is only slightly more (€300) for spending on holidays, whereas for mortgages it is almost €600.

5.3 Heterogeneity

In this section we turn to investigating the heterogeneity of the effects we estimated for total household consumption spending. The large sample that we have access to via the LISS allows us to maintain reasonable statistical power even when splitting it into different subgroups. We can start re-examining the role of income by dividing the sample into three groups, one for each tertile of the household net income distribution. The average monthly net household income in our sample is €2,983, and the two cut-off points between the three tertiles are €2,038 and €3,296. Figure 7 shows that, for all three tertiles, we have estimated a similar downward profile in total household spending.¹⁸ In all three cases, we found a gradual decrease that has led to a level more than €1,000 below the reference category. For the first two tertiles we estimated a stable profile that then turned into a steady decline, while for the highest tertile we estimated a relatively more hump-shaped profile. The latter began with a higher level of consumption (ages 30 to 50) and ended with a lower level (ages 65+) compared to the first two tertiles. Nevertheless, for most age groups, the point estimates for the three tertiles are not significantly different from each other. Interestingly, for the last three age groups (i.e., ages above 75) we see that households in the first tertile experience a significantly lower consumption drop compared to those in the third tertile. The difference between these two tertiles is close to €1,000 for each of the last three age groups. The differences are statistically significant and imply that the drop in consumption at older ages is larger for richer households.

We then carried out the same heterogeneity analysis by level of education. Whereas income tends to change and can be somewhat volatile throughout the life cycle, the educational level tends to be more stable. Therefore, it could serve as a better measure for permanent income. In our sample, we see that about 13% of the household-year observations correspond to heads of households who have received a university education.¹⁹ Figure 8 shows that we did not find significant differences when comparing those who received a university education with those with lower levels of education. In both cases, we estimated downward patterns similar to those in Figure 7. Note that the confidence intervals for the point estimates corresponding to the higher educated are rather wide due to the lower sample size. By showing significant spending declines for all income groups, the results in Figures 7 and 8 confirm once more (as in Figures 2, 3, B.1, and B.2) that changes in income over the life cycle are not what determine the pattern we observed in Figures 1, 4, and 5.

18 In this section, all the coefficient estimates we provide have been obtained including fixed effects in the specification.

19 This figure reaches roughly 30% if we also consider universities of applied sciences, which are quite popular in the Netherlands. However, the results we have found do not qualitatively differ from those we reported in Figure 8.

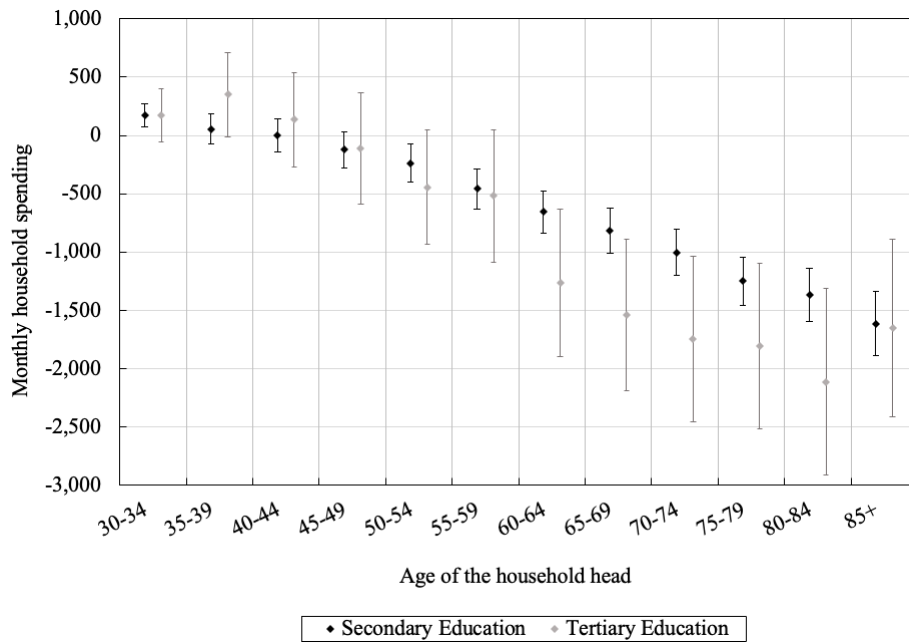
Given the importance of mortgage-related spending that we reported in Figure 6, it is worth investigating the heterogeneity of spending patterns by home ownership status as well. Figure 9 shows the results we obtained for home owners and renters separately. In our sample, 64% of the households are home owners, and we observed very few transitions from renting to owning and vice-versa. In particular, on average we see that between the waves, 1.66% of households move from renting to owning, whereas the figure is 0.88% for transitions from owning to renting. In Figure 9 we do see a significantly different pattern for home owners and renters. In both cases, we estimated a downward trend but for home owners it appears to be steeper and it reaches a significantly lower level of household spending at older ages. At ages 80+ the consumption level of homeowners is about €2,000 lower compared to the reference category, whereas for renters it is between €1,000 and €1,500 lower. This result confirms the importance of mortgage redemption in explaining the patterns we observed for total spending. However, it also confirms that, as we have shown in Section 5.2, mortgage is not the only factor explaining the results we have found, since we also find a strong and very significant decline for renters.

