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JEL Classification: D12, D13, M31, J22

Keywords: consumer purchase behavior, Household production, time use, retirement

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1 Introduction

One goal of modern marketing practice is to provide value by lowering consumers' time cost of purchasing, home production, and consumption.[1] At the same time, popular media claim that demands on the consumer's time are higher than ever before and that consumers experience difficulty coping with time scarcity (The Economist, 2014; Robinson and Godbey, 2005). Yet, despite this practical and societal relevance, the role of time budgets in formalizing and explaining consumer shopping baskets has received relatively little attention in quantitative marketing and economics, certainly compared to the role of income and money budgets. Indeed, there is relatively little empirical work on how the availability of time affects the composition of the shopping basket, which is a question that is particularly relevant for marketing practice.

This paper seeks to understand several important questions about household purchase behavior that are related to the availability of time. How does the choice among bundles of market goods depend on the household's availability of time? Do households demand more market goods? Do they prefer a higher degree of product variety? Do they systematically buy different products when time becomes more scarce?

In this paper, we propose a new theoretical model in the tradition of the *home production* consumer theory pioneered by Becker (1965) and Muth (1966). We use it to study the effect of retirement and unemployment on the size and composition of shopping baskets. The main novelty of the model relative to the literature is that consumers have a taste for variety and maximize utility from quantities of *many* consumption goods, also called varieties. They do so subject to a time and an income constraint. There is a fixed time cost for each additional variety households prepare. With this, we formalize the idea that it does take time to turn market goods into consumption experiences, and that there is a time cost to home producing more variety. We use this model to make predictions about the isolated effect of time availability when we hold income and preferences fixed. We take these predictions to the data and show that the effects obtained are consistent with our interpretation of being caused by an increase in discretionary time and not by a shift in income or preferences.

For this, we construct a novel household panel data set that combines purchase data from GfK's ConsumerScan Panel, tracking the Dutch grocery market between 2009-2013, with detailed annual survey data for the same panel and periods. The annual surveys contain variables

[1] This includes large parts of retail distribution, assortment management, informative advertising, manufacturer product design, and almost all of service marketing.

that track events that shift time budgets, like retirement- and employment status. We use their within-household variation to estimate the effects on consumption.

An important challenge we face is that retirement and unemployment may not only affect the availability of time, but also household income and consumer preferences. We address this challenge in a number of ways. To set the stage, we explain and document that the Netherlands provides a close-to-ideal setting to conduct our analysis. The generous social security system essentially guarantees a minimum income, substantially reduces income inequality, and to a large extent offsets drops in household income at retirement and when individuals become unemployed. Our data allow us to confirm this empirically and to control for household income. We show that retirement has no effect on net household income and does not cause households to perceive increased monetary budget tightness. Unemployment leads to some perceived budget tightness and after a few years it has a negative effect on net household income. For this reason, we control for income in our analysis. Moreover, our data record when households stop working for health-related reasons. Then, they are not classified as unemployed or retired, but as receiving disability benefits. In line with this, we again use our survey data to show that retirement and unemployment are not related to self-reported health problems. We also show that self-stated preferences for home production are unaffected by retirement or unemployment. Throughout, we control for household fixed effects, which capture all time-invariant heterogeneity in drivers of demand, for observed changes in household composition, and for age and time effects.

Our model predicts four effects of an increase in time availability (controlling for income). Consumers (1) expand the variety in their shopping basket, (2) buy previously unchosen products that are more time-intensive, (3) do not abandon products they bought before the shift in the time constraint, and (4) adjust quantities of these previously-bought products proportionally. Importantly, predictions (3) and (4) do not hold if retirement and unemployment also have an effect on preferences. This allows us to test whether preferences are stable.

Our empirical findings are in line with these four predictions. We find that households buy 3.3% more varieties when they retire. We measure the time-intensiveness of products and find that spending is shifted into types of products that are more time-intensive. At the same time, in line with the third and fourth prediction, we find that there are very low levels of switching out of products bought in the previous year and that the relative quantities of products bought in two consecutive years are highly similar and not affected by retirement or unemployment. We

find that the effects of unemployment go in the same direction as the ones of retirement, but are smaller in terms of magnitude and less precisely estimated. Our preferred explanation for this is that short-term unemployment resembles employment in that households spend a substantial fraction of their time to either acquire human capital or search for a new job.

Our findings are central to marketing practice in at least two ways. First, we further our understanding of consumer behavior by showing that not only the size, but also the composition of shopping baskets changes in a way that is consistent with the view that consumption goods (or services) come at two costs to a household: a variable monetary price for market goods plus a time cost that has a fixed component. Second, our findings suggest that one way for firms to successfully forward-integrate into the households' home production is to offer products that are not only attractively priced, but also offer variety at a low time cost.

The remainder of this paper is organized as follows. Section 2 relates our paper to the literature. In Section 3, we introduce the theoretical model of consumption and home production. Section 4 describes our data. Section 5 establishes that retirement and unemployment mainly shift households' available time, and do not significantly affect net household income or preference for cooking at home. Section 6 presents the empirical approach and results. Section 7 interprets our findings more broadly and concludes.

2 Literature

Our work contributes to various strands of the literature. An early literature in marketing studied home production and consumer strategies to reduce time inputs. Myers (1967) found that working wives are less likely to adopt new brands due to lack of time. Nickols and Fox (1983) found that dual labor households employ both time-buying strategies (e.g., child-care) and time-saving strategies (e.g., reducing time in home production or leisure) to deal with the time pressures originating from dual participation in the labor force. Anderson and Shugan (1991) report that superior products can lose market share to other, more inferior, products due to consumer's preference for convenience. We contribute to this literature by showing detailed accounts of how availability of time affects purchasing behavior and home production. For instance, we document that as consumers get more time, they buy products that take more time to turn into consumption experiences.

Next, there is a literature that views one function of retailing as shifting the purchasing costs

from consumers to the market, e.g., via provision of distribution services (Betancourt, 2004). Among other things, this literature investigates the relationship between one-stop shopping, retailer competition, and pricing (e.g., Bhatnagar and Ratchford, 2004; Baye et al., 2017; Caprice and Schlippenbach, 2013; Messinger and Narasimhan, 1997; Thomassen et al., 2017). Our results support the view that an important driver of the costs incurred by the household is the time spent on undertaking shopping trips, including the time it takes to search and examine the products. In particular, we find that households undertake more shopping trips and are more likely to visit multiple store when they have more time.

A third strand of the literature investigates the costs and benefits of purchasing variety (e.g., Berger et al., 2007; Bronnenberg, 2015; Hamermesh, 2005). We contribute to this literature by finding a positive effect of a household's time budget on its demand for variety. Our findings support the idea that households face fixed (to quantity) purchasing and evaluation costs that limit their demand to a subset of varieties (see also Huang and Bronnenberg, 2018).

Finally, there exists a large literature on consumers' time use in economics. One part of that literature documents the trends in household time use over long periods of time and documents stylized patterns in multi-nation time use data (Aguiar and Hurst, 2007b; Kimmel, 2008; Ramey, 2009; Ramey and Francis, 2009; Aguiar et al., 2012; Lee et al., 2012; Aguiar et al., 2013; Kawaguchi et al., 2013; Duernecker and Herrendorf, 2015). This is related to a recent interest in macroeconomic- and growth-models that incorporate home production (see for example Benhabib et al., 1991; Greenwood et al., 2005; Francis and Ramey, 2009), which require reliable estimates of long-run trends in time use. Another set of contributions (including Biddle and Hamermesh, 1990; Solberg and Wong, 1992; Cutler et al., 2003; Aguiar and Hurst, 2005, 2007a; Bertrand and Schanzenbach, 2009; Meyer and Sullivan, 2008; Stancanelli and van Soest, 2012; Stratton, 2012; Aguiar and Hurst, 2013; Nevo and Wong, 2019) uses information on consumption and time use (sometimes as macro-level shocks to households' time and money budgets) to answer questions related to household well-being, i.e., consumption, sleep, leisure, and gender differences in time use. The papers that are most closely related to ours are Aguiar and Hurst (2005), Aguiar and Hurst (2007a), Aguiar and Hurst (2013), and Nevo and Wong (2019). Aguiar and Hurst (2005) find that older individuals have lower food expenditure and spend more time preparing meals, while quantity and quality of food intake is similar. Aguiar and Hurst (2007a) show that older individuals spend more time shopping and pay lower prices for identical goods. Aguiar and Hurst (2013) show that older individ-

uals have lower consumption expenditures, which is driven by work-related expenditures, in particular work-related eating out, transportation, and clothing. Nevo and Wong (2019) show that households changed purchase behaviors during the Great Recession: they bought more on sale and larger sizes, more generic products, increased coupon usage, and shopped more often at discount stores. To the best of our knowledge, none of the papers studies the effects of time availability on the composition of shopping baskets and the time intensity of the products households buy.

3 Demand under time and money constraints

In this section, we present our model of household demand. The aim of the model is to better understand the implications of changes in the availability of time on the composition of a shopping basket. Central elements of the model are varieties that are produced using market goods and time, a taste for variety, as well as a time and a money constraint.

3.1 Setup

Households are static optimizers and maximize a Cobb-Douglass utility function, which is defined over a composite consumption good X and leisure R. The utility function is

$$U = X^{\rho} \cdot R^{1-\rho}, \tag{1}$$

with $\rho \in (0,1)$ being the preference for consumption and $1-\rho$ the preference for leisure. The composite good, X, follows a constant elasticity of substitution (CES) specification over a continuum[2] $[0,V]$ of consumption goods (alternatively called varieties) v that is chosen by the household and that is a subset of the full assortment $[0,\mathscr{V}]$ that is available.[3] The composite good is then aggregated as

$$X = \left(\int_0^V a(v)\, x(v)^{\frac{\sigma-1}{\sigma}}\, dv \right)^{\frac{\sigma}{\sigma-1}}, \tag{2}$$

[2]We use a continuum of varieties for analytical convenience, as is standard in the literature (see, e.g., Chaney, 2008; Melitz, 2003).

[3]Formally, households choose the last variety V they consume.

with σ being the elasticity of substitution and $a(v)$ the preference for individual consumption goods v.[4]

The composite good is positive in quantities $x(v)$ and homogeneous of degree 1 in quantities consumed.[5] Its derivative with respect to x is positive and its second derivative negative if $\sigma > 1$. Therefore, for $\sigma > 1$, the functional form of the composite good (2) characterizes consumers with satiation for any variety v. As is well-known (see, e.g., Dixit and Stiglitz, 1977) this also implies that consumers have a love of variety. We will assume this holds.

The consumer's resources are T units of time (the numeraire) and M units of non-labor income, e.g., retirement or unemployment benefits. The consumer allocates time to three uses. A total of H units is spent in the labor market to generate income. A total of R units is used as leisure. The remaining time, $T-R-H$, is used for home production of the consumption goods in $[0,V]$. Wages are w for each unit of time that is spent in the labor market. Home-producing $x(v)$ units of consumption good v requires a fixed cost of $t(v)$ units of time plus a price of $p(v)$ per unit. The time cost $t(v)$ represents the time it takes to prepare v for consumption. It is possible to include an additional time cost $\tau(v)$ per unit of $x(v)$, but we assume that the variable preparation cost is low, e.g., that preparing the same variety for 1 portion or for 4 portions involves more or less the same time. Therefore, for simplicity, we set $\tau(v) = 0$. We then have the following resource constraints on time and money

$$T = R + H + \int_0^V t(v)\,dv \quad \text{and} \quad wH + M = \int_0^V p(v)\,x(v)\,dv. \tag{3}$$

The consumer's problem can now be formally stated as maximizing utility U with respect to quantities $x(v)$ in X, leisure R, and the variety (size) of the shopping basket $[0,V]$, subject to the income and time constraints in equation (3).

We solve this problem in general and then present the results for two special cases. The first case is an employed household receiving no benefits ($M = 0$), and working for H hours. The second case is a household that does not work (e.g., for reasons of being retired or unemployed) ($H = 0$), and receives benefits M (which may or may not equal its past labor income).

[4] Alternatively, without loss in generality , $a(v)$ can be interpreted as productivity at home in generating utility from $x(v)$.

[5] To see this, the utility from $k \times x(v)$ can be rewritten as $\left(\int_{v\in V} a(v)\,(k\times x(v))^{\frac{\sigma-1}{\sigma}}\,dv\right)^{\frac{\sigma}{\sigma-1}} = k \times \left(\int_{v\in V} a(v)\,x(v)^{\frac{\sigma-1}{\sigma}}\,dv\right)^{\frac{\sigma}{\sigma-1}}$.

3.2 Demand

The outcome of the consumer problem with respect to chosen levels of leisure, quantity demand, and variety can be characterized as follows.

Proposition 1.

Consider the model described in Section 3.1. Then, optimal choice can be characterized as follows.

a) Utility increases as a result of adding variety V to the set $[0,V)$ iff

$$\frac{t(V)}{a(V)}\left(\frac{p(V)}{a(V)}\right)^{\sigma-1} < \psi_1 \cdot \frac{A(V)}{(\sigma-1)}. \tag{4}$$

with

$$A(V) = \frac{T - \int_0^V t(v)\,dv}{\int_0^V p(v)^{1-\sigma} a(v)^{\sigma}\,dv}. \tag{5}$$

b) Quantity demanded is

$$x(v) = \psi_2 \cdot A(V)\left(\frac{p(v)}{a(v)}\right)^{-\sigma}. \tag{6}$$

c) The total amount of time spent on leisure is

$$R = \psi_3 \cdot \left(T - \int_0^V t(v)\,dv\right) \tag{7}$$

The constants are given by

	Employed	*Retired/Unemployed*
ψ_1	ρ	$\dfrac{\rho}{1-\rho}$
ψ_2	$w\rho$	$\dfrac{M}{T - \int_0^V t(v)\,dv}$
ψ_3	$1-\rho$	1

Proof. See Appendix A. □

3.2.1 Interpretation

We would like to highlight three aspects. First, equation (4) pins down the size *and* the composition of the optimal shopping basket as follows. To build intuition, consider all available varieties v in the universal set $[0, \mathscr{V}]$ are sorted by an inverse 'attraction' index, $\frac{t(v)}{a(v)}\left(\frac{p(v)}{a(v)}\right)^{\sigma-1}$. This index is a weighted (geometric) average of the time-cost $t(v)$ and money-cost $p(v)$, relative to the household's preference $a(v)$. It can be thought of as a scalar summarizing the cost relative to the benefit of consuming a variety. Therefore, more attractive varieties have a lower value of the index.

