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Behavioural Responses of Older Europeans to Inheritance Receipt

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Abstract

Recent increases in longevity imply that individuals are increasingly older at the moment of receiving an inheritance. Inheritances are transitory shocks to lifetime income that, nevertheless, can be large and thus may have an impact on the economic situation of individuals around the retirement age. The present paper studies how individuals respond in terms of consumption, labour supply and retirement decisions. I start out by studying the responses of interest within framework of the life cycle model. I then test the implications of the model using data from the Survey on Health, Ageing and Retirement in Europe (SHARE), which allows me to distinguish between expected and unexpected inheritances by using self-reported inheritance expectations. The outcome of the regression analysis allows ruling out large effects on working hours and on retirement. Regarding consumption, the poor quality of the data implies that the effects are estimated rather imprecisely and it is thus more difficult to reach a conclusion. These results are compatible with several explanations. First, it can be that inheritances do not have an effect because they are not large enough *vis-à-vis* previous wealth and expected future income. Second, it can be that inheritance receipt increases the willingness to leave a bequest and thus individuals simply save the amount received. Third, it can be that labour market and social security regulations are not flexible enough to allow individuals to reduce working hours or retire earlier after receiving an inheritance. Finally, it can be that there are large responses in consumption that cannot be captured witht the data I use.

Keywords: Inheritance, Wealth, Retirement, Labour Supply, Consumption.
JEL Codes: D11, D12, D14, D14.

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1 Introduction

The aim of this study is to analyse how individuals react to inheritance receipt in terms of their consumption, labour supply and retirement choices. Studying this issue is relevant for two main reasons. First, it has potential implications for any public policy that induces changes in wealth such as pension and tax reforms. There is a large literature that exploits diverse sources of variation in wealth to assess the effect of such policy reforms (*e.g.* Imbens *et al.*, 2001; Coile and Levine, 2006; and Cesarini *et al.*, 2015). The case of inheritances is particularly interesting since taking into account how they affect labour supply and/or consumption can help optimally calibrate estate taxation. Second, it has implications for the literature estimating the contribution of inheritances to wealth accumulation and wealth inequality (*e.g.* Wolff, 2002; Brown and Weisbenner, 2004; and Boserup *et al.*, 2016). This literature largely assumes that individuals fully save inheritances and transfers. To the extent that inheritances are spent by increasing consumption and/or reducing work effort, ignoring these effects may bias both the estimate of their share of total wealth and of their effect on wealth inequality.

Most literature studying the effects of inheritance receipt has so far focused on labour supply responses (*e.g.* Joulfaian and Wilhelm, 1994; Sila and Sousa, 2014; and Bø *et al.*, 2018). In the present study, I take a more holistic approach and focus on how individuals trade off between multiple possible responses to inheritance receipt. To that end, I construct a formal life-cycle model based on Blundell and MaCurdy (1999) in which a representative individual makes decisions about consumption, leisure and retirement. Following Joulfaian (2006) and Eder (2016), I introduce an inheritance as a transitory shock to lifetime income and study how the individual responds.[1] I show that if the inheritance is unexpected and large enough it will have an effect upon receipt. According to her preference for consumption *vis-à-vis* leisure and retirement, the individual will trade off the different possible responses the model considers.

To test the implications of the model I employ data from the Survey on Health, Ageing and Retirement in Europe (SHARE), which follows European individuals aged 50 plus over six biennial waves taking place between 2004 and 2015. I exploit the panel structure of the survey by using waves one to six and I include only the ten countries that are present in all the waves I use.[2] The SHARE contains information on a variety of aspects of household's behaviour. Most importantly, it contains information on inheritances and transfers received by respondents. The latter are asked whether they (or their spouse) have received an inheritance or transfer of five thousand Euros or more in the past, from whom they received it and when.[3] Furthermore, the SHARE provides information on labour market status, hours worked, and consumption, which allows generating the dependent variables of interest. Regarding consumption, the SHARE provides consistently over all waves only information on food consumption. Given this limitation,

[1] Joulfaian (2006) considers a very simple framework assuming exogenous labour supply, while Eder (2016) constructs a model in which individuals can only react to inheritance receipt by changing their retirement age.

[2] The third wave is excluded since it focuses on people's life histories and does not contain information on most of the variables used in the analysis.

[3] A question on the monetary amount of the inheritances or transfers received is present in waves one and two but has been dropped since. For that reason, I do not use this information in this study.

I follow Joulfaian and Wilhelm (1994) and assume that food expenditures provide a reasonable representation of the total level of consumption of non-durables of a household.

My empirical strategy closely relies on the work by Brown *et al.* (2010). The latter use the Health and Retirement Study (HRS) and apply a reduced form approach to investigate whether individuals respond to inheritance receipt by retiring earlier than expected. In general, the literature investigating the effect of inheritances is not able to clearly distinguish between expected and unexpected inheritances, which is a crucial aspect to take into account when identifying their effect on life-cycle choices. Using a question in HRS about inheritance expectation, Brown *et al.* (2010) classify an inheritance as unexpected if the receiver previously reported a zero chance of receiving an inheritance in the near future. On the contrary, they classify it as expected if the previously reported change of receiving an inheritance is above zero.[4] The SHARE provides information on inheritance expectations, which allows me to follow this same strategy. Furthermore, I introduce a new measure that takes into account the continuous nature of inheritance expectations.

To study the effect of inheritances on retirement, I derive a reduced form equation from the theoretical model which I estimate using a binary choice model. Taking into account retirement expectations is a key element in this analysis. That is because if inheritance receipt correlates with taste for retirement, individuals may chose early retirement after inheriting simply because they already planned it regardless of the inheritance. To solve this issue, I follow Brown *et al.* (2010) and study whether unexpected inheritance receipt has an effect not only on retiring, but on retiring earlier than expected as of wave one. This approach hinges on the assumption that unobserved heterogeneity in preference for early retirement is fully captured by the expected retirement age. Closely relying on the theoretical model, I set up two additional specifications to estimate the effect of inheritance receipt on the wave-to-wave changes in consumption and the intensive margin of labour supply. In this case individual unobserved heterogeneity is taken into account by taking first differences.