6. Conclusion

In this study we have analysed the evolution of household consumption spending over the life cycle, with particular attention to the retirement years. In using rich longitudinal data for the Netherlands and exploiting within-household variation, we documented a clear hump-shaped profile. Monthly household spending rises during early adulthood followed by a plateau, and then it declines gradually from approximately at age 55 onward. The decline continues throughout retirement with a total drop of approximately €1,500 by ages 85+ compared to the reference group (younger than 30). Most of the decline (about €1,000) takes place after the age of 55. This is a very large and significant decline especially when compared to the average consumption spending level for households younger than 55, *i.e.* €2,031.

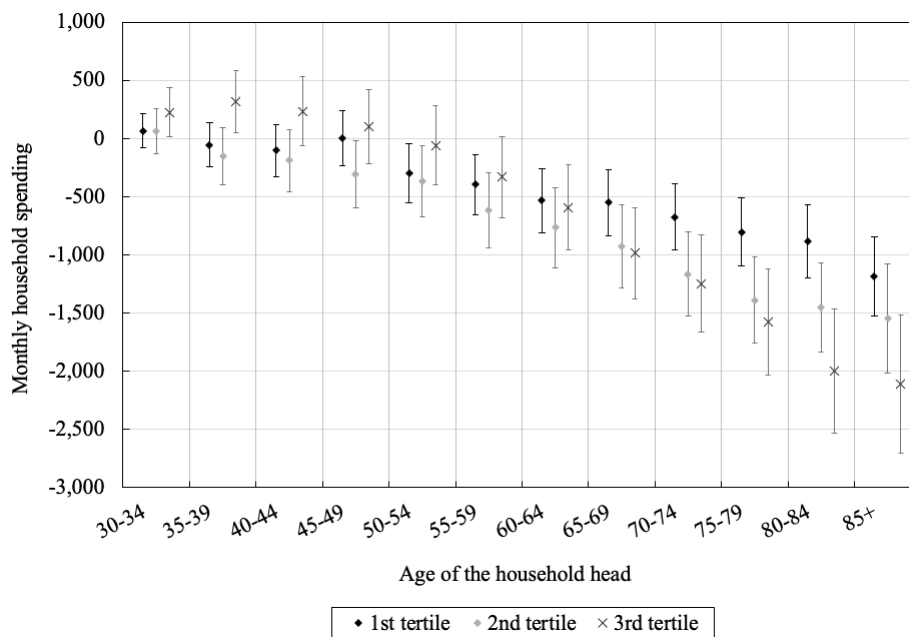
This pattern persists after controlling for labour market status, household structure, income, health, home ownership status and housing wealth, cohort effects, and other unobserved time-invariant heterogeneity. We have observed a similar decline in household spending across income and education groups when comparing home owners and renters as well. Furthermore, the consumption pattern we estimated does not appear to be accompanied by an increase in reported financial distress as measured by a dummy variable indicating whether households experience ‘problems making ends meet’. All things considered, these findings suggest that the reduction in spending at an older age cannot only be explained by transitions in labour market status, household structure, or health. Importantly, the generosity of the current pension system indicates that these transitions are also not driven by liquidity constraints or inadequate pension resources. However, it is important to note that this may change if future developments should reduce replacement rates and/or make them more uncertain.