Next, the optimal set is obtained by adding the varieties in the order they appear on the list until the marginal variety V makes equation (4) bind. As the consumer buys a larger mass of variety V, the left hand side of equation (4) rises or does not fall (from the sorting), and the right hand side falls.[6] If the condition does not bind for the last available variety $\mathscr{V}$, then the optimal action is to buy all varieties. For instance, when $t = 0$ for all varieties, equation (4) will not bind for any supply of variety no matter how large and hence the consumer buys all varieties.[7] Conversely, if the time cost associated with preparing varieties is positive, then consumers generally have a limited demand for variety.

Second, because the impact of a given price change $p(v)$ on the demand shifter $\psi_2 A(V)$ is negligible, quantity demand $x(v)$ in equation (6) is a constant elasticity demand function.

Third, equation (7) shows that the consumer chooses leisure to be a fraction ψ_3 of time disposable after home production of the varieties in $[0, V]$ and allocates a fraction $1 - \psi_3$ of that time to earning income in the labor market (endogenizing income).

3.2.2 Predictions from a shift in time availability.

Life events like retirement or unemployment represent a discrete positive shock on the availability of disposable time and a possible shock on disposable money. To make the discussion about consumption as affected by such time shocks precise, demand prior to a time shock from retirement or unemployment is indexed by a subscript 0, while demand after it is indexed by 1. For instance, at retirement or unemployment, working hours change from $H_0 > 0$ to $H_1 = 0$, and benefits change from $M_0 = 0$ to $M_1 > 0$. Most predictions of our model are not specific to

[6] It follows directly from the fundamental theorem of calculus that $\frac{\partial A(V)}{\partial V} < 0$.

[7] This is the assumption in the much of the economic literature on trade and monopolistic competition, e.g., in Dixit and Stiglitz (1977).

the value of M_1, although retirement and unemployment in the Netherlands has the additional feature of full net replacement of income, or in terms of our model that $M_1 = wH_0$. The model makes 4 predictions.

Prediction 1: Consumers buy more variety after a positive time shock. During employment consumption involves all varieties in $[0, V_0]$. According to the proposition. V_0 makes equation (4) bind. Before the time-availability shock, we have $\psi_1 = \rho$; after it, it becomes $\psi_1 = \frac{\rho}{1-\rho}$ (which is larger). Thus, after the time shock (4) is slack at V_0. Therefore, this equation will only bind when a consumer buys more variety, $V_1 > V_0$.

Prediction 2: Retiring consumers buy additional time-intensive varieties. The model further predicts that varieties that are part of the expansion from retirement $v \in (V_0, V_1]$ are more costly in terms of time and money on average, i.e., have higher $\frac{t(v)}{a(v)}$ and higher $\frac{p(v)}{a(v)}$ than those in the pre-retirement set $v \in [0, V_0]$. Figure 1 visualizes the situation for working households (a) and retirees/unemployed (b) for the illustrative case where $a(v) = 1, v \in [0, V]$. It considers a bi-variate distribution of the costliness $\frac{p(v)}{a(v)}$ and convenience $\frac{t(v)}{a(v)}$ supplied in the market, where the hatched contours visualize the density of supply. Price and time intensity are depicted as negatively correlated, as one might expect. The solid line (a) is the frontier of inclusion into the purchase set for working households, i.e., equation (6) in equality, and the triangle (a) gives the average costliness and convenience in the pre-retirement set. The line (b) and triangle (b) do the same for the post-retirement set. Thus, variety expansion deeper into the list sorted on time and money cost implies more time-intensive varieties and more expensive varieties. This holds even more for categories for which the elasticity of substitution is small and the consumer would like to have more variety at the expense of quantity.

–insert Figure here–

Prediction 3: Expansion without substitution. Next, the model predicts that as long as the ordering on preferences and costs $\frac{t(v)}{a(v)} \left(\frac{p(v)}{a(v)} \right)^{\sigma-1}$ doesn't change year-over-year, the set of varieties purchased pre-retirement is a subset of the set of varieties purchased post retirement. Pre-retirement varieties are only dropped post retirement if, e.g., preferences $a(v)$ for these varieties change in a way such that the consumer abandons such products or if prices $p(v)$ rise.

Denoting purchase incidence of variety v post-retirement as $I_1(v)$, the model predicts that

$$\int_0^{V_0} I_0(v)\,dv = \int_0^{V_0} I_1(v)\,dv.$$

That is to say, products can enter but not exit the purchase set after the time budget expands, as long as preferences $a(v)$, prices $p(v)$, and time intensities $t(v)$ remain constant. So, as long as this condition is met, retiring consumers expand into more time-intensive (and more expensive) products, but will not abandon the alternatives bought pre-retirement.

Prediction 4: Proportional changes. As long as household preferences $a(v)$, retail prices $p(v)$, and time intensities $t(v)$ remain constant, equation (2) implies that changes to purchase quantities, e.g., from the expansion of the purchase set post-retirement, are proportional, i.e., that

$$\frac{x_0(v)}{x_1(v)} = \frac{x_0(v')}{x_1(v')}$$

for all varieties $v, v' \in \{V_0\}$.

4 Data

4.1 Households

Our data are drawn from GfK's ConsumerScan panel and cover five years of grocery purchases for a national sample of Dutch households, starting at the beginning of 2009 and continuing until the end of 2013. GfK provides weekly monetary incentives to panel members to report their purchases. Each household is given a handheld device to scan the bar codes of products that were purchased across a near-exhaustive set of retailers. Households record the bar code, the retailer from which the product is purchased, and during which part of the day of a specific date the transaction takes place.[8]

In addition to collecting scanner data at the household level, GfK surveys households to collect data on demographics, cooking preferences, and other characteristics (e.g., health status) of the Dutch panelists every year. The survey is always conducted around the turn of the year. We match it to the purchase records of the new year. From these data, we construct a purchase

[8]Each day contains three day parts in GfK's definition: (1) before noon, (2) between noon and 6PM, and (3) after 6PM.

panel of 6,815 households who actively scan purchases and for whom basic demographics –age of the household head, household composition, income, labor market status as defined below– and stated preferences for spending time on cooking are not missing.

Table 1 shows descriptive statistics for a number of demographic variables including age, income, and household composition. We first average demographics over all available years and then provide statistics of these household averages for the full unbalanced panel (in which purchase data or survey data are missing for some years) and a balanced panel (where we have purchase data and survey data for all years).[9] The average age of the household head in the unbalanced panel is 52.5 years, and a typical household in our data has 2.5 members. On average the net monthly household income in our sample is 2,090 euros. Aside from demographic variables, the survey elicits preferences regarding cooking. Dutch households self-report to be close to neutral preferences for cooking at home. Next, the table also lists self reports on incidence of any of 4 common health conditions.

–insert Table 1 here–

The table also shows that households in the balanced panel are similar to households in the unbalanced panel in terms of demographics. This suggests that selective attrition is not a concern for our analysis. In the following, unless mentioned otherwise, we report results for the unbalanced panel.[10]

Our aim is to characterize the effects of labor market events that shift the availability of time for housework and potentially affect the household's grocery purchase behavior. We focus on retirement and unemployment and define indicators that take on the value one when either the household head or the partner or both are retired or unemployed. The underlying idea is that household behavior will change as soon as one person has more available time due to retirement or unemployment. GfK measures retirement and unemployment at the beginning of the year, and we apply these measures to the purchase data for the full year.[11] The survey first asks which household members are working. For those who are not working, it asks further about about their situation. Importantly, individuals who stop work for health-related reasons and receive

[9] The table note contains more details on variable definitions.

[10] The table shows that households in the full sample are observed 3.46 years on average, while they are observed 5 years in the balanced sample. This means that that by focusing on the balanced panel we would lose about 45% of the observations $((2602 \cdot 5)/(6815 \cdot 3.46) \approx 0.55)$. We have re-run our main analyses for the balanced sample and found very similar results.

[11] This means that the labor market status in the year preceding a measured status change can be ambiguous. In Section 6.1, we show robustness of our findings to dropping the transition year.

disability benefits are not classified as retired or unemployed. This means that the effects we estimate are not related to changes in labor market status that are related to health shocks.[12] We coded a household as retired if one household member was retired and the other one was unemployed.[13] We expect the effects of unemployment to be similar to the ones of retirement in terms of the direction direction, but smaller in terms of magnitude, because we expect at least some unemployed individuals to spend time to acquire human capital or to search for a new job.

Appendix Table C.1 shows that, in our estimation sample, 1,823 households have at least one retiree at some point and among them, we observe 332 households experiencing a transition into having retiree(s) in the house during our observation window. We also see that 442 households are classified as unemployed at some point, and 279 of them transited into that during our data window.

4.2 Purchase behaviors

To empirically investigate how the availability of time affects choice outcomes, we organize measures of a household's purchasing behavior into three groups: (1) grocery shopping and home production for food consumption (as opposed to, e.g., visiting a restaurant), (2) use of the market in terms of shopping frequency and scope, and (3) the extent of buying more or less time-intensive products to be turned into consumption experiences.

First, we measure households' total grocery demand by the number of varieties they bought, volume, and expenditure. The underlying idea is that households make choices between different food options, which include meals produced at home and meals bought in the market (e.g., restaurants, or home delivery). Compared to eating out, buying groceries and undertaking home production are more time-intensive. Indeed, our model in section 3 predicts that a shift in time availability makes households buy more grocery varieties as ingredients for home producing food. This expansion of the purchase set lowers expenditure on pre-retirement varieties including those outside the grocery channel (e.g., restaurant-visits). So this also predicts that grocery volume and expenditures go up. Table 2 shows that the average household in our

[12] See Section 6.2 for a related robustness check.

[13] We also experimented with other definitions of these measures. For instance, we have also used the number of retired or unemployed individuals or separate indicators for the household head and the partner. Results with these alternative measures were remarkably similar. For instance, compare Appendix Table C.12 in which we use the number of retired and unemployed household members to Table 5 (discussed below) in which we use the indicators defined here.

data buys about 627 unique different Universal Product Codes (SKU's) in food per year, on average from 140 subcategories. Associated average yearly spending on food items is 2,791 euros.

–insert Table 2 here–

Next, we measure household decisions related to the amount of travel to stores and shopping time with three constructs tracking annual shopping behavior—the number of shopping trips (which may combine multiple retailers), the number of retailer visits, and the number of unique retailers visited. We expect that more available time, due to retirement or unemployment, is associated with a greater willingness to incur travel costs and spend time on shopping. Households may be motivated to travel more as to benefit from temporal or cross-store variation in prices, i.e., more frequently to (possibly more) stores in order to buy the same products at lower prices (see also, e.g., Aguiar and Hurst, 2005; Nevo and Wong, 2019). Similarly, households may like more variety, some of which is exclusively available from a single retailer, and additional time allows them to evaluate and buy it. Therefore we expect the availability of time to be associated with more shopping trips, more retailer visits in a year, and a greater diversity of retailers visited. Table 2 provides sample statistics for these measures. The average household in our data is observed to make 132 shopping-trips per year, covering a total of 188 retailer visits across 15 unique retailers.

Third, we measure the time intensity of goods purchased, i.e., how time-consuming it is for the consumer to convert products purchased in the store into meals at home by means of home production. For each SKU, GfK's product directory provides a detailed description and membership of subcategories and categories. Our empirical strategy is to test for within-category shifts into time-intensive varieties when households experience a time-budget shock. To do so, we need categories that contain time-intensive and goods-intensive products. We selected 5 categories, Fruit, Meat, Potatoes, Seafood & Shellfish, and Vegetables, for (1) being the largest primary inputs in the home production of meals, (2) belonging to the 20 largest food categories (see Appendix Table C.2), and (3) containing ample time-intensive and goods-intensive subcategories that are close substitutes (e.g., unprocessed raw potatoes and peeled pre-cooked potatoes).[14] Together, these categories contain 68 subcategories that we seek to classify as time-intensive or goods-intensive. Using Prolific, we surveyed Dutch consumers

[14]We cannot simply select the largest categories outright, because several of them contain only goods-intensive subcategories (e.g., beverages).

($N = 150$), who were asked to rate all subcategories for 2 categories that were randomly assigned to them. In particular, the survey asked how many minutes it would take for a typical product in a given subcategory (e.g., fresh fish, or ready-to-eat fish snacks) to be prepared for consumption. Each category was rated by 60 respondents on average. Next, each subcategory was classified by taking the median (across respondents) minute-score and recorded as time-intensive (goods-intensive) if its median was strictly higher (strictly lower) than the category median (the median of medians). Appendix B provides full details and Appendix Table C.3 lists the full classification, including examples of products that belong to each subcategory.

4.3 Auxiliary data on time use and income

4.3.1 Time use data

To provide insight into how unemployment and retirement shift time used for domestic work in the Netherlands, we use data from the Dutch Time Use Survey,[15]. The survey is conducted by the Central Bureau of Statistics every 5 years. It collects diaries of primary and secondary activities for a random sample of individuals (with a resolution of 10 minute episodes). The time use survey also collects a rich set of background characteristics.[16]

4.3.2 LISS panel

As a final data set, we use the LISS[17] panel from CentERdata at Tilburg University. The LISS panel consists of 4,500 households, comprising 7,000 individuals. The panel tracks consumers from 2007 onward and is representative for the Netherlands.[18] Our main data set contains information about household income that is collected at the yearly level. We use the LISS panel to validate our finding that retirement and unemployment have small effects on income. The LISS panel is well-suited for this purpose, as it provides us with income data on incomes and labor market status at the individual level that is collected at the monthly level.

[15] See, e.g., https://www.scp.nl/Onderzoek/tijdsbesteding.

[16] We use these respondent characteristics to construct proxies for retirement and unemployment. The time use survey does not ask directly about retirement and unemployment, although the survey allows us to define good proxies. In the results below, retirement is proxied by age exceeding 65 and unemployment is proxied by "Are you in a paying job [no]?" and "Do you want to be in a paying job [yes]?"

[17] LISS stands for Longitudinal Internet Studies for the Social Sciences. See https://www.lissdata.nl for data access and explanation of the variables collected.

[18] The panel does not select on Internet access, i.e., households are provided with a computer and Internet connection if it prevents them from participation.