This study contributes to the literature in two major ways. First, this is the first study to thoroughly examine inheritance receipt in the context of a formal life-cycle model with three choice variables: consumption, leisure and retirement. This approach allows a theoretical mapping of the trade-offs individuals face when experimenting a transitory shock to their lifetime income. Within this framework I study at the theoretical level how individuals solve these trade-offs according to their preferences, which provides a solid background for the empirical analysis. Second, this is the first study to empirically investigate responses to inheritance receipt using a large European panel. Eder (2016) has previously studied the effect of inheritance receipt on retirement using SHARE data. However, he only uses waves one to four and does not take into account that individuals can also respond by lowering their working hours and/or increasing

[4] Two recent studies, *i.e.* Andersen and Nielsen (2010) and Elinder *et al.* (2016), pursue an alternative strategy to identify unexpected inheritances: by employing administrative data on cause of death they classify as unexpected those inheritances that result from unexpected deaths.

consumption.[5]

The results of the present study show that estimated effects of inheritance receipt are in all cases not significantly different from zero. The precision of the estimates allows ruling out any substantially large effects on retirement and on the intensive margin of labour supply. For consumption the estimates are less precise and thus it is more difficult to reach a conclusion. These results imply that the findings by Brown *et al.* (2010), who conclude that inheritance receipt increases chances of retiring by around 5%, cannot be rejected using the SHARE. However, they are compatible with most of the literature on labour supply effects of inheritance receipt, since the latter usually reports effects that are either small or not significantly different from zero (*e.g.* Joulfaian and Wilhelm, 1994; Sila and Sousa, 2014; and Bø *et al.*, 2018). Regarding the consumption analysis, more research needs to be done since I cannot rule out large responses that could be relevant. Intuitively, it makes sense to think of larger responses in terms of consumption, since labour supply and retirement decisions are usually restricted by labour market and social security regulations, while consumption is more discretionary.

The reminder of the paper is structured as follows. Section 2 reviews the related literature and gives a broader motivation for the study. Section 3 presents the theoretical model and studies the introduction of a fully expected and a fully unexpected inheritance. Section 4 describes the empirical strategy that derives from the model. Section 5 describes de data. Section 6 presents de results. Section 7 concludes and discusses different possible explanations for the results that I find and the venues for future research. The appendices provide variable definitions, summary statistics, full regression results and extensions of the theoretical model.

2 Related Literature

Studying behavioural responses to inheritance receipt has relevant implications for several strands of the economic literature. First of all, it is of relevance for the literature estimating wealth effects. This literature aims at finding evidence that can be used to asses policies that induce changes in wealth such as pension and tax reforms. The main challenge is that changes in wealth will generally be in some way or another endogenously related to the behavioural response of interest. Therefore, this literature tends to exploit exogenous sources of wealth variation. For instance: unanticipated policy changes that affect Social Security wealth (Krueger and Pischke, 1992), stock market fluctuations (Coile and Levine, 2006; and McFall, 2011), lottery winnings (Imbens *et al.*, 2001; and Cesarini *et al.*, 2015) and tax rebates (Parker *et al.*, 2013). Next to this sources of variation in wealth, inheritances, as long as they are unexpected, provide an additional possibility to study responses to exogenous wealth shocks. The case of inheritances is in particular interesting since, besides providing information to assess policies affecting household wealth, understanding their effect can help optimally calibrate estate taxation.

[5]Eder (2016) examines the effect inheriting between waves one and four on the probability of being retired at wave four. In doing that, he does not exploit information provided in wave tow. Therefore, he does not take into account that individuals might receive the inheritance between waves two and four while already having retired by wave two.

In addition, behavioural responses to inheritance receipt are of relevance for the literature studying the contribution of inheritances and inter-vivos transfers to wealth accumulation (Modigliani, 1988; Kotlikoff, 1988; Gale and Scholz, 1994; Brown and Weisbenner, 2004; and Piketty and Zucman, 2014) and wealth inequality (Wolff, 2002; Elinder *et al.*, 2016; Boserup *et al.*, 2016; and Karagiannaki, 2017). These strands of literature largely assume that individuals fully save inheritances and transfers, thus the share of transfer wealth is typically estimated as the capitalized total value of inheritances and transfers received in the past divided by total wealth. In case inheritances increase consumption and/or reduce work effort, ignoring this effect may bias upwards the estimates of their share of total wealth (Blinder, 1988). Furthermore, if the effect is conditional on pre-inheritance wealth it will also determine how inheritances affect wealth inequality (Elinder *et al.*, 2016).

Previous literature investigating responses to inheriting has mostly focused on labour supply effects.[6] In two early contributions, Holtz-Eakin *et al.* (1993) and Joulfaian and Wilhelm (1994) use US administrative data and find a strong negative effect of receiving a large inheritance on labour force participation and a weaker effect on hours worked. Other studies using administrative tax data and/or survey data have followed, with a fast growing literature during the last decade (Elinder *et al.*, 2012; Sila and Sousa, 2014; and Bø *et al.*, 2018). While most of these studies focus on labour supply measures such as hours worked and labour force participation, a recent sub-trend in this literature pays specific attention to the effect of inheritances on retirement (Brown *et al.*, 2010; and Eder, 2016). Overall, the existing literature suggests that there is a negative effect, albeit small, of receiving an inheritance on labour supply.

Parallel to the literature on labour supply responses, there are a few studies that estimate the effect of inheritances on consumption. Joulfaian and Wilhelm (1994) use US survey data to estimate the effect of inheritance receipt on food consumption by families. They find a robust positive effect that is however rather small. Joulfaian (2006) uses US administrative data on estate and income tax returns and finds that they year right after inheriting, wealth of heirs increases (*vis-à-vis* pre-inheritance wealth) by substantially less than the inherited amount. Which suggest that part of the inheritance is spent right away. Elinder *et al.* (2016) use Swedish administrative data and find a similar result. Interestingly, they find that those with the lowest level of pre-inheritance wealth spend a higher share of the inheritance compared to those at the top of the wealth distribution. Following a similar strategy, Karagiannaki (2017) uses UK survey data to follow households over ten years and finds that, by the end of the period, inheritors tend to have spent on average about a third of the amount they received.