Figure 7: Heterogeneity by Income



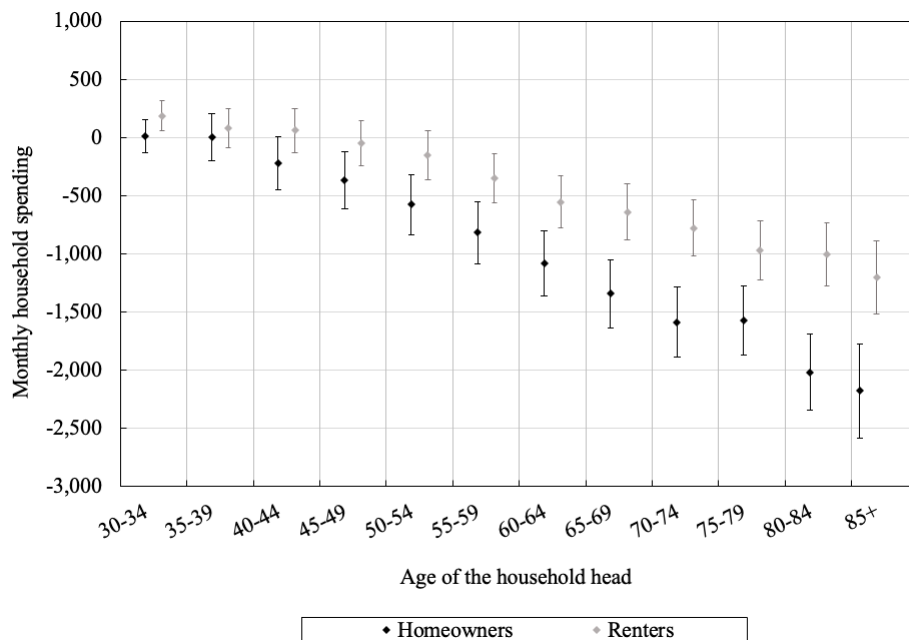
Note: Results have been obtained just they were in Figure 5, but for separate income groups. All results reported here have been obtained including fixed effects in the specification.

Figure 8: Heterogeneity by Education



Note: Results have been obtained as in Figure 5, but for separate educational levels. All results reported here have been obtained including fixed effects in the specification.

Figure 9: Heterogeneity by Home Ownership



Note: Results have been obtained as in Figure 5 but for separate home owners and renters separately. All of the results reported here have been obtained including fixed effects in the specification.

An analysis of spending categories shows that several components contribute more than others to the decline in total spending. Mortgage-related expenditures fall greatly, reflecting the effect of mortgage redemption and declining mortgage payments (in real terms) at older ages. In addition, we observe significant declines in categories such as holidays, clothing, transport, and food consumed at home. At the same time, some categories such as cleaning and gardening show modest increases, consistent with age-related substitution away from physically-demanding activities. Interestingly, we find no evidence for increases in medical care expenditures during retirement. Overall, the evidence points to predictable changes in needs and preferences as an important driver of lower spending at an older age. This is in line with prior evidence provided by Bonekamp and van Soest (2022) on stated preferences for income and spending during retirement.

We should acknowledge that at least part of the decline in consumption we observed could be explained by data limitations. For instance, as people become older they may suffer from recall bias due to cognitive decline and thus report their consumption level less accurately. If this bias is systematically negative then this could lead to underreporting of consumption levels as people age. Furthermore, some expenditures may go unreported if they are carried out by the children of respondents. Think, for instance, of adult children doing the shopping for their elderly parents. Finally, it could be that individuals with the most serious health problems fall out of the sample and are thus unrepresented in our

results. For these reasons, it is important to interpret our results with a degree of caution. Notwithstanding, even if these limitations are likely to be relevant, they are unlikely to fully account for the large decline we observe in monthly expenditures between ages 55 and 85+ (of about €1,000), which we still observe even after controlling for cohort effects and other relevant factors.

To the extent that they reflect changes in preferences, our findings have very relevant implications for the design of retirement income profiles. In the Dutch pension system, pension wealth is largely illiquid and by default paid out as a flat annuity. If spending needs decline predictably with age, a strictly flat payout profile may not align with a household's revealed preference for consumption. The introduction under the *Wet Toekomst Pensioenen* of the option to withdraw up to 10% of pension wealth as a lump sum at retirement increases flexibility in the timing of income. Our results suggest that such front-loading of pension income may match observed spending patterns during retirement better, without increasing total expenditures for the pension system. An alternative policy that could potentially also provide a better match with the observed consumption patterns would be to allow participants to choose a high-low income profile during retirement, which in turn would allow retirement income to start relatively high at retirement and then decline with age. Nevertheless, future work is needed to fully simulate the effect of these potential reforms in light of our results.