5 Retirement and unemployment as time-shifters

Our empirical analysis uses labor market events as proxies of a change in the availability of time. To substantiate this approach, we use the auxiliary time use data described in Section 4.3.1 to directly study the effect of retirement and unemployment on time spent (measured in minutes/week) on 2 activities that are relevant in our study: preparing meals at home, and consumption of food at home. Unlike the other data sets we use, our time use data are repeated cross sections, which means that we cannot control for household fixed effects. We however account for age, gender, household size, income, and wave (survey year) fixed effects. Our results in Table 3 show that retirement is associated with allocating an additional 68 minutes per week preparing meals at home (from a baseline of 253 minutes) and 142 minutes per week consuming food at home (baseline 612 minutes). For the unemployed, we observe a similar relation for the time spent preparing meals at home and consuming food at home. We conclude from these numbers that retirement and unemployment are associated with a large reallocation of time into home production of meals for which grocery products serve as an input.[19]

–insert Table 3 here–

Obviously, retirement and unemployment are major events in life, and one may wonder whether they also affect decisions through other pathways, in particular by having substantial effects on budget tightness by affecting household income. For institutional reasons, the Netherlands provides an ideal environment for our study, because –unlike in countries like the U.S.– retirement and unemployment are unlikely to have economically significant effects on income. Before going into the details of why this is the case, we use data for our sample of households and the same specification that we will also use for our main analysis described in Section 6 below to estimate the effect of retirement and unemployment on household income. In brief, we control for demographics, household and year fixed effects.

Table 4 shows the results. We find that reported net monthly household income is not affected significantly by retirement or unemployment.[20] Moreover, we find that retirement does not significantly affect perceived budget tightness, while unemployment has a significant

[19]We also considered using child birth and changes of the number of children as shifters of the availability of time. However, we expect the tastes of children to have direct effects on household food preferences and we do not observe the use of child care services.

[20]We have also experimented with a specification where we distinguish between short-term (observed up to 2 years) and long-term unemployment (longer than 2 years). Then, we find that long-term unemployment has an effect of about 10% on net household income.

but small effect on it.[21]

To understand the reasons for these small effects, it is important to note that first, we are reporting the relationship between net household income and at least one person being retired or unemployed. This is not the same as the effect of individual retirement or unemployment on net individual income. For instance, one partner's unemployment can lead to changes in the other partner's labor market choices, and even absent this would only partly affect household income. Second, the Dutch social security system aims to offset the drop in labor earnings at retirement (see for instance Bovenberg and Meijdam, 2001). In line with that and with our results, the OECD reports that the net pension replacement rate –defined as net individual income after retirement relative to net individual income before retirement– for the Netherlands is 101% (for both men and women) in 2016. This compares to, for instance, 49% in the U.S.[22] Third, and in the same vein, unemployment benefits are meant to compensate for income losses that are due to unemployment. By law unemployment benefits are at least 75% of gross income in the first 2 months of unemployment, and at least 70% thereafter. The OECD translates this into replacement rates for net income in the range of 85 to 90%.[23] But this is only what the law requires. Many so-called collective labor agreements (between unions and employer organizations) actually have a clause that raises this to 100%, at least for some time.

–insert Table 4 here–

To assess whether this empirical finding of no significant effects of retirement and unemployment on household income is an artifact of the data we use, we also used the auxiliary LISS data described in Section 4.3.2 to estimate these effects, in this case at the individual level and using monthly data. We control for time and individual fixed effects. Appendix Table C.4 reports the results. We again find no significant effects of retirement on income at the 5 percent level, and an effect of unemployment on individual income in the order of a 10% decrease (see also footnote 20). For the reasons given above, the effects on household income are likely to be much smaller than this and unlikely to drive our results.[24]

Taken together, our analyses from the three data sources –the time use data, the GfK panel data on household income, and the LISS data on individual income– support the view that re-

[21] Budget tightness is measured on a 5 point scale. Table 1 shows that the mean is 2.91 and the standard deviation is 0.94.

[22] See, e.g., https://data.oecd.org/pension/net-pension-replacement-rates.htm.

[23] See, https://stats.oecd.org/Index.aspx?DataSetCode=NRR for a family with 2 children and both partners out of work, previously earning average wages, and being unemployed for 12 months or less.

[24] The LISS data do not allow us to estimate how big the effect is on household income.

tirement and unemployment mainly shift the time households have available and not household income. We think of this as an advantage of our empirical setup. To be conservative, we nevertheless control for income in our analysis below.[25] This also makes our specification more comparable to the one that one would want to use for settings like the U.S., and we believe it helps interpretation of our results as stemming from shifts in the time budget and not shifts in income that are associated with it.

The last two columns of Table 4 show variables that are related to preferences. First, we report that preferences to cook at home are not associated with retirement and unemployment. This is in line with the view that we can meaningfully distinguish between preferences and constraints when studying economic activity and that the effects on home production measured in this study (reported and discussed in Section 5) are more likely to come from shifts in the time budget than from shifts in preference for home production. Second, we report that the incidence of any of 4 health related problems[26] is not associated with retirement or unemployment. Moreover, Appendix Table C.6 reports that, individually, none of the 4 health problems are associated with any of the labor market events. This is in line with our definition of these two events, as those individuals who stop working for health-related reasons would be classified as disabled, which is subsumed under the reference category of neither being retired nor unemployed. In an additional robustness check that we discuss in Section 6.2, we drop households that are ever classified as disabled from our analysis and re-do the analysis controlling for perceived budget tightness and reported health problems.

6 Available time and shopping behavior

Guided by the 4 predictions we have developed in Section 3, we now turn to the empirical analysis of how retirement and unemployment affect shopping behavior.

[25]Data on household income is missing for 14% of the household-year observations in the unbalanced panel, which means that there is also cost to controlling for it. We note that –as one would expect given the above– our results replicate in the larger sample that includes all households. To assess this, we have re-run the regressions in Table 5 below without controlling for income. The same is true for the other results in the paper, presented below. This is also the case when we do not control for income and use only data for those households with non-missing income data. Table C.13 shows that the results are very similar.

[26]Summary statistics and variable definitions are provided in Appendix Table C.5.

6.1 Variety of products purchased, grocery expenditure, and shopping trips

As motivating model-free evidence, we plot in Figure 2 the total expenditure on grocery items against age and retirement status. The overall trend in age is mildly negative. The older the household head, the lower the overall expenditure on groceries becomes. The gradient is a reduction of about 20 euros of annual expenditure per year of age. At first glance this seems consistent with the finding by Aguiar and Hurst (2005) that the elderly shop for low prices and therefore spend less. However, looking at expenditure as a function of retirement while holding age constant, we observe that –within the age range of 61-65– retirement is associated with households actually spending about 300 euros *more* on food items; a difference of about 10% of their annual food expenditure.[27] This suggests that the retired are spending more on groceries relative to their non-retired age peers, consistent with the second prediction of the model in section 3, i.e., that consumers buy more time-intensive varieties (e.g., buy additional grocery which will lower their restaurant expenditures).

–insert Figure 2 here–

An obvious disadvantage of this motivating example is that the figure represents mostly cross-sectional variation and misses proper controls for existing preferences and time trends. We therefore turn to a regression framework and specify

$$y_{it} = \alpha_i + x_{it}\beta + z_{it}\gamma + \delta_t + \varepsilon_{it}. \tag{8}$$

The dependent variable y_{it} is an outcome such as the number of varieties consumers buy, or the expenditure on market goods needed in home production. The coefficient α_i is a household-specific fixed effect. The vector x_{it} contains dummy variables indicating whether the household is classified as retired or unemployed. The vector z_{it} contains observed demographic characteristics for each household-year, i.e., the number of adults, children, and babies/toddlers, respectively. We use year dummies to control for time effects δ_t. This captures, e.g., supply side changes that may affect households' shopping activities like more retailer branches or the availability of online channels. Note that the combination of household- and time fixed effects also accounts for age.

[27] This is equivalent to about €160 per adult in the household.

We assume that, once we control for demographics, year dummies, and household fixed effects, labor market events are strictly exogenous (in the sense that x_{is} not related to ε_{it} for any combination of s and t) and that ε_{it} is independent across households. This assumption means that the decision to retire or cease market work is not motivated by a change in the preference for home production and shopping. It is supported by the evidence presented in Table 4, showing that retirement and unemployment are not associated with health problems and cooking preferences. Under this exogeneity assumption, we can take the estimates of β as causal. To be conservative, we interpret estimated values of β as the treatment effect on those who retire or become unemployed. Throughout, we cluster standard errors at the household level and thereby allow for a correlation of ε_{it} within household over time.

Recalling the first prediction of our model in Section 3.2.2, we now test whether time available from retirement or unemployment causes consumers to buy more variety. We expect a positive change in the availability of time to positively affect both the incidence and the variety of home produced meals. Therefore, we expect consumers to buy more diverse grocery goods as inputs to these meals, buy larger quantities, and spend more. This expectation relates to, yet complements, Aguiar and Hurst (2005), who find that expenditure declines with retirement status, while time spent on food production dramatically increases. Their analysis exploits cross-sectional data with rich demographic information and household expenditure in restaurants. We add to their findings by exploiting the panel nature of our data, which allow us to make a causal interpretation of the effect of retirement and unemployment. The effect of time availability on expenditures is theoretically ambiguous as households may increase producing meals at home, yet also spend time finding lower prices. This would mean that there is a positive effect of time availability on quantities and a negative effect on price.

Using the specification (8) described above, Table 5 shows that retirement leads to households buying an extra 3.3% ($= 100 \times \left(e^{0.032} - 1\right)$) SKU's of variety, 4.5% ($= 100 \times \left(e^{0.044} - 1\right)$) more volume in equivalent units (see table notes for details), and 5.0% ($= 100 \times \left(e^{0.049} - 1\right)$) higher spending. Expenditure thus increases somewhat more than volume. This implies that the average price per unit in the shopping basket increases after retirement. This is predicted by the theoretical model, e.g., illustrated by the comparison of pre- and post-retirement average prices (the triangles (a) and (b)) in Figure 1.[28]

[28] We also investigated whether retirement and unemployment have effects on the price at which households buy products. This is a mechanism that is important in the U.S., where both events are associated with large drops in income. Aguiar and Hurst (2007a) document for the U.S. that older households make the most shopping trips and

–insert Table 5 here–

Relative to retirement, Table 5 reports smaller effect sizes of unemployment on variety, volume, and expenditure. Our preferred explanation for this is that effect sizes of short-term unemployment are smaller, perhaps caused by short-term unemployed households spending more time looking for work (we cannot directly measure this). In Table C.11, we report that focusing on unemployment spells of 2 years and more increases the point estimates for unemployment by more than 100% and brings them close to the point estimates for retirement. In general, the effects of unemployment are noisy due to the limited number of unemployed households (see Appendix Table C.1) and are insignificant. However, note that we can't reject the null hypothesis that the effects for the retired and unemployed are equal to one another, regardless of the duration of unemployment.

Our online appendix offers several robustness checks.[29] For instance, we drop the year in which the labor market status switches and is therefore ambiguous (see Table C.15). This increases the point estimates of our effects. Also,Table C.16 considers the effects of the number of retirees in the family and shows that dual-retirement status has substantially large effects than single-retirement status (which is consistent with a mechanism of time availability).These and other robustness checks reported in the online appendix leave our conclusions unaffected.

The demand model in section 3 can also be interpreted along another margin of costly variety, namely that of visiting a larger number of different retailers and making more retailer trips. Using the same specification as above, Table 6 shows how time availability affects the number of shopping trips made by a household. The first column of Table 6 shows that increased time availability leads to more shopping trips. On average, the retirement of at least one person leads to 4.4 additional shopping trips per year, whereas unemployment raises the number of shopping trips per year by 5.1. The second column of Table 6 shows that retirement increases the number of retailer visits by about 8.0 a year. Unemployment has a large effect too (5.2), but the estimate is relatively noisy. Finally, as can be seen in the third column, the increased availability of time due to retirement is also associated with visiting a more diverse set of retailers. In sum,

pay the lowest prices. Our results are reported in Table C.7. We find no effects of retirement and unemployment on the prices households pay. One can see this as additional indirect validation for the view that in the Netherlands, retirement and unemployment mainly affect the available time, and not household income, as we have argued in Section 5.

[29]The Appendix Tables C.10-C.16 contains 7 robustness checks of our results, (1) in selected categories, (2) using only unemployment spells of 2 years and more, (3) using the number of retired/unemployed household members, (4) not controlling for income, (5) not controling for household fixed effects, (6) dropping the year in which retirement/unemployment status changes (because that year is ambiguous), and (7) the effects of single versus dual retirement. None of these robustness checks alter the conclusions drawn here.

controlling for income, we find that retirement is associated with more trips, retailer visits and unique retailers. As above, we also find positive effects from unemployment but these are more noisy and not always significant.

–insert Table 6 here–

We continue by investigating whether increased time availability in a household affects the nature of grocery items purchased, and in particular whether it leads to a shift into buying more time-intensive varieties.

6.2 Effects on the time-intensity of products

An important potential adjustment margin of purchasing behavior in response to time availability is that it changes the nature of the products consumers buy. Our model in section 3 predicts that additional discretionary time makes a household switch to more time-intensive substitutes within a category. This prediction has to our knowledge not been tested before.

In our empirical test, we focus on the five categories selected earlier (based on these categories being large, central to the home production of meals, and having meaningful variation in time intensity of market goods—see Section 4.2 for details). Using our sub-category classification as time-intensive or goods-intensive within each selected category, we aggregate purchases y_{ikst} to one observation per household i, year t, category k, and time-intensity s (thus $5 \times 2 = 10$ observations for each household and year). We then specify

$$y_{ikst} = \alpha_i + \alpha_{ks} + (\beta + \theta s)\, x_{it} + \gamma z_{it} + \delta_t + \varepsilon_{ikst}, \tag{9}$$

where k denotes the category, and s is the dummy tracking time-intensity. As before in (8), x_{it} is a vector of household time budget shifters, i.e., whether or not at least one household member is retired or unemployed, respectively. Next, z_{it} is a vector of observed demographic variables that may influence a household's grocery shopping decisions. z_{it} also includes log net household income. Also as before, we control for time effects δ_t by including year dummies. These also capture supply-side changes that may affect households' shopping activities, e.g., more retailer branches and retailer adoption of online channel. We further control for household (α_i) and subcategory (α_{ks}) fixed effects. The vector β has two elements: one is the coefficient on the indicator for retired and the other one on the indicator for unemployed. These have the interpretation of the effect of retirement and unemployment, respectively, on y_{ikst} when $s = 0$,

i.e., in goods-intensive categories. Similarly, θ contains the two parameters that measure the *additional* causal impact of retirement and unemployment, respectively, on purchasing time-intensive varieties in a given category. This is the additional impact because the total effect of these labor market events on consuming time-intensive products is the sum of β and θ. Put differently, θ measures the *difference* in the evolution between goods- and time-intensive products when the availability of time increases.