Besides the literature studying labour supply and consumption responses to inheriting, there are additional streams of literature studying the effects on entrepreneurship (Holtz-Eakin *et al.*, 1994; and Hurst and Lusardi, 2004), stock market participation (Andersen and Nielsen, 2010) and bequest giving (Cox and Stark, 2005; and Stark and Nicinska, 2015). These are responses that should also be taken into account to fully understand how individuals react to the receipt

[6]The literature on inheritances and labour supply is nicely reviewed by Cox (2014).

of an inheritance. However, they are beyond the scope of the present paper.

3 Theoretical Framework

The framework I propose is based on the one presented in Blundell and MaCurdy (1999), the main difference being that I introduce retirement as a choice variable. The latter is introduced following the tradition of the option value models in the spirit of Stock and Wise (1990).[7] Within this setting I study the consequences of the receipt of a fully expected inheritance and a fully unexpected inheritance. I consider only inheritances received while individuals are not yet retired and employed in the labour market, which allows focusing on the trade-offs between consumption, labour supply and retirement responses.[8]

By studying inheritance receipt in a formal life-cycle framework, I build on the previous work by Joulfaian (2006), who considers a very stylized setting to study the effect of inheritances on consumption assuming exogenous labour supply, and Eder (2016), who constructs a model in which individuals can only react to inheritance receipt by changing their retirement age. My contribution consists in developing a more elaborated and comprehensive theoretical framework which allows mapping how individuals react to an inheritance shock when having multiple responses available.

3.1 Optimization Problem

Consider a setting with separability between consumption and leisure, neither income nor lifetime uncertainty, no liquidity constraints and no bequest motive. Consider an individual that lives up to age L. Her lifetime utility is defined as

$$U(c,l,R) = \sum_{t=s}^{R-1} \frac{D_t}{(1+\rho)^{t-s}} \left(\theta \ln c_t + (1-\theta) \ln l_t\right) + \sum_{t=R}^{L} \frac{D_t}{(1+\rho)^{t-s}} \left(\theta \ln c_t + \phi\right), \tag{1}$$

where c_t is consumption at age $t = s, ..., L$, $l_t = T - h_t$ is hours of leisure defined as the difference between T, the total time endowment in a year, and hours of work h_t, R is the retirement age which cannot be larger than the mandatory retirement age M, D_t is a factor determining the way in which demographic variables scale consumption and leisure, $\rho \geq 0$ is the rate of time preference, $0 \leq \theta \leq 1$ determines the weight the individuals gives to c_t relative to l_t, and ϕ is the extra utility the individual gets from being retired, which can be expressed as $\phi = (1-\theta)\ln T$.[9]

[7]For applications of the option value model of retirement, see for instance Chan and Stevens (2004), and Belloni and Alessie (2013).

[8]In this framework, inheritance receipt at retirement and after retirement can only have an effect on consumption. Including this possibility would make the problem more complicated since, as shown by the literature on the retirement-consumption puzzle (*e.g.* Banks *et al.*, 1998), retirement has usually substantial effects on consumption that should be included in the model when studying inheritance receipt at or after retirement.

[9]The elasticity of intertemporal substitution and the elasticity of substitution between c_t and l_t are both assumed to be equal to one. Note that allowing the elasticity of intertemporal substitution to differ from one results in non-separability between c_t and l_t.

The factor D_t takes the form

$$D_t = \exp(\delta_0 + \boldsymbol{\delta}'\mathbf{Z}_t), \tag{2}$$

where δ_0 is a an individual fixed effect and $\mathbf{Z}_t$ is a vector of demographic variables. Conditional on not being retired yet, at the initial age s the individual chooses a path for c_t and l_t and the optimal R such as to maximize (1) subject to

$$\sum_{t=s}^{L} \frac{c_t}{(1+r)^{t-s}} = \frac{I_n}{(1+r)^{n-s}} + \sum_{t=s}^{R-1} \frac{(T-l_t)w_t}{(1+r)^{t-s}} + \sum_{t=R}^{L} \frac{y(R)}{(1+r)^{t-s}} + A_{s-1}(1+r), \tag{3}$$

where r is the constant interest rate, w_t is the hourly wage rate, I_n is an inheritance the individual receives at age $n < R$, $y(R)$ is constant retirement income, and $A_{s-1}(1+r)$ is initial wealth. Retirement income depends on R in such a way that the present value of full retirement income, *i.e.* $\left[(L-R)y(R)\right]/(1+r)^{t-s}$, increases with R and reaches its maximum level at the mandatory retirement age M. To solve the model I first derive the optimal path for c_t and l_t taking R as given. Then I discuss the trade-off the individual faces when choosing the optimal R.

3.2 Consumption and Leisure Decision

3.2.1 Fully Expected Inheritance

If the individual has full awareness of the future inheritance, she sets an optimal path for c_t and l_t already taking I_n into account. Allowing only an interior solution for the leisure choice, thus discarding the $l_{t<R} = T$ scenario, the first order conditions with respect to c_s and l_s imply

$$c_s = \frac{1}{\lambda} D_s \theta, \tag{4}$$

$$l_s = \frac{1}{\lambda} \frac{D_s}{w_s} (1-\theta), \tag{5}$$

where λ is the marginal utility of lifetime income which summarizes all relevant information affecting c_s and l_s from all periods other than s. For ages above s, the first order conditions imply

$$c_t = c_s \frac{D_t}{D_s} \left(\frac{1+r}{1+\rho}\right)^{t-s} \qquad \forall\; t \in \{s, ..., L\}, \tag{6}$$

$$l_t = l_s \frac{D_t}{D_s} \frac{w_t}{w_s} \left(\frac{1+r}{1+\rho}\right)^{t-s} \qquad \forall\; t \in \{s, ..., R-1\}. \tag{7}$$

Substituting Equations (4) to (7) in the budget constraint (3), allows finding an expression for λ which can then be used to find a solution for the optimal values of c_s and l_s. The latter are a function of r, ρ, θ, lifetime wages, full retirement income, the lifetime path of D_t, R, and I_n.[10]

[10] For the full solution to this part of the model, see Section C.1 in C.

The inheritance is already taken into account from age s and it does not have an impact upon receipt. The relative values of the parameters r and ρ determine how the inheritance (jointly with the other components of lifetime income) is allocated over time, while the preference parameter θ determines how it is allocated between consumption and leisure.