Even though our results do suggest that there is a preference for a declining consumption pattern at an older age, an additional future analysis is required to estimate which responses should be made to policies such as a lump-sum and the possibility of a high-low income profile during retirement. This analysis should also consider the potential benefits of a flat annuity, which in some circumstances does provide a form of insurance against unexpected increases in consumption.

More broadly, our results caution against interpreting observed spending declines in retirement as evidence of widespread pension inadequacy. A substantial part of the decline remains once income has been taken into account, thus indicating that changes in needs and preferences over the life cycle are potentially relevant. Besides changes in preferences, biases and/or financial literacy problems could also play a role in the spending patterns we observed. For instance, uncertainty and difficulty in understanding life expectancy, probability weighting (overweighting of small probability but high-cost events), loss aversion, and difficulty understanding withdrawal strategies can lead to overly conservative spending. Our results apply to the particular Dutch context we have described in Section 2, which is characterized by rather generous replacement rates. Therefore, they cannot be directly extrapolated to other countries or to other possible future Dutch scenarios with a different replacement rate. Besides a more detailed policy analysis, future research could incorporate uncertainty, heterogeneity in balance sheets, and endogenous housing

decisions to refine implications for pension design further. Interesting venues for future research are also considering heterogeneity by health status and subjective expectations. Nonetheless, our results have already indicated that spending declines during retirement are systematic and largely predictable, and pension payout design should take this life-cycle dynamic into account.

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Appendices

A. Summary Statistics

Table A.1: Summary Statistics Consumption Variables

	Mean	Median	St.Dev.	% zeros	Obs.	Waves
Total	1,894	1,725	1,185	5.06%	32,628	All
Mortgages	347	136	437	45.53%	29,660	All
Rent	165	0	263	68.65%	30,159	All
Utilities	202	192	104	3.98%	29,211	All
Transport	123	93	119	12.01%	29,961	All
Insurance	232	201	153	4.03%	28,937	All
Debt	23	0	75	86.79%	30,621	All
Cleaning	46	20	66	31.47%	29,909	All
Food inside	321	286	203	2.79%	30,258	All
Food outside	52	30	67	27.46%	23,553	1-3, 6-9
Alimony	13	0	64	93.68%	30,507	All
Daycare	18	0	96	94.19%	23553	All
Holidays	125	50	195	40.91%	23,417	1-6, 8-9
Personal care	46	33	44	6.32%	10,196	1-3
Medical care	45	19	79	31.50%	31,335	All
Tobacco	19	0	43	74.08%	10,199	1-3
Schooling	8	0	30	87.32%	23,769	1-3, 6-9
Clothing	85	54	92	16.84%	23,534	1-3, 6-9
Leisure activities	61	44	71	15.65%	13,627	1-3, 9
Donations	49	29	64	18.27%	23,525	1-3, 6-9
Electronics	43	23	65	33.99%	6,725	7-8

Note: Waves have been numbered from one to nine and correspond to the years 2009, 2010, 2012, 2015, 2017, 2019, 2020 (two waves), and 2021.