Table 7 presents the results. Our model predicts that for variety, β is zero and θ is positive. When we measure variety as the number of SKU's households buy, then we find a small but significant effect of retirement on variety for goods-intensive products and a three times as big positive and significant effect on variety for time-intensive products. If we measure variety as the number of subcategories households buy products from, then we find that our estimate of β is not significantly different from zero, while our estimate of θ is positive and significant.

–insert Table 7 here–

The last two columns show results for volume and expenditure. Our estimates suggest that retirement leads to an expenditure drop for goods-intensive products of -8.1% ($= 100 \times \left(e^{-0.085} - 1\right)$) and an increase for time-intensive goods of 17.5% ($= 100 \times \left(e^{-0.085+.246} - 1\right)$). This means that households spend less on goods-intensive and more on time-intensive products within category when the time budget increases due to retirement. The difference in the growth rates is 25.6 percentage points.[30]

As before, the results for unemployment are generally similar in terms of the direction, but slightly smaller in terms of magnitude and less precisely estimated. Turning again to the effects on expenditures, we find that unemployment is associated with a difference in the growth rates of expenditures between time-intense and goods-intensive varieties of 10.2 percentage points (calculated for expenditure in the same way as above).

We now show the robustness of the above result, i.e., that retirement and unemployment lead to substitution into time-intensive varieties. First, we show in Table C.17 that our result does not depend on whether drop the initial year of employment (and thus focus our unemployment results on spells of 2 years or more).

[30]Taking the difference in growth rates is in general not innocuous and could be misleading if the base is very different. In our case, however, the level of expenditures for time-intensive products is similar to the level of goods-intensive products. At the same time, the advantage of comparing percentage changes caused by labor market events between time-intensive and goods-intensive products is that it is meaningful to pool data across categories even if spending levels are very different in different categories.

Second, recall that so far, disabled individuals have been classified as neither unemployed nor retired (see Section 4). Appendix Table C.18 reports that we find very similar results when we exclude households that ever become disabled from the comparison group.

Next, we show that the results are robust when we condition on purchase incidence, $y_{ikst} > 0$. Appendix Table C.19 shows the results. The impact of retirement on making the shopping basket more time-intensive remains strong and significant, with similar effects as before. The impact of unemployment is a little noisier but is statistically equal to the effects of retirement.

Third, we ask the question whether the effects are driven by low-income households who feel financially constrained. For reasons given in Section 5 we do not believe that this is likely to be the case. Nevertheless, we dropped below-median income households and re-ran the analysis. Table C.20 shows that, although the results are nosier from the median split, the estimated effects are qualitatively similar to the ones reported in Table 7.

Appendix Table C.21 shows the results when we control for health status and perceived budget tightness. The results for retirement are unaffected, but the results for unemployment are positive but a bit nosier.

Fifth, rather than classifying subcategories as time-intensive or goods intense by using above or below median time-intensity, we can additionally use information in the continuous time intensity score (the number of minutes to prepare for consumption) directly. Appendix Table C.22 shows that the interaction between retirement/unemployment and time intensity on all measures of purchasing is positive and significant.[31]

This analysis and its robustness to different selections of the data and to different classification methods into time-intensive and goods-intensive subcategories complements the results in Aguiar and Hurst (2005, 2007a) who do not address product-type choice or within category substitution. Earlier, in Section 5, we established that retirement mainly affects the time households have available and not the preference for cooking at home. We also established that retirement is not associated with income effects (and additionally, throughout, we control for household income. Therefore, we attribute the reported shift in behavior to the availability of more time. Our findings thus suggest that consumers combine the time release from retirement or unemployment with buying fresh ingredients to achieve quality improvements in home

[31] In a previous version of the paper, we also used a bottom-up measure of time intensity, counting the number of cooking tasks (e.g., peel, cut, use can-opener, season, bake, etc.) needed to convert products from a given subcategory into a consumption good. Classifying subcategories based on this count, relative to the category average, also leads to the conclusion that retirement and long-term unemployment cause purchasing of more time-intensive goods.

production.[32]

6.3 Effects on switching and abandonment

The third empirical prediction of our theoretical model in Section 3 is that with constant preferences $a(v)$ the set of varieties purchased before a time-availability shock is a subset of the set of varieties purchased after that shock, i.e., that the consumer does not switch out of varieties bought, e.g., pre-retirement. This indirectly tests our proposed mechanism, i.e., in particular that preferences remain unaffected by retirement/unemployment, thereby supporting that the behavioral changes are driven by shifts in the time constraint.

We will take this prediction to the data by constructing a measure of similarity between the sets of products that are bought in consecutive years. To do so, we define a product or a variety to be a SKU.[33] Denote expenditures for household i and variety v in the previous year by $e_{it-1}(v)$ and the discrete set of varieties that was bought in year $t-1$ and t by $\{V_{it-1}\}$ and $\{V_{it}\}$, respectively. As a robustness check we also use volume instead of expenditures.

The set of varieties that is bought both in $t-1$ and t is $\{V_{it-1} \cap V_{it}\}$. Our measure of similarity for year t is the fraction of year $t-1$ expenditures that is spent on varieties bought in t,

$$\eta_{it} = \frac{\sum_{v \in \{V_{it-1} \cap V_{it}\}} e_{it-1}(v)}{\sum_{v \in \{V_{it-1}\}} e_{it-1}(v)}. \tag{10}$$

Note that this measure weighs varieties bought in $t-1$ and t by respective expenditures in $t-1$. That is, the weights are fixed. The measure in equation (10) is between 0 (full abandonment at t of varieties bought at $t-1$) and 1 (full similarity). For instance, if a household i buys 100 varieties at $t-1$ and stops buying 10 of them in year t, collectively making up 5 percent of last year's expenditure, then $\eta_{it} = 0.95$.

We calculate η_{it} for each year and relate it to changes in labor market status. When doing so, we control for household and time fixed effects. Our prediction is that η_{it} is close to 1. Theoretically, our prediction is that it is equal to 1, but we expect consumers to change the set of products they buy in a year for incidental reasons other than the ones studied in this paper. One may think about occasional stock-outs, discontinuation, some regular price

[32] Additionally, Appendix Table C.8 reports that households in the LISS panel report a decrease of restaurant expenditures relative to grocery expenditures when they retire or become unemployed. Like the analysis of the GfK panel, this supports a substitution into more time-intensive goods.

[33] Our results are unchanged when we use that a single variety is a subcategory.

changes, different shelf-space allocations, etc. Importantly, however, these reasons will affect both households whose labor market changes and households whose labor market status does not change. Therefore, we can use the latter households as a control group and test the third empirical prediction of our model by testing whether a change in labor market status has an effect on η_{it}.

The first column of Table 8 shows the results for expenditures. The coefficient on the constant term indicates that in 2010, our measure is equal to 0.952 for households that do not change labor market status. The estimated time fixed effects are very small and precise. Changes in labor market status have no effect at all on the similarity of products that were bought, in line with the third prediction of our model. The effects are very small, insignificant, and precise. This means that pre-retirement consumers buy highly similar sets of varieties year-over-year including the year their retirement status changes. The second column shows results that use volume as a weight. The results are similar.

6.4 Proportional expenditure changes

The fourth empirical prediction is that the effect of a shift in the time constraint, holding everything else equal, is that relative changes to expenditures and purchase quantities are equal across varieties.[34] As in the previous subsection, this indirectly tests our proposed mechanism that the behavioral changes are driven by shifts in the time constraint by showing support that retirement/unemployment do not impact preferences. To make this more precise, write the vectors of expenditures in year $t-1$ and year t for varieties bought in year $t-1$ ($v \in \{V_{t-1}\}$) as $\boldsymbol{e}_{t-1}$ and $\boldsymbol{e}_t$. This means that $\boldsymbol{e}_t$ contains the expenditures for varieties bought at $t-1$, just like $\boldsymbol{e}_{t-1}$. If preferences for these varieties are the same in subsequent years, then the relative expenditures for these varieties are equal across $t-1$ and t. This means that $\boldsymbol{e}_{t-1}$ and $\boldsymbol{e}_t$ lie on a single ray through the origin. We define a test statistic using this observation,

$$\kappa_t = \frac{\boldsymbol{e}'_{t-1}\boldsymbol{e}_t}{\sqrt{\|\boldsymbol{e}_{t-1}\|\,\|\boldsymbol{e}_t\|}}. \tag{11}$$

This test statistic is equal to the cosine-similarity measure. Proportionality of expenditures or quantities in consecutive years implies that the vectors $\boldsymbol{e}_{t-1}$ and $\boldsymbol{e}_t$ point in the same direction, i.e., that $\kappa_t = 1$.

[34] Recall from our discussion of the theoretical model that this is not the case when retirement shifts consumers' food preferences.

As before, we expect consumers to change their purchase patterns for reasons other than the ones studied in our paper and captured by our model. Therefore, we expect κ_t to be close to 1, but not exactly equal to one, even if time availability does not change. As in the previous sub-section, our main test is based on the observation that the test statistic does not depend on changes in labor market status. The third column of Table 8 shows results based on expenditures. We find that the cosine-similarity without labor market changes is 0.912 in 2010. It changes little in from year to year. The effects of changes in labor market status on the cosine similarity are precisely estimated and statistically equal to 0, as predicted by the model. The fourth column shows that this is also true when we base results on volume instead of expenditures.

Combining results from subsections 6.3 and 6.4, we conclude that the availability of time that comes with labor market status changes does not make consumers abandon pre-retirement choices but expands their purchase set with more time-intensive goods. This expansion causes changes of purchase quantities in the pre-retirement set. Such changes are found to be close to proportional. Retirement or unemployment does not affect these results at all. We view this as support for our claim that the main mechanism for the behavioral changes is not a shift in preferences but consistent with a shift in available time. Indeed, if preferences $a(v)$ in the model in section 3 were to depend on labor market status, we would expect that retirement status affects abandonment and proportionality. This suggests that preference shifts are not the main drivers of the effects on purchasing. Moreover, the idea that the effects are not driven by preferences, is also consistent with recent results that suggest that, once formed, preferences for foods are very persistent (see, e.g., Bronnenberg et al., 2012; Atkin, 2013).

7 Discussion and concluding remarks

In this paper, we study the effect of retirement and unemployment on shopping behavior. We find that households buy more variety, make more shopping trips, and switch into more time-intensive (and more expensive) varieties. At the same time, they continue to buy varieties they bought before, and do so in the same relative quantities.

We use a simple model of consumer behavior to show that these findings are consistent with an explanation that involves a shift in the time constraint that accompanies retirement and unemployment. At the same time, they are inconsistent with explanations that involve

fundamental changes in preferences (consistent with other findings in the literature that we discussed above). We further show that these effects are not driven by observed changes in preferences for home production, income or demographics.

The explanation that we provide in this paper is that households have a taste for variety and use additional time as a complement to produce additional, more varied consumption experiences at home, while continuing to consume what they have consumed before.

Such a taste for variety in the context of home production has implications for innovation in retailing and product development. First, the effect of time availability on the number of shopping trips supports the idea that retailers can compete for consumers by reducing the time costs associated with purchasing. Retailers have started to do so by providing an online channel, delivery service, or extended store opening hours. Second, our findings also speak to how time use affects the direction of innovation in grocery products. Judging from their purchasing, most households in our panel prefer variety and preparing meals themselves using fresh ingredients. Manufacturers and retailers can cater to this preference by offering low time cost of home production and of discovery of new recipes.

In line with this, online food retailers like Hello Fresh or Blue Apron have recently entered the market with a subscription service that curates and delivers a box of fresh ingredients and preparation instructions to households every week. This new way of retailing grocery products to households lowers the total time cost of home producing meals while offering greater variety. In this case, consumers save time not through less time-intensive ingredients, but through the convenience of delivery, low discovery cost of new recipes, and preparation instructions. Existing brick-and-mortar grocery retailers have responded, too, by selling similar meal kits consisting of measured, boxed fresh ingredients in-store, along with preparation instructions. Finally, manufacturers have innovated into providing more advanced market goods that require less time inputs in home production (e.g., pre-mixed spices, easy-to-cook meal kits, etc.). These innovations are all examples of sellers' forward integration into households' home production. Our findings suggest that demand for such innovations will increase in the future and that it is a particularly successful strategy to cater both to the households' taste for variety and to their wish to save time producing consumption experiences at home.

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Table 1: Household characteristics

	variable	10^{th} percentile	mean	90^{th} percentile	std. dev.	N
full sample	age	33.0	52.5	73.0	14.8	6815
	number adults age 19+	1.00	1.89	2.80	0.70	6815
	number children age 5-18	0.00	0.46	2.00	0.85	6815
	number babies/toddlers age 0-4	0.00	0.13	0.50	0.39	6815
	monthly income	1102	2090	3149	812	6815
	budget tightness	2.00	2.91	4.00	0.95	6345
	cooking preference	2.00	3.94	5.00	1.08	6815
	any health problem	0.00	0.62	1.00	0.42	6306
	number of years observed	1.00	3.46	5.00	1.52	6815
balanced sample	age	41.0	58.0	75.0	12.7	2602
	number adults age 19+	1.00	1.90	2.80	0.68	2602
	number children age 5-18	0.00	0.34	1.60	0.74	2602
	number babies/toddlers age 0-4	0.00	0.04	0.00	0.19	2602
	monthly income	1161	2104	3114	769	2602
	budget tightness	1.75	2.78	4.00	0.87	2602
	cooking preference	2.20	3.91	5.00	1.03	2602
	any health problem	0.00	0.62	1.00	0.40	2601
	number of years observed	5.00	5.00	5.00	0.00	2602

Note: Reported descriptive statistics are first taken over years and then households. Households in the balanced sample are observed in all five years, 2009 to 2013. Age refers to the household head. Monthly income is nominal net monthly household income, directly measured on the survey in increments of €200. Budget tightness is measured on a 5-point Likert scale by asking how much households agree with the statement "My household budget is always tight.". Cooking preferences are measured as a 5-point Likert by asking how much consumers disagree with the statement "I actually don't like cooking". A high value indicates a preference for cooking. Any health problem measures incidence of any of the following health problems: sensitive skin, indigestion, high cholesterol, constipation/bowel problems.