3.2.2 Fully Unexpected Inheritance

In case the individual considers the chance of receiving an inheritance to be zero at every age, the path chosen for c_t and l_t at age s is the same as in Section 3.1.1 but setting $I_n = 0$. However, if the individual receives an unexpected inheritance at age $n < R$, she then re-optimizes current and future choices taking into account the new information. The effect of the inheritance on consumption and leisure is given by the forecast error $\nu_t = c_t^n/c_t^s = l_t^n/l_t^s$,[11] where the superscripts n and s indicate consumption and leisure as planned at age n and s respectively.[12] Keeping R fixed, the forecast error can be expressed as

$$\nu_t = \frac{\lambda^s}{\lambda^n} = \frac{I_n}{\sum_{t=n}^{R-1} \frac{w_t T}{(1+r)^{t-n}} + \sum_{t=R}^{L} \frac{y(R)}{(1+r)^{t-n}} + A_{n-1}(1+r)} + 1, \tag{8}$$

where λ^s and λ^n denote the marginal utility of lifetime income that results from the optimizations at age s and at age n respectively, and A_{n-1} is wealth accumulated up to age $n-1$.[13] Equation (8) shows that the forecast error is conditioned by the size of the inheritance in relation to pre-inheritance wealth and future (potential) labour income and retirement income streams. The sum of all future streams of $w_t T$ and $y(R)$ is lower the older the individual is, which implies that, keeping everything else fixed, ν_t increases with age. The positive age dependence of ν_t is a result of the usual life-cycle model prediction stating that any unexpected transitory shock will be smoothed across the remaining lifetime horizon.

Using Equations (6) and (7) to express the yearly change in c_t and l_t, substituting in the definitions of ν_t and D_t, and taking the natural logarithm on both sides of the expression, allows writing the change in consumption and leisure as

$$\Delta \ln c_t = \ln \left(\frac{1+r}{1+\rho} \right) + \boldsymbol{\delta}' \Delta \mathbf{Z}_t + \Delta \ln \nu_t \quad \forall\, t \in \{s, ..., L\}, \tag{9}$$

$$\Delta \ln l_t = \ln \left(\frac{1+r}{1+\rho} \right) - \Delta \ln w_t + \boldsymbol{\delta}' \Delta \mathbf{Z}_t + \Delta \ln \nu_t \quad \forall\, t \in \{s, ..., R-1\}, \tag{10}$$

where $\Delta \ln \nu_t = \ln \nu_t$ if $t = n$, and $\Delta \ln \nu_t = 0$ otherwise. That is because at period n the lifetime profiles of consumption and leisure jump from the optimal path set at period s to the new optimal path set once the unexpected inheritance is received. Note that if the elasticity

[11]The forecast error is the same for consumption and leisure when expressed in relative terms. In absolute terms, the forecast error differs for consumption and leisure according to the preference parameter θ.

[12]In Section 3.1, realized and planned choices at age s are always equivalent since there is no uncertainty, *i.e.* $c_t = c_t^s$ and $l_t = l_t^s$. In Section 3.2 this still holds for all $t < n$. I assume the individual receives only one inheritance over her lifetime, therefore it holds that $c_t = c_t^n$ and $l_t = l_t^n$ for all $t \geq n$.

[13]For a full derivation of the forecast error, see Section C.2 in Appendix C.

of intertemporal substitution is allowed to be different from one, then there is non-separability between consumption and leisure and the wage change would also feature in Equation (9). That is because with non-separability the marginal utility of consumption (leisure) depends on leisure (consumption), and changes in the wage rate affect consumption through their effect on leisure. For the sake of simplicity, and without loss of generality with respect to the effect of inheritance receipt, I ignore here any cross-derivative effects between consumption and leisure.

3.3 Retirement Decision

3.3.1 Fully expected inheritance

Given the optimal choices for consumption and leisure conditional on R, they can be substituted into the utility function (1) to set up an optimization problem in which R is the only choice variable. The individual chooses then the optimal R which can take values from s up to M. Following the modelling approach of Stock and Wise (1990), I express the value of retiring at age t conditional on not having retired before as

$$G_t(\bar{R}) = U(t) - U(\bar{R}) \quad \forall\ t \in \{s, ..., M-1\}\,, \tag{11}$$

where $\bar{R}$ is the retirement age that maximizes $U(\cdot)$ out of the set of possible retirement ages ahead of age t, and $G_t(\bar{R})$ is the utility difference between retiring at t and postponing retirement up to $\bar{R}$. The individual decides to keep working at age t if $G_t(\bar{R}) < 0$ and retires if $G_t(\bar{R}) \geq 0$. Since there is no uncertainty, at age s the individual already solves (11) for every possible retirement age and chooses the optimal R.

The trade off between quitting the work force and keeping the option value of retirement comes from the fact that if ϕ is large the individual would like to retire early, however, by doing so she incurs a reduction in lifetime income. Keeping everything else constant, receiving an inheritance increases lifetime income thus, if it is large enough, it may compensate for the costs of retiring early. Therefore, the individual is likely to plan an earlier retirement at age s when $I_n > 0$ *vis-à-vis* the $I_n = 0$ scenario.

3.3.2 Fully Unexpected Inheritance

Besides re-optimizing consumption and leisure, an unexpected inheritance receipt also leads to a re-optimization of R. If the individual is indifferent between retirement and continued work, *i.e.* $\theta = 1$ and $\phi = 0$, then the inheritance is distributed between consumption before and after retirement and R remains unchanged. However, if the individual's taste for leisure is strong enough and the value of the inheritance compensates for the costs of retiring earlier, then it pays off to revise the optimal R downwards. In that case, the forecast error is not defined as in Equation (8) since λ^n and λ^s differ not only due I_n but also due to the fact that $R^n \neq R^s$.

A decrease in R implies a drop in lifetime income and, in addition, it implies a drop in lifetime expenditures. If the relative size of these changes result in a decline in lifetime income that offsets I_n, then $\ln \nu_t = \ln 1 = 0$ and there are no consumption and leisure responses.[14] Note however that the room to change R critically depends on how far ahead the individual is to the initially set R^s. Therefore, what matters is not whether an individual who receives an inheritance retires early, but whether she retires earlier than planned at age s and how far she is from R^s at age n.