Table A.2: Summary Statistics Control Variables

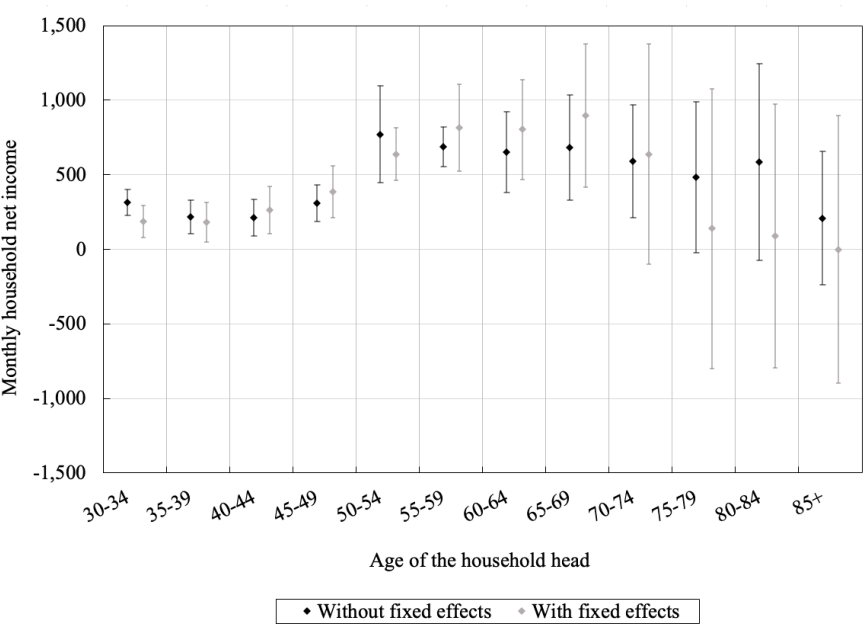
	Mean	Median	St.Dev.
Age	53.95	56	16.70
Female	43.30%	-	-
Labour market status			
<i>Employee</i>	47.82%	-	-
<i>Self-employed</i>	5.11%	-	-
<i>Unemployed</i>	3.30%	-	-
<i>Student</i>	3.72%	-	-
<i>Not active</i>	8.03%	-	-
<i>Disabled</i>	4.44%	-	-
<i>Retired</i>	27.60%	-	-
Marital status			
<i>Married</i>	51.04%	-	-
<i>Separated</i>	0.48%	-	-
<i>Divorced</i>	12.86%	-	-
<i>Widowed</i>	8.24%	-	-
<i>Never married</i>	27.38%	-	-
No. children in hh.	0.60	0	1.01
No. hh. members	2.25	2	1.25
Net household income	2,983	2,606	4,585

Table A.2: Summary Statistics Control Variables (Continuation)

	Mean	Median	St. Dev.
Education			
<i>Primary</i>	3.58%	-	-
<i>Secondary</i>	80.55%	-	-
<i>Tertiary</i>	12.40%	-	-
<i>Other</i>	3.47%	-	-
Health			
<i>Poor</i>	1.59%	-	-
<i>Moderate</i>	16.63%	-	-
<i>Good</i>	57.90%	-	-
<i>Very good</i>	23.88%	-	-
Home ownership	64.15%	-	-
Net housing wealth	5.96	0	16.89
Household position			
<i>Head</i>	82.58%	-	-
<i>Partner</i>	14.54%	-	-
<i>Parent</i>	0.06%	-	-
<i>Child</i>	2.42%	-	-
<i>Other family</i>	0.10%	-	-
<i>House mate</i>	0.29%	-	-
<i>Unknown</i>	0.01%	-	-

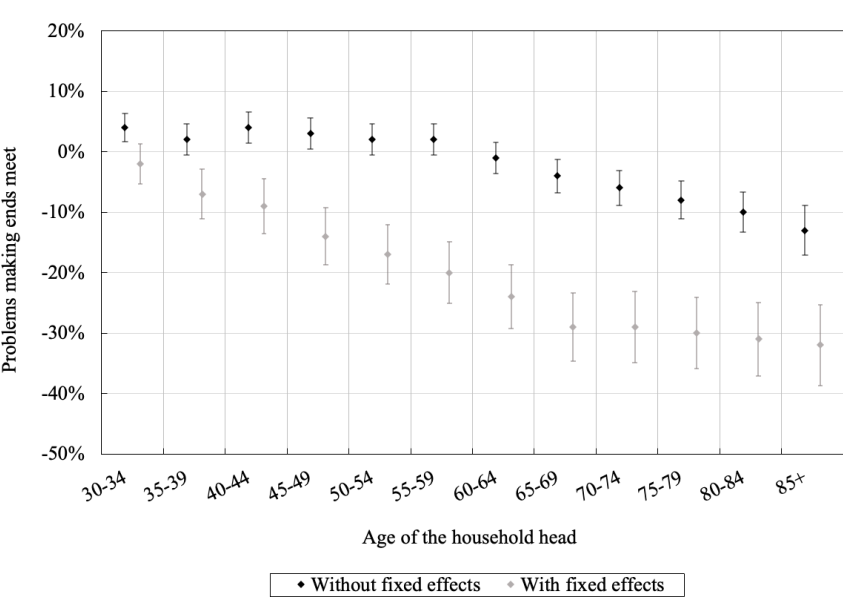
Note: Net housing wealth is provided in €10,000s. Female, education, and household position are not included in Table 1, but they have been included in the OLS regressions.

Figure B: The Role of Income



Note: Results have been obtained as in Figure 5 but by using net household income as the dependent variable.

Figure B.2: Problems Making Ends Meet



Note: Results have been obtained as in Figure 5 but by using a dummy variable indicating having 'Problems Making Ends Meet' as the dependent variable.



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