Table 2: Shopping behavior

variable	10^{th} percentile	mean	90^{th} percentile	st.dev.
variety (SKU)	302	627	994	272
variety (subcategory)	98	140	177	31
volume	358999	990649	1776000	578637
expenditure	1104	2791	4760	1475
expenditure on selected categories	249	777	1388	476
expenditure on time-intensive categories	41	173	340	129
expenditure on goods-intensive categories	69	224	412	145
trips	51	131	234	72
retailer visits	61	188	354	124
unique retailers	5	15	27	8

Note: Reported descriptive statistics are taken over households in the full unbalanced panel and years 2009 to 2013. The variable variety is either the number of SKU's the household has bought at least once in a given year or the number of subcategories from which the household has bought at least one item in a given year. Volume is in equivalent units (equating one milliliter to one gram where needed to sum across food categories) per year. Expenditure refers to a household's yearly overall grocery expenditure on food items (in euros). Expenditure on selected categories refers to 5 categories we use to construct time intensity measures. The variable trips refers to the annual number of recorded shopping trips (household/day/day-part) combinations. The variable retailer visits counts the number of household/retailer/day/day-part combinations. Finally, the variable unique retailers refers to the count of retailer identifiers per household year.

Table 3: The effect of retirement and unemployment on time used for food consumption and preparation

variable	preparing meals at home	consuming food at home
retired	67.715	142.414
	(11.194)	(16.441)
unemployed	59.341	128.310
	(14.492)	(21.284)
age	15.631	45.537
	(1.521)	(2.234)
gender	✓	✓
household size	✓	✓
income	✓	✓
wave fixed effects	✓	✓
mean dependent variable	252.610	611.720
overall R^2	0.254	0.285
number obs.	3540	3540

Note: Based on data from time use survey described in Section 4.3.1. We use two consecutive (5-year) waves from 2011 and 2016. One observation is a respondent in a given wave. Respondents are observed only once. The dependent variable is reported time in minutes per week. Preparing meals includes cleaning up. Retirement is proxied by age exceeding 65 and unemployed is proxied by "Are you in a paying job [no]?" and "Do you want to be in a paying job [yes]?" Household size is measured using 5 categories for household size from 1 to 5 persons, and a sixth category for 6 and more persons. Income is measured using 5 brackets.

Table 4: The effect of retirement and unemployment on income and preferences

variable	log income	budget tightness	cooking preferences	any health problem
retired	0.004	0.047	-0.001	0.019
	(0.016)	(0.042)	(0.033)	(0.023)
unemployed	-0.011	0.172	0.019	0.037
	(0.014)	(0.054)	(0.044)	(0.025)
number adults age 19+	0.055	-0.007	-0.029	0.021
	(0.008)	(0.023)	(0.021)	(0.012)
number children age 5-18	0.030	0.027	-0.055	0.030
	(0.009)	(0.029)	(0.023)	(0.016)
number babies/toddlers age 0-4	0.040	0.056	-0.061	0.037
	(0.014)	(0.045)	(0.034)	(0.021)
household fixed effects	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓
within-household R^2	0.035	0.002	0.002	0.001
num. household-year obs.	23577	18181	23577	18156

Note: One observation is one household in one year. See notes to Table 1 for definitions of dependent variables. Retired means that either the household head or his or her partner is retired. Likewise for unemployed. We recode unemployed as 0 when retired is equal to 1. The table reports robust standard errors clustered at the household level.

Table 5: The effect of retirement and unemployment on grocery purchases

variable	log variety (SKU)	log variety (subcategory)	log volume	log expenditure
retired	0.032	0.013	0.044	0.049
	(0.009)	(0.005)	(0.012)	(0.011)
unemployed	0.013	0.007	0.016	0.015
	(0.012)	(0.007)	(0.015)	(0.015)
log income	0.032	0.017	0.049	0.056
	(0.008)	(0.005)	(0.011)	(0.010)
number adults age 19+	0.062	0.028	0.144	0.121
	(0.006)	(0.003)	(0.008)	(0.008)
number children age 5-18	0.061	0.026	0.146	0.110
	(0.008)	(0.005)	(0.010)	(0.010)
number babies/toddlers age 0-4	0.051	0.015	0.118	0.094
	(0.011)	(0.006)	(0.015)	(0.015)
household fixed effects	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓
within-household R^2	0.061	0.076	0.136	0.064
num. household-year obs.	23577	23577	23577	23577

Note: One observation is one household in one year. See notes to Tables 1, 2 and 4 for variable definitions. When constructing the dependent variables, logs are taken after adding one to the yearly quantity. The table reports robust standard errors clustered at the household level.

Table 6: The effect of retirement and unemployment on shopping trips

variable	trips	retailer visits	unique retailers
retired	4.379	7.988	1.003
	(1.433)	(2.480)	(0.198)
unemployed	5.070	5.206	0.082
	(1.661)	(2.610)	(0.217)
log income	0.397	1.432	0.243
	(0.982)	(1.562)	(0.145)
number adults age 19+	5.658	8.675	0.061
	(0.865)	(1.384)	(0.108)
number children age 5-18	5.196	8.098	-0.144
	(1.071)	(1.792)	(0.132)
number babies/toddlers age 0-4	7.283	9.798	0.212
	(1.509)	(2.511)	(0.207)
household fixed effects	✓	✓	✓
year fixed effects	✓	✓	✓
within-household R^2	0.078	0.078	0.077
num. household-year obs.	23577	23577	23577

Note: One observation is one household in one year. See notes to Tables 1, 2 and 4 for variable definitions. The table reports robust standard errors clustered at the household level.

Table 7: The effect of retirement and unemployment on time intensity of shopping basket

variable	log variety (SKU)	log variety (subcategory)	log volume	log expenditure
retired	-0.035	-0.002	-0.073	-0.085
	(0.011)	(0.005)	(0.044)	(0.018)
unemployed	-0.021	-0.008	-0.090	-0.030
	(0.017)	(0.007)	(0.061)	(0.025)
retired × time-intensity	0.110	0.019	0.153	0.246
	(0.010)	(0.004)	(0.043)	(0.018)
unemployed × time-intensity	0.068	0.024	0.202	0.100
	(0.019)	(0.008)	(0.077)	(0.030)
log income	0.031	0.013	0.100	0.066
	(0.008)	(0.003)	(0.030)	(0.013)
number adults age 19+	0.049	0.009	0.150	0.103
	(0.006)	(0.003)	(0.023)	(0.010)
number children age 5-18	0.023	0.001	0.100	0.064
	(0.008)	(0.003)	(0.028)	(0.012)
number babies/toddlers age 0-4	0.017	-0.001	0.053	0.051
	(0.011)	(0.004)	(0.041)	(0.018)
household fixed effects	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓
category*time-intensity fixed effects	✓	✓	✓	✓
within-household R^2	0.697	0.686	0.443	0.532
num. obs.	235730	235730	235730	235730

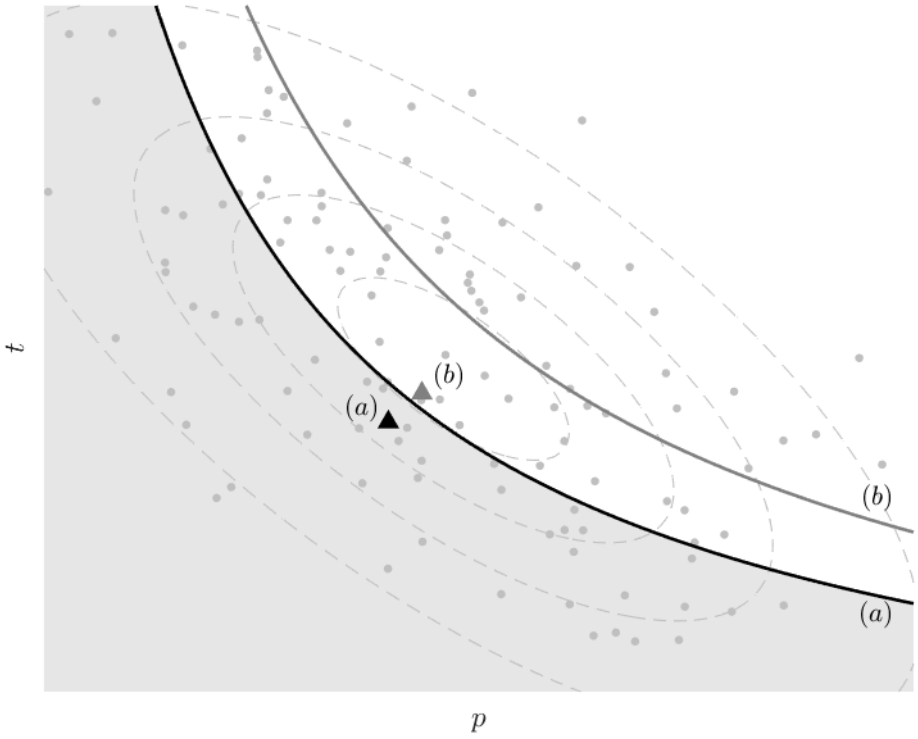
Note: We classify products into time-and goods intensive within five categories (see Appendix B for the classification approach and Appendix Table C.3 for the classification results). There are 10 observations per household and year, one for time-intensive products and one for goods-intensive products, in the five selected categories, respectively. We control for fixed effects for the 10 combinations of category and time-intensity. See notes to Tables 1, 2 and 4 for variable definitions. When constructing the dependent variables, logs are taken after adding one to the yearly quantity. The table reports robust standard errors clustered at the household level.

Table 8: The effect of retirement and unemployment on the purchase set and preferences

variable	persistent purchase set		proportional changes	
	euros	volume	euros	volume
change in retirement status	-0.000	-0.001	-0.001	-0.003
	(0.002)	(0.002)	(0.003)	(0.004)
change in unemployment status	0.003	0.003	-0.003	-0.002
	(0.002)	(0.002)	(0.003)	(0.003)
baseline	0.952	0.963	0.912	0.929
	(0.000)	(0.000)	(0.001)	(0.001)
2011	-0.006	-0.006	-0.002	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)
2012	-0.006	-0.006	-0.002	-0.009
	(0.001)	(0.001)	(0.001)	(0.001)
2013	-0.012	-0.009	-0.005	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
household fixed effects	✓	✓	✓	✓
within-household R^2	0.015	0.008	0.001	0.004
num. household-year obs.	21818	21818	21816	21813

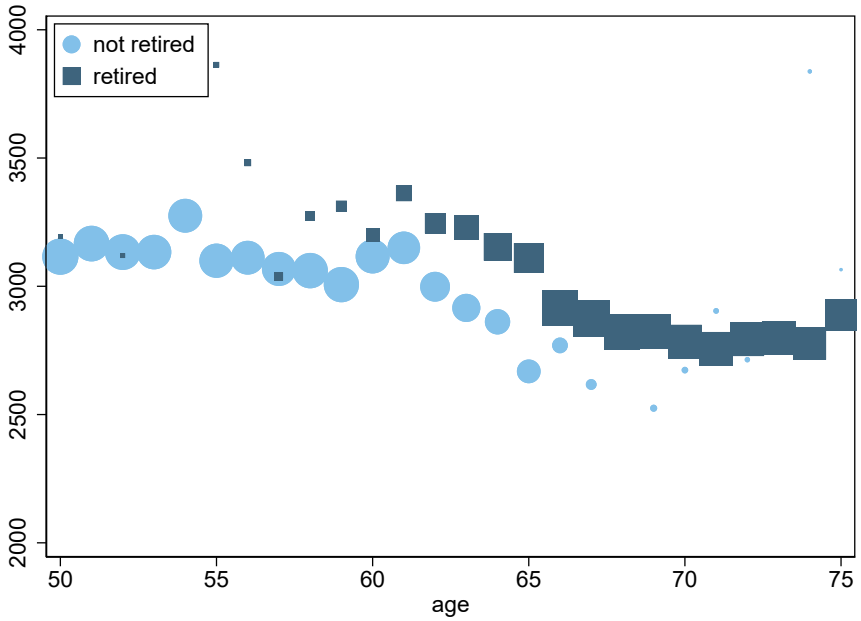
Note: A change in retirement or unemployment status in year t is measured as the difference between that status in year t and in year $t-1$. The table reports robust standard errors clustered at the household level.

Figure 1: Purchase sets and time budgets



Note: This figure shows a hypothetical supply of different varieties (dots). Each dot is a combination of price (p) and time intensity (t). The purchase set of employed, time-constrained, consumers consists of all varieties below the line denoted (a). The purchase set of retired, less time-constrained, consumers consists of all varieties below the line denoted (b).

Figure 2: Expenditure on food



Note: This figure shows average yearly spending on food items by age and retirement status. See notes to Tables 1, 2 and 4 for variable definitions. The size of each marker corresponds to the number of observations that was used. We only show markers that lie between 2000 and 4000 euros. This excludes a limited number outliers with few observations from households that retire either very early or very late. Calculated for the full, unbalanced, sample.

Online Appendix

A Proof of Proposition 1

A.1 Proof for employed households

Quantities

Employed households receive no benefits $M = 0$. The money and time constraints in equation (3) can be combined in a single "total income" constraint

$$wT = wR + \int_0^V p(v)x(v) + wt(v)\,dv.$$

The Lagrangian of the consumer problem is equal to

$$\mathscr{L} = \left(\int_0^V a(v)x(v)^{\frac{\sigma-1}{\sigma}}\,dv\right)^{\frac{\sigma}{\sigma-1}\rho} \times R^{1-\rho} + \lambda\left(wT - wR - \int_0^V p(v)x(v) + wt(v)\,dv\right).$$

The KKT conditions for optimality are stationarity: (1) $\frac{\partial \mathscr{L}}{\partial x(v)} = 0$, (2) $\frac{\partial \mathscr{L}}{\partial V} = 0$, (3) $\frac{\partial \mathscr{L}}{\partial V} = 0$, and primal feasibility (4) $\frac{\partial \mathscr{L}}{\partial \lambda} = 0$. The stationarity condition for quantities is

$$\frac{\partial \mathscr{L}}{\partial x(v)} = 0 \rightarrow \rho\left(\int_0^{V_0} a(v)x(v)^{\frac{\sigma-1}{\sigma}}\,dv\right)^{\frac{\sigma}{\sigma-1}\rho-1} x(v)^{\frac{-1}{\sigma}} \times R^{1-\rho} = \lambda\frac{p(v)}{a(v)}. \tag{A.1}$$

Taking the ratio of this FOC for quantities for varieties v_1 and v_2 in V gives

$$\frac{x(v_1)}{x(v_2)} = \left(\frac{(p(v_1))/a(v_1)}{(p(v_2))/a(v_2)}\right)^{-\sigma}$$

Multiply by $x(v_2)\,p(v_1)$, integrate over v_1, and use the optimality condition $\frac{\partial \mathscr{L}}{\partial \lambda} = 0$, i.e., that

$$wT - wR - \int_0^V p(v)x(v) + wt(v)\,dv = 0.$$

This will give for each $v_2 \in V$ the following expression

$$x(v_2) = w\frac{\left(T - R - \int_0^V t(v)\,dv\right)}{\int_0^V p(v)^{1-\sigma}a(v)^{\sigma}\,dv}\left(\frac{p(v_2)}{a(v_2)}\right)^{-\sigma} \tag{A.2}$$

Substituting $R = (1-\rho)\left(T - \int_0^V t(v)\,dv\right)$ (shown below), we obtain the expression in the proposition.