4 Empirical Strategy

To test the implications from the model I rely on a mixed approach consisting of an empirical approximation to Equations (9) and (10) for the labour supply and consumption response, and a reduced form equation for the retirement responses. In this section I lay out the specifications that result from this approach and which I use to produce the results presented in Section 6.

4.1 Specification 1: Consumption and Labour Supply

The empirical approximation to Equations (9) and (10) relies on the previous work by Banks *et al.* (1998) and Attanasio *et al.* (1999) who lay out the foundations for the empirical estimation of Euler equations.[15] To estimate the effect of inheritance receipt on consumption I set up the regression equation

$$\Delta \ln c_{it} = \beta_0 + \beta_1 inherit_{it} + \boldsymbol{\iota}'_{it}\boldsymbol{\beta}_2 + \Delta\mathbf{Z}'_{it}\boldsymbol{\beta}_3 + \boldsymbol{\xi}'_{it}\boldsymbol{\beta}_4 + \epsilon_{it}, \tag{12}$$

where the constant term captures the average rate of time preference, $inherit_{it}$ is a dummy that takes value one if the individual receives an unexpected inheritance between waves t and $t-1$, $\boldsymbol{\iota}_{it}$ is a vector containing a set of variables that proxy for the features of the forecast error in Equation (8), *i.e.* the inverse hyperbolic sine of household net worth at period $t-1$, education, age and subjective survival probabilities, $\Delta\mathbf{Z}_{it}$ contains changes in marital status, household structure and health status, $\boldsymbol{\xi}_{it}$ is a vector of wave and country dummies which captures changes in the interest rate over time and across countries as well as other possible country- and/or time-specific effects, and ϵ_{it} is an error term capturing changes in unobserved taste shifters and individual-specific deviations from the average rate of time preference. I assume that, except for the inheritance receipt, all changes between $t-1$ and t are expected and thus ϵ_{it} does not contain an expectational error.[16] Expressing Equation (12) in first differences has the advantage that any individual fixed effect related to demographics and taste for leisure is cancelled out.[17]

Note that the assumption of separability between consumption and leisure excludes the change in the wage rate from Equation (12). However, as long as inheritance receipt is not

[14]For more details on this, see Section C.2 in Appendix C

[15]For a thorough review of the empirical applications of the life cycle model, see Attanasio and Weber (2010).

[16]In practice there can be indeed unexpected changes in other variables that also affect consumption. However, as long as they are not correlated with inheritance receipt, they do not interfere with the estimation of β_1.

[17]This become clear by noticing that, in the theoretical model, demographic fixed effects δ_0 and taste for leisure θ do not feature in Equations (9) and (10).

correlated with the change in the wage rate, including or excluding the latter in Equation (12) will not have an effect on the estimate of β_1. Non-separability between consumption and leisure would also imply an effect on consumption of transitions to unemployment or retirement. However, I abstract from these transitions here and focus only on the effect of inheritance receipt on employed individuals. As I detail further in Section 5, the data on consumption are given at the household level. Therefore I estimate Equation (12) for singles and couples separately.[18] When performing the couples estimation, all individual level variables are included for both members in the couple.

Regarding the effect of inheritance receipt on the intensive margin of labour supply, I rely on Equation (10) and on the fact that an increase (decrease) in hours of leisure implies and equal decrease (increase) in hours of work. Therefore, I use a specification that expresses the change in log hours worked, *i.e.* $\Delta \ln h_{it}$, as a function of the same independent variables as in Equation (12). I exclude the change in the hourly wage rate since the data at hand do not allow to measure this variable. Furthermore, the same reason to excuse its inclusion in the consumption specification applies to the hours worked specification. $\Delta \ln h_{it}$ captures changes only along the intensive margin of labour supply and thus excludes transitions to retirement and any other type of labour market status transitions.

4.2 Specification 2: Retirement

The reduced form strategy I employ to estimate the retirement effect closely follows the approach by Brown *et al.* (2010). Consider Equation (11) from the theoretical model, which provides an expression for the utility difference between retirement and continued work denoted as G_{it}, where I add the individual subscript i, and t indexes here all waves of the SHARE included in the sample. I assume the distribution of G_{it} can be approximated by a linear and additive function of observable characteristics plus an error term such that

$$G_{it} = \gamma_0 + \gamma_1 inherit_{it} + \mathbf{X}_{it}' \boldsymbol{\gamma}_2 + \boldsymbol{\xi}_{it}' \boldsymbol{\gamma}_3 + u_{it},$$

where vector $\mathbf{X}_{it}$ contains a set of set of demographic variables: age, gender, marital status at $t-1$, age of the partner, educational level, presence of children, presence of grandchildren, parental death between $t-1$ and t, and health status at $t-1$; and economic variables: household income and wealth at wave $t-1$, sector of employment at $t-1$ (public, private or sef-employed), type of occupation at wave one, and a dummy indicating whether the household already received an inheritance or transfer before wave one.[19]

According to the theoretical model, an individual who is employed will keep on working if $G_{it} < 0$ and will retire if $G_{it} \geq 0$. This decision can thus be studied using a binary choice model

[18]For the predictions of the model to apply to the analysis for couples I adopt the unitary assumption and thus refrain from writing a model with collective decision making

[19]The choice of variables to be included in the vector $\mathbf{X}_{it}$ closely follows Brown *et al.* (2010). Their reasoning behind th inclusion of a variable capturing parental death between t and $t-1$ is to control for any direct effect of the death of a parent that does not take place through the receipt of an inheritance.

of the type

$$\Pr(retire_{it} = 1 | inherit_{it}, \mathbf{X}_{it}, \boldsymbol{\xi}_{it}) = \mathrm{F}(\gamma_0 + \gamma_1 inherit_{it} + \mathbf{X}'_{it}\boldsymbol{\gamma}_2 + \boldsymbol{\xi}'_{it}\boldsymbol{\gamma}_3),$$

where $\mathrm{F}(\cdot)$ is the cumulative distribution function (cdf) of $-u_{it}$. If the distribution of $-u_{it}$ is symmetric, $\mathrm{F}(\cdot)$ is also the cdf of u_{it}. In this type of models, the economic literature commonly assumes two alternatives for the distribution of u_{it}, *i.e* the standard normal cdf, which results in the probit model and the standard logistic cdf leading to the logit model. Both provide essentially the same results in this analysis thus I report only the results of the probit specification.[20]

5 Data and Descriptive Statistics

To estimate the equations in Section 4 I use data from the Survey on Health Ageing and Retirement in Europe (SHARE). The SHARE is a cross-national panel survey that provides detailed information on respondents' labour supply, health, finances, family relations and socio-economic status. It targets people aged fifty and older and their spouses/partners independent of age. The survey is conducted every two years on average and I use waves one to six, which run from 2004 until 2015. The third wave is excluded from the sample because it focuses on people's life histories and does not contain information on most of the variables used in this analysis.