Leisure

Substitute Marshallian demand, A.2, into the stationarity condition for quantities, A.1, to obtain an expression for λ.

$$\lambda = \rho\left(\int_0^V a(v)^{\sigma} p(v)^{1-\sigma}\,dv\right)^{\frac{\rho}{\sigma-1}} \times \left(\frac{R}{w\left(T - R - \int_0^V t(v)\,dv\right)}\right)^{1-\rho}$$

Next, for leisure we use the stationarity condition that

$$\frac{\partial \mathscr{L}}{\partial R} = 0,$$

from which follows

$$R = \left(\frac{1-\rho}{w\lambda}\right)^{\frac{1}{\rho}} \left(\int_0^V a(v)x(v)^{\frac{\sigma-1}{\sigma}}\,dv\right)^{\frac{\sigma}{\sigma-1}}.$$

We can next once more substitute Marshallian demand A.2 and λ to obtain

$$R = (1-\rho)\left(T - \int_0^V t(v)\,dv\right). \tag{A.3}$$

Note that this solves the Lagrangian multiplier as

$$\lambda = \left(\frac{1-\rho}{w\rho}\right)^{1-\rho} \rho\left(\int_0^V a(v)^{\sigma} p(v)^{1-\sigma}\,dv\right)^{\frac{1}{\sigma-1}\rho}$$

This means, that with a set $[0,V]$ the value of the objective function increases by λ from an increase in the money constraint or λw from an increase in the time constraint.

Variety

Finally, we have the stability condition that

$$\frac{\partial \mathscr{L}}{\partial V} = 0$$

from which we obtain

$$\frac{A(V)}{\sigma-1}=\left(\frac{t(V)}{a(V)}\right)\left(\frac{p(V)}{a(V)}\right)^{\sigma-1}.$$

It is also easy to show that utility rises by adding V to any set $v\in[0,V)$ iff

$$\frac{\rho A(V)}{\sigma-1}>\left(\frac{t(V)}{a(V)}\right)\left(\frac{p(V)}{a(V)}\right)^{\sigma-1} \tag{A.4}$$

A.2 Proof for unemployed/retired households

Unemployed and retired households spend no time in the labor market, and receive benefits M. The Lagrangian for this problem is

$$\mathscr{L}=\left(\int_0^V a(v)x(v)^{\frac{\sigma-1}{\sigma}}dv\right)^{\frac{\sigma}{\sigma-1}\rho}\times R^{1-\rho}+\lambda_1\left(T-R-\int_0^V t(v)\,dv\right)+\lambda_2\left(M-\int_0^V p(v)x(v)\,dv\right).$$

The same optimality conditions as above apply here, except that there are two constraints (and therefore two primal feasibility conditions) instead of 1.

Quantities

The stationarity condition for quantities is

$$\frac{\partial\mathscr{L}}{\partial x(v)}=0\rightarrow\rho\left(\int_0^V a(v)x(v)^{\frac{\sigma-1}{\sigma}}dv\right)^{\frac{\sigma}{\sigma-1}\rho-1}x(v)^{\frac{-1}{\sigma}}\times R^{1-\rho}=\lambda_2\frac{p(v)}{a(v)}$$

Taking the ratio of this FOC for quantities for varieties v_1 and v_2 in V gives

$$\frac{x(v_1)}{x(v_2)}=\left(\frac{p(v_1)/a(v_1)}{p(v_2)/a(v_2)}\right)^{-\sigma}$$

Multiply by $x(v_2)\,p(v_1)$, integrate over v_1, and use the optimality condition $\frac{\partial\mathscr{L}}{\partial\lambda_2}=0$, i.e., that

$$M-\int_0^V p(v)x(v)\,dv=0.$$

This will give for each $v_2\in V$ the following expression

$$x(v_2)=\frac{M}{\int_0^V p(v)^{1-\sigma}a(v)^{\sigma}dv}\left(\frac{p(v_2)}{a(v_2)}\right)^{-\sigma}$$

The effect of any single $p(v)$ on $\int_{v\in V} p(v)^{1-\sigma} a(v)^{\sigma} dv$ is negligible. Therefore, we can write the equation above as

$$x(v) = \frac{M}{T - \int_0^V t(v)\, dv} A(V_1) \left(\frac{p(v)}{a(v)}\right)^{-\sigma}. \tag{A.5}$$

Furthermore, we can solve for λ_2 as

$$\lambda_2 = \rho \left(\left(\int_0^V a(v)^{\sigma} p(v)^{1-\sigma} dv \right)^{\frac{1}{\sigma-1}} \right)^{\rho} \left(\frac{T - \int_0^V t(v)}{M} \right)^{1-\rho}$$

Leisure

The stationarity condition for leisure is

$$\frac{\partial \mathscr{L}}{\partial R} = 0,$$

from which follows

$$R = \left(\frac{1-\rho}{\lambda_1}\right)^{\frac{1}{\rho}} \left(\int_0^V a(v) x(v)^{\frac{\sigma-1}{\sigma}} dv \right)^{\frac{\sigma}{\sigma-1}}.$$

Substituting $x(v)$ from equation (A.5) and the identity that $R = T - \int_0^V t(v)$,

$$\lambda_1 = (1-\rho) \left(\left(\int_0^V a(v)^{\sigma} p(v)^{1-\sigma} dv \right)^{\frac{1}{\sigma-1}} \right)^{\rho} \left(\frac{M}{\left(T - \int_0^V t(v)\, dv\right)} \right)^{\rho}$$

and

$$\frac{\lambda_1}{\lambda_2} = \frac{(1-\rho) M}{\rho \left(T - \int_0^V t(v)\right)}$$

Variety

Finally, we have the stability condition that

$$\frac{\partial \mathscr{L}}{\partial V} = 0$$

from which we obtain

$$\frac{A(V)}{\sigma - 1} = \left(\frac{1-\rho}{\rho}\right) t(V)\, a(V)^{-\sigma}\, p(V)^{\sigma-1}.$$

It is also easy to show that utility rises from any set $v \in [0,V)$ by adding V_1 iff

$$\frac{A(V)}{\sigma-1} > \left(\frac{1-\rho}{\rho}\right)\left(\frac{t(V)}{a(V)}\right)\left(\frac{p(V)}{a(V)}\right)^{\sigma-1} \tag{A.6}$$

B Measuring time intensity of subcategories

We use a survey to measure the time intensity of products at the level of subcategories. For this, we recruited 150 Dutch residents through Prolific.

Participants were first informed that they took part in a survey and that the goal of the survey was to measure how much time is needed to prepare food for consumption. Participants were randomly assigned to two product categories. Taking the "Fish and Shellfish" category as an example, the participants next informed that "Below is a list of different types of products in the "Fish and Shellfish" product category. To give you an idea about what each product type represents, we have provided some popular examples". Here, we use the term "product type" instead of "subcategory" to make it easier to understand for the participants, but what we did was to ask them to evaluate all the subcategories within the two randomly assigned product categories. They could only submit the survey if the had completed that task.

We presented the products with the highest sales volume as the "popular examples" of each subcategory. The participants are then asked to "indicate how much time (in minutes) it generally takes you to cook each of the following product types." See Appendix Figure C.2 for an example of the online interface of the survey.

With 150 respondents evaluating two categories each, we obtained on average 60 evaluations per category. To classify subcategories as either time-intensive or goods-intensive, we first computed the median number of minutes of reported preparation time for each subcategory across the respondents. Next, we compared the median number of minutes to the category median (the median of the medians). A subcategory is classified as time-intensive (goods-intensive) if the median number of minutes to prepare that subcategory is strictly more (strictly less) than the category median. That is, we classified ties (i.e., cases where the median number of minutes of a given subcategory equals the category median) as neutral with respect to time intensity. Appendix Table C.3 shows the full classification.

We perform our analysis using all the goods intense and time intense subcategories (results in Table 7).

C Additional tables and figures

Table C.1: Labor market status

labor market status	households
total	6815
always	
employed	4585
retired	1491
unemployed	163
ever	
employed	5133
retired	1823
unemployed	442
experience transition into/out of	
retirement	332
unemployment	279

Note: Reported summary statistics on labor market status and changes thereof. "Always" refers to the households who have the same labor market status throughout our observation window. "Ever" refers to the households who have ever been in a certain labor status during our observation window. "Experience transition into/out of" refers to the households who experience a transition into/out of a certain labor status during our observation window.

Table C.2: Top categories in GfK Panel

rank	category name	euros	units	vol
1	meat	8709153.15	3.3e+06	6.90e+08
2	alcoholic beverages	6679691.06	6.2e+06	2.62e+09
3	vegetable	6461696.15	6.4e+06	2.02e+09
4	non alcoholic drinks	5381460.23	8.9e+06	7.42e+09
5	bread	5376452.82	1.3e+07	2.29e+09
6	fruit	5090985.31	6.8e+06	1.54e+09
7	cold cuts	4946690.47	3.3e+06	3.45e+08
8	cheese	4897526.16	2.2e+06	3.38e+08
9	milk and dairy drinks	3416028.85	5.3e+06	4.53e+09
10	milk products	3212314.1	4.6e+06	2.25e+09
11	cookies	3147148.45	3.3e+06	7.55e+08
12	hot drinks	3106802.23	1.4e+06	3.33e+08
13	savory snacks	2597282.64	2.9e+06	4.34e+08
14	chicken and poultry	2447846.79	875424	1.72e+08
15	meals	2373815.99	1.2e+06	4.24e+08
16	fish and seafood/shellfish	2134080.33	783729	1.84e+08
17	edible oils and fats	2109068.91	1.7e+06	7.93e+08
18	potatoes	1856750.18	1.2e+06	1.66e+09
19	sugar confectionery	1518659.61	1.7e+06	2.66e+08
20	chocolate	1506054.16	1.1e+06	2.03e+08

Note: This table lists the Top 20 largest selling categories. Of these we choose the largest meal components: meat, vegetable, fruit, fish and shellfish, and potatoes. The table lists aggregates across all households and time periods in the GfK household panel data.

Table C.3: Time-intensity classification of product groups

category and subcategory name	examples of products with highest revenue	classification
fish and shellfish		
canned crustaceans	mussels; mussels in vinegar	goods intense
canned fish	tuna in water; marinated herring	goods intense
canned invertebrates	caviar, roe	goods intense
fresh crustaceans	mussels, shrimp	time intense
fresh fish	herring, salmon	neutral
pre-cooked invertebrates	pre-cooked octopus, squid	goods intense
frozen crustaceans	shrimp ball; peeled shrimp	neutral
frozen fish	salmon, bass, catfish	time intense
frozen invertebrates	snails in garlic butter; calamari	neutral
fruits		
apples	various apples	neutral
canned stone fruit	olives, capers	goods intense
canned fruit	peach, pineapple, fruit mix	goods intense
coconuts	whole coconut; coconut box	time intense
stone fruit/dried fruit	olives, apricots	neutral
fresh processed fruit	pineapple pieces, blueberry	neutral
frozen fruit	blueberry, berry mix	time intense
fruit compote	apple sauce	neutral
fruit mix-salads	various fruit salads	time intense
grapefruits	various grapefruit	time intense
oranges	various oranges	time intense
other citrus fruit	tangerines, mandarins	neutral
other fruit large	kiwi, banana	neutral
other fruit small	berries, grapes, cherry	goods intense
pears	various pears	neutral
ready to use pie filling	cherry pie filling, strawberry pie filling	neutral
meats		
canned meat	meat balls, stew	goods intense
canned meat substitutes	seitan	goods intense
frozen beef	beef kebab, beef steak	neutral
frozen meat snacks (fryer)	minced meat snacks	neutral
frozen meat substitutes	veggie sate, vegan chicken piece	neutral
frozen minced meat	minced beef, minced pork	neutral
frozen mixed meat	hamburgers	neutral
frozen pork	spare ribs, schnitzel	time intense
frozen smoked sausage	smoked sausage	neutral
other frozen meat	lamb, lamb racks	time intense
other raw meat	other meat	time intense
uncooked beef	steaks, stew meat	neutral
ready to eat meat snacks	various snacks, serrano ham rolls	goods intense
uncooked meat substitutes	vegetarian burgers and schnitzels	goods intense
uncooked minced meat	minced beef, pork	goods intense
uncooked mixed meat	various	goods intense
uncooked pork	cutlets, filets	neutral
smoked sausage	various smoked sausages	goods intense
potatoes		
canned (processed) potatoes	chile potato; potato gratin	goods intense
pre-cooked potato products	mini potato stick, pre-cooked mini potato	goods intense
fresh potatoes	potatoes unpeeled	time intense
frozen mashed potatoes	frozen mashed potato	neutral
frozen potato products (fries)	potato fries, pre-cut fries	neutral
mashed potatoes	instant mashed potato	goods intense
peeled potatoes	potato peeled	neutral
vegetables		
cabbage, cauliflower, br.sprouts	cauliflower; br.sprouts	time intense
canned ginger	ginger balls	goods intense
canned mushrooms	sliced mushrooms	goods intense
canned tomato products	tomato paste, tomato puree	goods intense
canned legumes	peas, green beans	goods intense
dried mushrooms	dried porcini	neutral
dried vegetable	split peas	neutral
unprocessed mushrooms	mushrooms	time intense
ready to eat vegetable snacks	vegetable croquette, vegetable spring rolls	goods intense
frozen mixed vegetable	stir fry mix, broccoli-mix	time intense
frozen mushrooms	frozen sliced mushroom	neutral
frozen vegetable	frozen spinach; frozen peas	neutral
frozen vegetable snacks	Indian spinach pakora, samosas	neutral
leafy vegetable	endive; iceberg lettuce	goods intense
legumes	peas, green beans	neutral
mixed vegetable	Mexican vegetable mix; Italian vegetable mix	neutral
other vegetable	broccoli; chicory	time intense
paprika	various bell peppers	goods intense

Note: This table presents the (translated) names of the UPC's with highest sales for each sub-category. If the top three UPCs have identical product names, then we only present the top one or top two. See Appendix B for details on how we classified subcategories as either goods intensive, neutral, or time intensive.

Table C.4: The effect of retirement and unemployment on log monthly net income

variable	all households	households with age $\in [50, ..., 75]$	households with age $\in [50, ..., 60]$ or age $\in [65, ..., 70]$
retired	-0.027	0.000	-0.040
	(0.017)	(0.018)	(0.022)
unemployed	-0.113	-0.093	-0.092
	(0.017)	(0.020)	(0.021)
age	0.014	0.000	0.005
	(0.007)	(0.010)	(0.011)
individual fixed effects	✓	✓	✓
year-quarter effects	✓	✓	✓
within-household R^2	0.030	0.014	0.020
num. household-year obs.	41191	22889	18714

Note: Based on LISS data described in Section 4.3.2. One observation is one individual-year. Robust standard errors clustered at the individual level are reported in parentheses.

Table C.5: Reported health problems

sample	variable	10^{th} percentile	mean	90^{th} percentile	st. dev.	N
full	sensitive skin	0.00	0.38	1.00	0.43	6310
	indigestion	0.00	0.18	0.75	0.32	6310
	high cholesterol	0.00	0.22	1.00	0.38	6309
	constipation/bowel problems	0.00	0.28	1.00	0.39	6311
balanced	sensitive skin	0.00	0.35	1.00	0.40	2601
	indigestion	0.00	0.16	0.67	0.28	2601
	high cholesterol	0.00	0.26	1.00	0.39	2601
	constipation/bowel problems	0.00	0.26	1.00	0.36	2601

Note: Reported descriptive statistics are first taken over years and then households. Only complete observations were considered. Households in the balanced sample are observed in all five years, 2009 to 2013. The 4 variables are indicators for the prevalence of the respective health issue in a household.

Table C.6: The effect of retirement and unemployment on health

variable	sensitive skin	indigestion	high cholesterol	constipation/ bowel problems
retired	-0.014	0.014	0.026	-0.005
	(0.022)	(0.019)	(0.018)	(0.021)
unemployed	-0.003	0.009	0.003	0.048
	(0.027)	(0.023)	(0.018)	(0.024)
number adults age 19+	0.039	0.008	0.007	-0.010
	(0.012)	(0.011)	(0.008)	(0.012)
number children age 5-18	0.022	-0.001	-0.011	-0.011
	(0.016)	(0.014)	(0.008)	(0.016)
number babies/toddlers age 0-4	0.045	-0.003	-0.000	0.040
	(0.021)	(0.018)	(0.012)	(0.026)
household fixed effects	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓
within-household R^2	0.002	0.000	0.005	0.001
num. household-year obs.	18199	18197	18208	18215

Note: We use the same specification as Table 4. See notes to that table for details.

Table C.7: The effect of retirement and unemployment on the price index

variable	price index all food categories	price index selected food categories
retired	-0.000	-0.000
	(0.002)	(0.003)
unemployed	-0.001	-0.004
	(0.002)	(0.003)
log income	0.002	0.003
	(0.001)	(0.002)
number adults age 19+	0.005	0.013
	(0.001)	(0.002)
number children age 5-18	0.005	0.015
	(0.001)	(0.002)
number babies/toddlers age 0-4	0.004	0.012
	(0.002)	(0.003)
household fixed effects	✓	✓
year fixed effects	✓	✓
within-household R^2	0.009	0.007
num. household-year obs.	23577	23575

Note: We use the same specification as Table 5. See notes to that table for details. The first price index is the total amount spent in euros divided by the amount that the household would have spent had he purchased the exact same items at the average price all households paid. The second price index is for selected categories, fish and seafood/shellfish, fruit, meat, potatoes, and vegetables.

Table C.8: The effect of retirement and unemployment on grocery versus restaurant expenditure

variable	stated restaurant expenditure		stated grocery expenditure		difference in expenditure	
retired	-0.047	-0.080	0.068	0.061	-0.126	-0.162
	(0.041)	(0.042)	(0.027)	(0.028)	(0.041)	(0.042)
unemployed	-0.342	-0.337	-0.267	-0.255	-0.051	-0.067
	(0.046)	(0.048)	(0.039)	(0.040)	(0.041)	(0.043)
log income		0.317		0.235		0.081
		(0.045)		(0.033)		(0.042)
college degree(y/n)		-0.137		-0.079		-0.081
		(0.087)		(0.062)		(0.094)
number of hh members		-0.114		0.005		-0.112
		(0.026)		(0.022)		(0.030)
age hh head		-0.004		0.003		-0.003
		(0.011)		(0.007)		(0.009)
household fixed effects	✓	✓	✓	✓	✓	✓
year-quarter fixed effects	✓	✓	✓	✓	✓	✓
within-household R^2	0.026	0.030	0.010	0.015	0.013	0.013
num. of obs.	44571	41116	40774	37558	40774	37558

Note: Restaurant expenditure is measured on 7 point scales as an answer to the question "Compared to what I did before (last quarter), I spent [x] money on eating out." In this question "x" stands for 1. Much less, 2. Less, 3. A little less, 4. Just as much, 5. A bit more, 6. More, and 7. Much more. Grocery expenditure is measured in the same way using the question "Compared to what you did before, in the last six months I spent [x] money on daily groceries. The difference in expenditure is measured as the difference between restaurant expenditure score and the grocery expenditure score. Income is net monthly household income. The table reports robust standard errors clustered at the household level.

Table C.9: Overview robustness checks

	relates to	brief description
Table C.10	Table 5	uses five selected categories that are main inputs to meal preparation
Table C.11	Table 5	uses only long term unemployment
Table C.12	Table 5	uses number of retired and unemployed household members, respectively
Table C.13	Table 5	does not control for income
Table C.14	Table 5	does not control for household fixed effects
Table C.15	Table 5	drops year in which retirement and unemployment is ambiguous
Table C.16	Table 5	shows effect of single-retirement versus dual-retirement
Table C.17	Table 7	uses only long term unemployment
Table C.18	Table 7	drops households with disabled members
Table C.19	Table 7	conditions on incidence
Table C.20	Table 7	uses only high income households
Table C.21	Table 7	additionally controls for budget tightness and health problems
Table C.22	Table 7	does not use time intensity classification but direct (minute) measure

Table C.10: The effect of retirement and unemployment on grocery purchases

variable	log variety (SKU)	log variety (subcategory)	log volume	log euros
retired	0.030	0.013	0.024	0.059
	(0.010)	(0.005)	(0.016)	(0.014)
unemployed	0.011	0.003	-0.021	0.016
	(0.015)	(0.007)	(0.025)	(0.019)
log income	0.038	0.020	0.050	0.063
	(0.010)	(0.005)	(0.015)	(0.013)
number adults age 19+	0.060	0.021	0.132	0.123
	(0.007)	(0.003)	(0.010)	(0.009)
number children age 5-18	0.033	0.008	0.112	0.092
	(0.009)	(0.005)	(0.013)	(0.012)
number babies/toddlers age 0-4	0.035	0.005	0.087	0.082
	(0.013)	(0.005)	(0.019)	(0.017)
household fixed effects	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓
within-household R^2	0.027	0.024	0.026	0.037
num. household-year obs.	23577	23577	23577	23577

Note: This table replicates Table 5 using five selected categories.

Table C.11: The effect of retirement and long-term unemployment on grocery purchases

variable	log variety (SKU)	log variety (subcategory)	log volume	log euros
retired	0.035	0.014	0.047	0.052
	(0.009)	(0.005)	(0.013)	(0.011)
unemployed	0.023	0.013	0.039	0.039
	(0.020)	(0.012)	(0.023)	(0.023)
log income	0.029	0.016	0.047	0.054
	(0.008)	(0.005)	(0.011)	(0.010)
number adults age 19+	0.061	0.027	0.144	0.122
	(0.006)	(0.003)	(0.008)	(0.008)
number children age 5-18	0.058	0.023	0.146	0.110
	(0.008)	(0.004)	(0.011)	(0.010)
number babies/toddlers age 0-4	0.050	0.013	0.119	0.095
	(0.012)	(0.005)	(0.016)	(0.015)
household fixed effects	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓
within-household R^2	0.060	0.075	0.136	0.064
num. household-year obs.	23124	23124	23124	23124

Note: This table replicates Table 5 disregarding the first year of unemployment.

Table C.12: The effect of retirement and unemployment on grocery purchases

variable	log variety (SKU)	log variety (subcategory)	log volume	log euros
no. retired hhld. members	0.034	0.013	0.044	0.050
	(0.006)	(0.003)	(0.009)	(0.008)
no. unemployed hhld. members	0.014	0.008	0.013	0.018
	(0.010)	(0.005)	(0.012)	(0.012)
log income	0.031	0.016	0.048	0.055
	(0.008)	(0.005)	(0.011)	(0.010)
number adults age 19+	0.061	0.027	0.142	0.119
	(0.006)	(0.003)	(0.008)	(0.008)
number children age 5-18	0.061	0.026	0.145	0.108
	(0.008)	(0.005)	(0.010)	(0.010)
number babies/toddlers age 0-4	0.051	0.014	0.117	0.093
	(0.011)	(0.006)	(0.015)	(0.015)
household fixed effects	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓
within-household R^2	0.062	0.076	0.137	0.065
num. household-year obs.	23577	23577	23577	23577

Note: This table replicates Table 5 using the number of retired and unemployed household members

Table C.13: The effect of retirement and unemployment on grocery purchases without controlling for income

variable	log variety (SKU)	log variety (subcategory)	log volume	log euros
retired	0.032	0.013	0.044	0.049
	(0.009)	(0.005)	(0.012)	(0.011)
unemployed	0.012	0.006	0.015	0.014
	(0.012)	(0.007)	(0.015)	(0.015)
number adults age 19+	0.064	0.029	0.147	0.125
	(0.006)	(0.003)	(0.008)	(0.008)
number children age 5-18	0.062	0.027	0.148	0.111
	(0.008)	(0.005)	(0.011)	(0.010)
number babies/toddlers age 0-4	0.053	0.015	0.120	0.096
	(0.012)	(0.006)	(0.016)	(0.015)
household fixed effects	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓
within-household R^2	0.060	0.075	0.135	0.061
num. household-year obs.	23577	23577	23577	23577

Note: This table replicates Table 5 while not controlling for income.

Table C.14: The effect of retirement and unemployment on grocery purchases without controlling for individual fixed effects

variable	log variety (SKU)	log variety (subcategory)	log volume	log euros
retired	0.076	0.025	0.107	0.235
	(0.011)	(0.006)	(0.012)	(0.013)
unemployed	0.021	0.006	0.057	0.022
	(0.025)	(0.014)	(0.027)	(0.027)
log income	0.184	0.084	0.153	0.313
	(0.012)	(0.007)	(0.014)	(0.014)
number adults age 19+	0.213	0.117	0.424	0.310
	(0.008)	(0.004)	(0.008)	(0.008)
number children age 5-18	0.117	0.064	0.249	0.119
	(0.006)	(0.003)	(0.007)	(0.007)
number babies/toddlers age 0-4	0.062	0.037	0.105	-0.014
	(0.012)	(0.005)	(0.013)	(0.015)
year fixed effects	✓	✓	✓	✓
within-household R^2	0.243	0.247	0.443	0.318
num. household-year obs.	23577	23577	23577	23577

Note: This table replicates Table 5 and does not control for household fixed effects.

Table C.15: The effect of retirement and unemployment on grocery purchases eliminating the year before reported retirement or unemployment

variable	log variety (SKU)	log variety (subcategory)	log volume	log euros
retired	0.050	0.023	0.068	0.069
	(0.012)	(0.006)	(0.017)	(0.015)
unemployed	0.019	0.010	0.015	0.018
	(0.015)	(0.008)	(0.020)	(0.019)
log income	0.032	0.017	0.049	0.056
	(0.009)	(0.005)	(0.011)	(0.011)
number adults age 19+	0.062	0.027	0.145	0.122
	(0.006)	(0.003)	(0.008)	(0.008)
number children age 5-18	0.061	0.025	0.145	0.109
	(0.008)	(0.005)	(0.011)	(0.010)
number babies/toddlers age 0-4	0.052	0.015	0.119	0.096
	(0.012)	(0.006)	(0.016)	(0.015)
household fixed effects	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓
within-household R^2	0.062	0.076	0.138	0.065
num. household-year obs.	23066	23066	23066	23066

Note: This table replicates Table 5 and removes the year before retirement/unemployment.

Table C.16: The effect of single-retirement and dual-retirement on grocery purchase

variable	log variety (SKU)	log variety (subcategory)	log volume	log euros
single retired	0.029	0.012	0.039	0.044
	(0.009)	(0.005)	(0.012)	(0.011)
dual retired	0.069	0.030	0.095	0.104
	(0.012)	(0.007)	(0.018)	(0.015)
unemployed	0.013	0.007	0.016	0.015
	(0.012)	(0.007)	(0.015)	(0.015)
log income	0.031	0.016	0.048	0.055
	(0.008)	(0.005)	(0.011)	(0.010)
number adults age 19+	0.061	0.027	0.143	0.120
	(0.006)	(0.003)	(0.008)	(0.008)
number children age 5-18	0.061	0.026	0.145	0.109
	(0.008)	(0.005)	(0.010)	(0.010)
number babies/toddlers age 0-4	0.051	0.014	0.117	0.093
	(0.011)	(0.006)	(0.015)	(0.015)
household fixed effects	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓
within-household R^2	0.062	0.076	0.137	0.065
num. household-year obs.	23577	23577	23577	23577

Note: This table replicates Table 5 and uses a categorical measure of retirement instead of 0/1 measure.

Table C.17: The effect of retirement and long-term unemployment on time intensity of shopping basket

variable	log variety (SKU)	log variety (subcategory)	log volume	log euros
retired	-0.033	-0.002	-0.070	-0.084
	(0.011)	(0.005)	(0.045)	(0.018)
unemployed	-0.024	-0.015	-0.123	-0.026
	(0.025)	(0.011)	(0.092)	(0.036)
retired × time-intensity	0.110	0.019	0.153	0.246
	(0.010)	(0.004)	(0.043)	(0.018)
unemployed × time-intensity	0.073	0.031	0.221	0.107
	(0.024)	(0.010)	(0.096)	(0.037)
log income	0.030	0.013	0.093	0.065
	(0.008)	(0.003)	(0.030)	(0.013)
number adults age 19+	0.048	0.009	0.148	0.103
	(0.006)	(0.003)	(0.023)	(0.010)
number children age 5-18	0.020	-0.000	0.090	0.062
	(0.008)	(0.003)	(0.027)	(0.012)
number babies/toddlers age 0-4	0.015	-0.002	0.043	0.049
	(0.012)	(0.004)	(0.041)	(0.018)
household fixed effects	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓
category*time-intensity fixed effects	✓	✓	✓	✓
within-household R^2	0.697	0.686	0.443	0.533
num. obs.	232050	232050	232050	232050

Note: This table replicates Table 7 disregarding the first year of unemployment.