Interviews have been conducted in twenty-one European countries, out of which I include in the analysis only the ten countries present in all waves, *i.e.* Austria, Belgium, Denmark, France, Germany, Italy, the Netherlands, Spain, Sweden and Switzerland. Out of all respondents in these countries, I select those who were employed in wave one and are observed at least until they retire. This selection leaves me with 3093 individuals who live in 2604 households. There are 599 individuals who, even though they were employed in wave one, are left out of the analysis due to missing information on job status at some point in the sample. Since the consumption and hours worked analyses are conducted conditional on not being retired, I start out this section by laying out the empirical definitions of retirement that I employ. These are followed by a description of the data used to measure consumption, labour supply and inheritances received. The samples used for each of the analyses are summarized in Table A1 of Appendix A. The same appendix provides definitions for all variables employed in the analyses, and summary statistics for the most relevant variables.[21]

5.1 Retirement

The initially selected 3093 individuals are employed (or self-employed) in wave one. From wave two they may transit to any of the other possible labour market statuses considered by the SHARE: *retired*, *unemployed*, *disabled*, *homemaker* or *other*. As a first measure of retirement, I create a dummy variable that takes value one if since the previous wave an individual transits

[20]The results of the logit model are available upon request.

[21]Summary statistics for control variables are not provided for economy of space. They are available upon request.

Table 1 Retirement by Wave of the SHARE

	Wave					
	One	Two	Four	Five	Six	Total
(a) Narrow retirement						
Not retired	3093	2402	1436	1063	747	747
Retired	0	691	966	373	316	2346
Total	3093	3093	2402	1436	1063	
Share retired	0.00%	22.34%	31.23%	12.05%	10.21%	75.85%
(b) Broad retirement						
Not retired	3093	2183	1226	847	558	558
Retired	0	910	957	379	289	2535
Total	3093	3093	2183	1226	847	
Share retired	0.00%	29.42%	30.94%	12.25%	9.34%	81.96%
(c) Retired before expected						
Not retired	2663	2521	1903	1237	956	956
Retired	0	142	228	78	55	503
Total	2663	2663	2131	1315	1011	
Share retired	0.00%	5.33%	8.56%	2.93%	2.06%	18.88%

Notes: Individuals are selected conditional on being *employed* or *self-employed* in wave one. Under *narrow retirement*, individuals may transit through status *unemployed*, *disabled* or *homemaker* before transiting towards *retired*. Under *broad retirement*, transitions from employment to any other labour market status is considered as retirement. In all cases individuals exit the sample after having transited to retirement. *Retired before expected* is based on *narrow retirement*. Due to missing or inaccurate information 430 individuals are lost when computing *retired before expected*. See main text for more details on the computation of *retired before expected*. The share of retired individuals refers in all cases to the share of individuals who retire in each wave out of the initial sample.

Table 2 Labour Market Status Transition Matrix

	Labour market status							
Lagged l.m. status	Retired	Employed	Self-emp.	Unemp.	Disabled	Homemaker	Other	Total
Employed	1796	4018	73	168	81	67	70	6273
	28.63%	64.05%	1.16%	2.68%	1.29%	1.07%	1.12%	100%
Self-emp.	307	71	712	20	14	32	14	1170
	26.24%	6.07%	60.85%	1.71%	1.20%	2.74%	1.20%	100%
Unemp.	96	37	3	68	5	4	4	217
	44.24%	17.05%	1.38%	31.34%	2.30%	1.84%	1.84%	100%
Disabled	51	9	0	3	61	1	1	126
	40.48%	7.14%	0.00%	2.38%	48.41%	0.79%	0.79%	100%
Homemaker	48	10	5	4	2	57	2	128
	37.50%	7.81%	3.91%	3.13%	1.56%	44.53%	1.56%	100%
Other	48	13	4	2	2	3	8	80
	60.00%	16.25%	5.00%	2.50%	2.50%	3.75%	10.00%	100%
Total	2346	4158	797	265	165	164	99	7994
	29.35%	52.01%	9.97%	3.31%	2.06%	2.05%	1.24%	100%

Notes: I assume retirement to be an absorbing state. Therefore, labour market status *retired* does not appear as a possible lagged labour market status. There are however 115 individuals (5% of those who retire at some point during the sample period) who still experience a labour market status transition after they retire. Out of these, only 65 transit from *retired* to *employed* or *self-employed*. For the sake of simplicity, I ignore these transitions.

from any other labour market status to *retired* and zero otherwise. Therefore, on their path from employment to retirement individuals may transit through any of the other possible labour market statuses. Once an individual transitions to retirement, she is dropped from the sample in further waves.[22] I call this measure *narrow retirement* since it does not consider any path towards retirement other than a transition to job status *retired*. Panel (a) of Table 1 shows the total number and share of individuals who retire in every wave under this definition. The yearly flow of new retirees results in a total of 75.85% of all initially selected individuals retiring at some point during the sample period.

The transition matrix in Table 2 shows that individuals follow different trajectories when transiting from employment to retirement. Even though the most common path consists in transiting directly from employment to retirement, there are a considerable number of individuals that transit through other labour market statuses before retiring. This evidence suggests that individuals may use unemployment and disability benefits as alternatives for early retirement, and that transition to *homemaker* may imply a definitive exit from the labour force. Therefore, I generate a broader measure of retirement consisting in a dummy that takes value one if the individual transits from his/her initial status (either *employed* or *self-employed*) to any of the other possible labour market statuses. Just like with the narrower measure of retirement, I drop individuals from the sample once they are considered to be retired.[23] Panel (b) of Table 1 shows that under this definition 81.96% of all initially selected individuals end up retiring at some point during the sample period.

At the end of Section 3.3.2 I argue that what matters is not whether individuals retire after receiving an inheritance, but whether they retire before they expected previous to the receipt. Not taking this issue into account will result in a spurious correlation between retirement and inheritance receipt if the latter is associated with a special taste for retirement. In terms of the theoretical model, this would be implied by a cross-sectional correlation between I_n and ϕ. If that is the case, inheritors may retire early or later than non-inheritors simply because of a special taste for retirement that is already determined before the receipt of an unexpected inheritance. To tackle this issue I follow the strategy of Brown *et al.* (2010) who use retirement expectations reported by DHS respondents. They generate a dummy that takes value one if an individual retires before expected and zero otherwise. The main assumption of this approach is that taste for retirement is fully captured by the expected retirement age.

The SHARE offers the possibility to apply the strategy by Brown *et al.* (2010) since respondents are asked about the age at which they expect to collect each of the pensions they are entitled to.[24] For each individual, I take the youngest out of all the ages of collection provided,

[22]In the theoretical model I assume that retirement is an absorbing state. However, in the data there are 115 individuals (about 5% of those who retire at some point during the sample period) who still experience a labour market status transition after they retire. Out of these, only 65 transit from *retired* to *employed* or *self-employed*. For the sake of simplicity, I ignore these transitions.

[23]In that case I incur an additional error since, as shown in Table 2, there are a few individuals who re-enter employment after transiting to *unemployed*, *disabled* or *homemaker*.

[24]There are six possible types of pension considered: public old age pension, public early retirement pension, public disability insurance, private/occupational old age pension and private/occupational early retirement

and generate an additional retirement variable that takes value one if individuals retire at a younger age than they expected as of wave one, and zero otherwise.[25] Out of the 2346 individuals who retire during the sample under the narrow definition of retirement, I lose 430 individuals due to four different reasons: because they do not provide information in wave one on expected age of pension collection, they report a minimum expected collection age that is lower than their actual age at wave one, they do not report the age at which they retired, and/or they report having retired at an age that is below their actual age at the wave prior to retirement. As shown in Panel (c) of Table 1, out of all individuals selected, 503 (18.88%) retire before they expected, which is a considerably low number compared to the totals of 2346 and 2535 individuals who retire under the narrow and broad definitions of retirement respectively.

5.2 Consumption

The SHARE provides information on total expenditures, as well as on expenditures in two specific categories, *i.e.* telephone and food. All expenditures are given at the household level and refer to a typical month out of the last twelve months preceding the interview. Total and telephone expenditures are not provided for all waves thus I use only the information on food consumption. The latter includes food consumption both inside and outside of the household. Following Joulfaian and Wilhelm (1994), I assume that, to a certain extent, food expenditures are a good representation of total household expenditures in non-durable goods, and that, as long as inheritances and transfers are not fully saved or dedicated to the purchase of a particular item, they will likely affect food consumption along with other expenditure categories that I cannot capture. Furthermore, for the theoretical model to apply, I assume that there is separability between food consumption and other types of consumption and that food is either a normal or a luxury good, *i.e.* income elasticity of demand for food is positive.

The 3093 individuals who form my initial sample live in 2604 households. Since the consumption data are given at the household level, I divide households between singles and couples, leaving out 67 households who experience a marital transition during the sample period. I keep households in the sample as long as they are not retired yet.[26] For this selection I use the broad definition of retirement, which implies dropping 789 households who already retire between wave one and two, but ensures that those households left in the sample stay employed and do not experience labour market transitions. I am left with a sample of 431 singles and 1317 couples, out of which, there are 39 singles and 561 couples with missing information on consumption for at least one wave. To prevent loss of observations, I use the imputed consumption data provided by the SHARE. The SHARE uses a multiple imputation technique that generates five values for each household-wave unit.[27] Figure 2 shows distributions of the wave-to-wave change in the

pension.

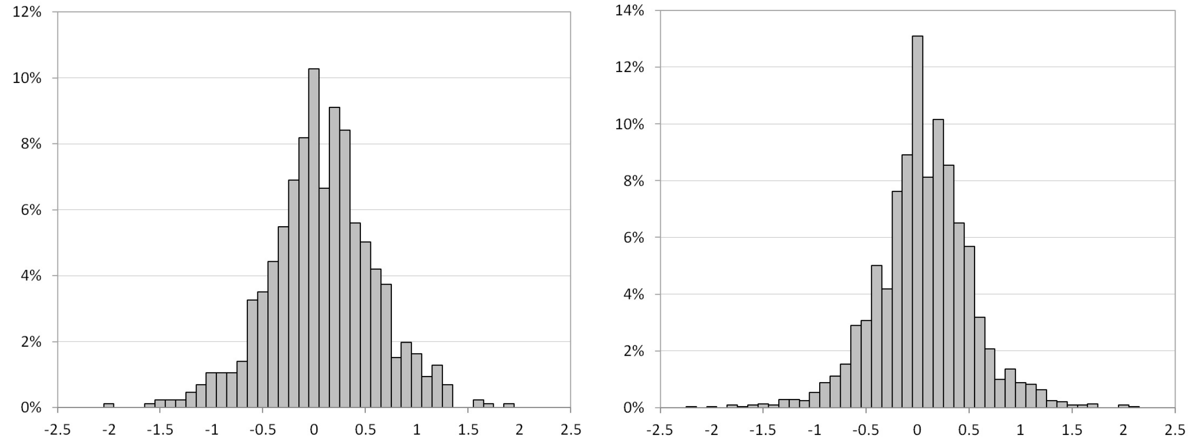
[25]To calculate whether someone retired before expected I use the narrow definition of retirement. That is because SHARE respondents provide the age at which they transfer into retirement, but not the age at which they transfer from employment to other labour market statuses.

[26]I consider a household composed by a couple to be retired once one of the two members in the couple retires.