Table C.18: The effect of retirement and unemployment on time intensity of shopping basket – excluding the disabled from comparison group

variable	log variety (SKU)	log variety (subcategory)	log volume	log euros
retired	-0.045	-0.004	-0.096	-0.102
	(0.011)	(0.005)	(0.046)	(0.019)
unemployed	-0.029	-0.010	-0.116	-0.037
	(0.018)	(0.008)	(0.064)	(0.026)
retired × time-intensity	0.120	0.020	0.152	0.256
	(0.011)	(0.004)	(0.045)	(0.018)
unemployed × time-intensity	0.077	0.025	0.229	0.108
	(0.020)	(0.008)	(0.081)	(0.031)
log income	0.027	0.010	0.088	0.060
	(0.008)	(0.004)	(0.031)	(0.013)
number adults age 19+	0.049	0.009	0.153	0.103
	(0.007)	(0.003)	(0.024)	(0.011)
number children age 5-18	0.024	0.001	0.103	0.063
	(0.008)	(0.003)	(0.029)	(0.013)
number babies/toddlers age 0-4	0.019	0.000	0.060	0.053
	(0.012)	(0.005)	(0.042)	(0.018)
household fixed effects	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓
category*time-intensity fixed effects	✓	✓	✓	✓
within-household R^2	0.699	0.688	0.444	0.535
num. obs.	212220	212220	212220	212220

Note: This table replicates Table 7 and excludes households that are ever disabled from the comparison group.

Table C.19: The effect of retirement and unemployment on time intensity of shopping basket conditional on purchase incidence

variable	log variety (SKU)	log variety (subcategory)	log volume	log euros
retired	-0.027	0.008	-0.078	-0.070
	(0.010)	(0.003)	(0.019)	(0.016)
unemployed	-0.008	-0.003	-0.011	-0.010
	(0.015)	(0.005)	(0.025)	(0.021)
retired × time-intensity	0.116	-0.002	0.209	0.259
	(0.009)	(0.003)	(0.018)	(0.014)
unemployed × time-intensity	0.048	0.007	0.057	0.053
	(0.016)	(0.006)	(0.032)	(0.025)
log income	0.025	0.007	0.041	0.048
	(0.008)	(0.002)	(0.013)	(0.011)
number adults age 19+	0.050	0.005	0.129	0.108
	(0.006)	(0.002)	(0.010)	(0.009)
number children age 5-18	0.029	0.000	0.106	0.080
	(0.008)	(0.002)	(0.012)	(0.011)
number babies/toddlers age 0-4	0.024	-0.001	0.077	0.067
	(0.011)	(0.003)	(0.019)	(0.017)
household fixed effects	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓
category*time-intensity fixed effects	✓	✓	✓	✓
within-household R^2	0.697	0.784	0.520	0.507
num. obs.	186064	186064	186064	186064

Note: This table replicates Table 7 conditioning on purchase incidence, i.e., that the consumer has at least bought some products in a given combination of category and time intensity.

Table C.20: The effect of retirement and unemployment on time intensity of shopping basket for above median income households

variable	log variety (SKU)	log variety (subcategory)	log volume	log euros
retired	-0.035	-0.003	-0.045	-0.103
	(0.017)	(0.008)	(0.068)	(0.027)
unemployed	0.016	0.003	0.009	0.017
	(0.026)	(0.011)	(0.086)	(0.038)
retired × time-intensity	0.111	0.009	0.141	0.261
	(0.017)	(0.007)	(0.070)	(0.030)
unemployed × time-intensity	0.039	0.007	0.076	0.070
	(0.029)	(0.011)	(0.116)	(0.048)
log income	0.042	0.016	0.082	0.089
	(0.012)	(0.005)	(0.045)	(0.019)
number adults age 19+	0.038	0.004	0.101	0.083
	(0.008)	(0.003)	(0.027)	(0.012)
number children age 5-18	0.010	-0.005	0.047	0.043
	(0.009)	(0.004)	(0.032)	(0.014)
number babies/toddlers age 0-4	0.014	-0.002	0.025	0.043
	(0.013)	(0.005)	(0.046)	(0.020)
household fixed effects	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓
category*time-intensity fixed effects	✓	✓	✓	✓
within-household R^2	0.722	0.710	0.474	0.554
num. obs.	119870	119870	119870	119870

Note: This table replicates Table 7 for above-median income households. For every household, we only include observations for those years in which household income exceeded the median across all year-household observations in our data.

Table C.21: The effect of retirement and unemployment on time intensity of shopping basket controlling for perceived budget tightness and health status

variable	log variety (SKU)	log variety (subcategory)	log volume	log euros
retired	-0.028	0.004	-0.024	-0.072
	(0.012)	(0.006)	(0.051)	(0.020)
unemployed	-0.011	0.004	-0.013	-0.006
	(0.020)	(0.009)	(0.076)	(0.030)
retired × time-intensity	0.109	0.018	0.139	0.243
	(0.011)	(0.005)	(0.046)	(0.019)
unemployed × time-intensity	0.066	0.019	0.186	0.101
	(0.022)	(0.009)	(0.091)	(0.035)
log income	0.025	0.010	0.097	0.054
	(0.009)	(0.004)	(0.036)	(0.015)
number adults age 19+	0.045	0.007	0.121	0.094
	(0.007)	(0.003)	(0.027)	(0.012)
number children age 5-18	0.014	0.001	0.094	0.059
	(0.010)	(0.004)	(0.034)	(0.015)
number babies/toddlers age 0-4	0.005	-0.006	0.031	0.042
	(0.014)	(0.006)	(0.050)	(0.021)
household fixed effects	✓	✓	✓	✓
year fixed effects	✓	✓	✓	✓
category*time-intensity fixed effects	✓	✓	✓	✓
within-household R^2	0.697	0.686	0.442	0.532
num. obs.	173910	173910	173910	173910

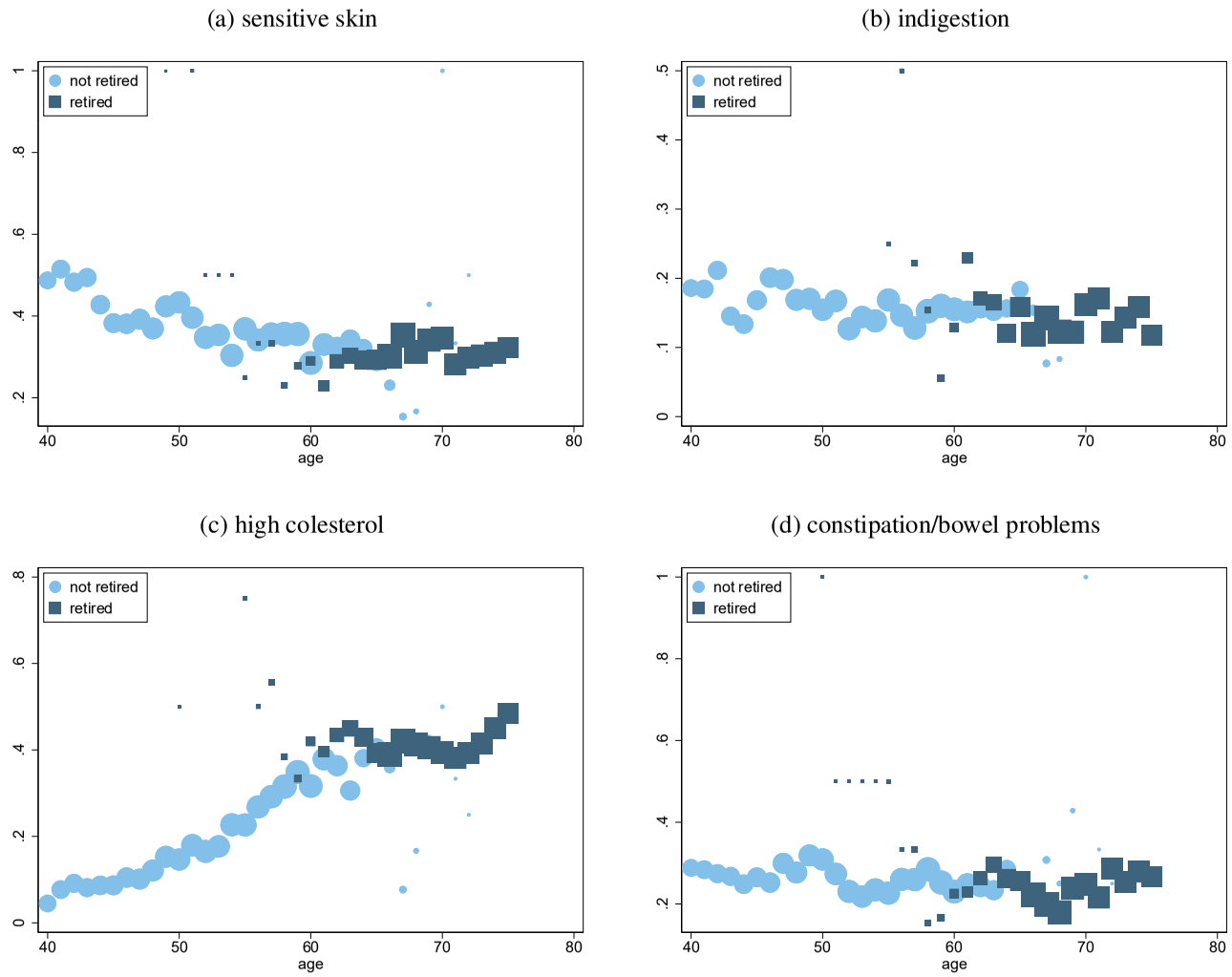
Note: This table replicates Table 7 and controls for changes in household health status and perceived budget tightness.

Table C.22: The effect of retirement and unemployment on time intensity of shopping basket using continuous time-intensity measure

variable	log variety (SKU)	log volume	log euros
retired	-0.082	-0.053	-0.236
	(0.007)	(0.031)	(0.012)
unemployed	-0.104	-0.229	-0.286
	(0.011)	(0.052)	(0.019)
retired × minutes	0.010	0.002	0.027
	(0.000)	(0.002)	(0.001)
unemployed × minutes	0.012	0.021	0.031
	(0.001)	(0.004)	(0.002)
log income	0.010	0.055	0.032
	(0.004)	(0.019)	(0.007)
number adults age 19+	0.028	0.111	0.079
	(0.003)	(0.013)	(0.006)
number children age 5-18	0.020	0.123	0.068
	(0.004)	(0.016)	(0.007)
number babies/toddlers age 0-4	0.024	0.097	0.064
	(0.007)	(0.027)	(0.011)
household fixed effects	✓	✓	✓
year fixed effects	✓	✓	✓
category fixed effects	✓	✓	✓
within-household R^2	0.038	0.111	0.043
num. obs.	715179	715179	715179

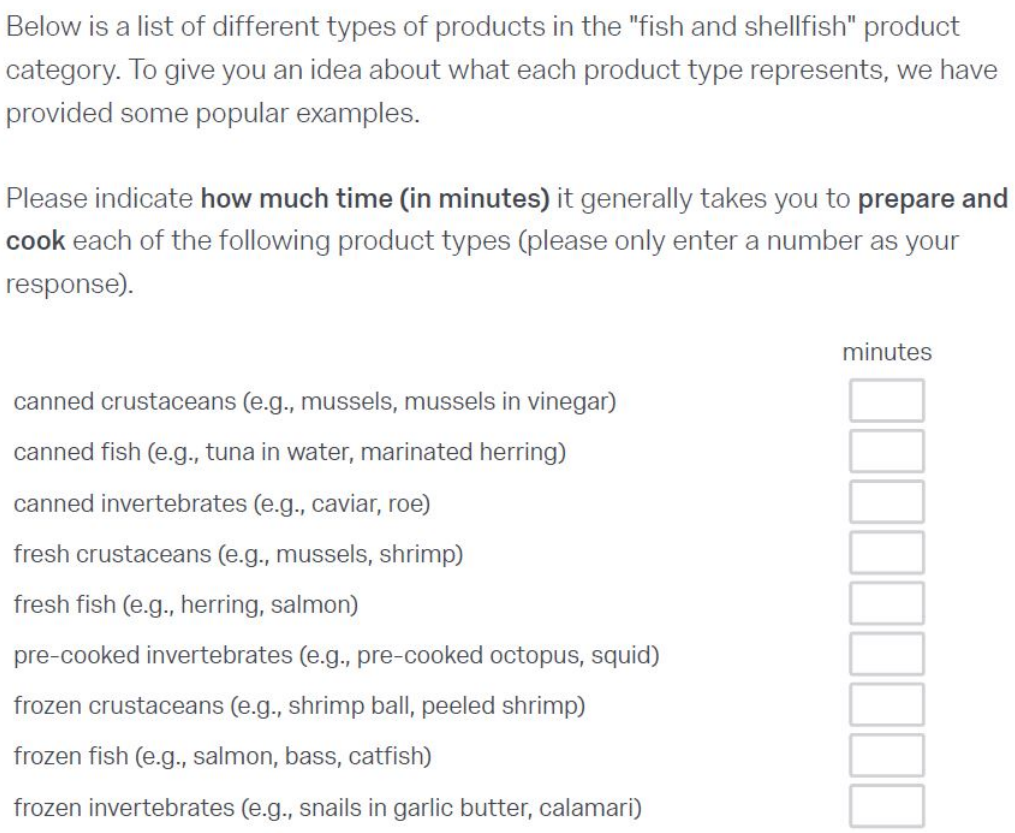
Note: This table replicates Table 7 by conducting the analysis at the subcategory level instead of the category-time intensity level. The variable minutes is the median number of minutes that respondents reported for the subcategory in the Prolific survey (see Section B for details). As there is one observation per household, year and subcategory, variety at the subcategory level is either 0 or 1. Therefore we do not report results for that measure of variety.

Figure C.1: Prevalence of health problems



Notes: This figure shows the prevalence of four health problems at the household level, by age and retirement status. Retired is defined as either the household head or her partner being retired. The size of each marker corresponds to the number of observations that was used. Calculated for the full, unbalanced, sample.

Figure C.2: Except from online time-intensity survey



Notes: Excerpt from the online survey to measure time intensity. This screenshot represents the category "Fish and Shellfish."