[27]For details on the multiple imputation technique used by the SHARE, see Christelis (2011).

Figure 1 Sample Distribution of Change in Log Food Consumption

(a) Singles (b) Couples



Notes: Out of the initially selected 2604 households, 789 are dropped because they are retired by wave two, and 67 are dropped because they experience a marital transition, which results in a sample of 431 singles and 1317 couples. To construct the histograms, I take the average of the five imputations for each household-wave unit. All waves are pooled together which results in 935 household-wave observations for singles and 2589 household-wave observations for couples.

logarithm of food consumption for singles and for couples. All waves are pooled together which results in 935 household-wave observations for singles and 2589 for couples. Both distributions are to a large extent symmetric around zero, which is always the most popular value.

5.3 Labour Supply

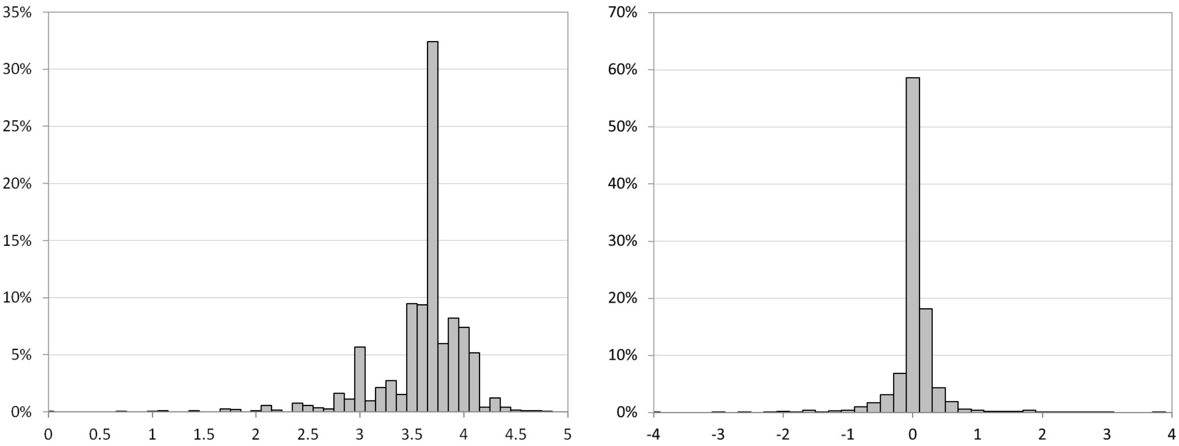
The SHARE asks individuals how many weekly hours are stipulated in their working contract and how many hours they actually work in a typical week. The question on contracted hours is not present in all waves hence I use only the measure based on actual hours.[28] For this analysis I take the initially selected 3093 individuals and compute wave-to-wave changes in the logarithm of hours worked. Since the focus is here on the intensive margin of labour supply, I compute wave-to-wave changes as long as individuals are not retired. For this selection, I follow again the broad definition of retirement, which ensures individuals who are in the sample I use for this analysis do not experience labour market transitions.

As Panel B of Table 1 shows, there are 910 individuals who are already retired by wave two and thus for whom I cannot compute any wave-to-wave changes in labour supply. Furthermore, I exclude 48 individuals with missing information on hours worked at least for one wave, and 53 individuals who at some point during the sample report to work zero hours a week even though they declare to be employed. These restrictions leave me with a sample of 2082 individuals who live in 1764 households. Panel (a) of Figure 1 provides the distribution of the logarithm of weekly worked hours. All waves are pooled together, which results in 6673 wave-individual observations. The distribution shows a clear peak at the value corresponding to forty hours per week. Panel (b) provides the distribution of the corresponding wave-to-wave change which

[28] When asked about actually worked hours in a typical week, individuals are requested to exclude meal breaks but to include any paid or unpaid overtime.

Figure 2 Sample Distributions of Level and Change in Log Hours Worked

(a) Log Hours Worked (b) Change Log Hours Worked



Notes: The sample is composed by the initially selected 3093 individuals minus those who retire in wave two according to the broad definition (910), those with missing information on hours worked (48), and those who at some point report zero worked hours in a typical week even though they report to be employed (53). Both figures include thus observations corresponding to 2082 individuals followed over the six waves of SHARE (third wave excluded) resulting in 6673 wave-individual observations in Panel (a) and 4591 in Panel (b).

appears to be fairly symmetric around zero.

5.4 Inheritances and Transfers Received

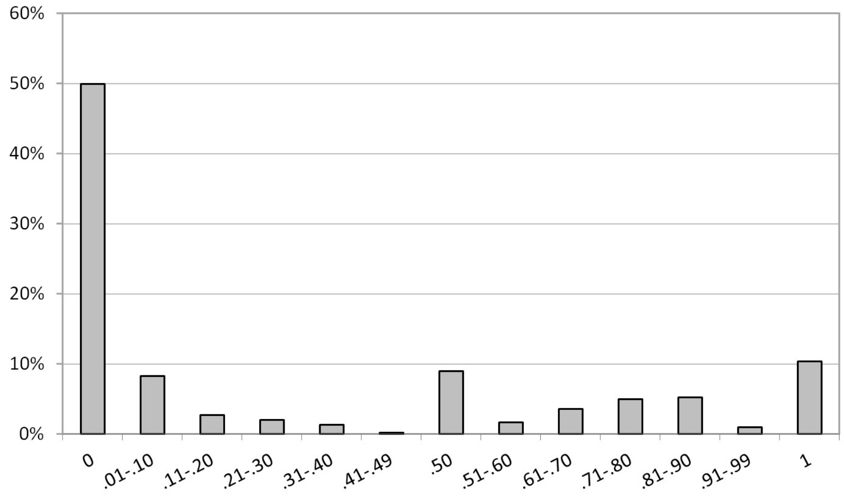
The SHARE provides information on inheritances and transfers received larger than five thousand Euros. Due to question design it is not possible to distinguish inheritances from transfers. However, for the age range targeted by the SHARE it is very likely that the large majority of cases of receipt correspond to an inheritance.[29] The information provided contains the year of receipt, the amount, and from whom the inheritance or transfer was received. The amount is only available for inheritances and transfers received before wave one and between waves one and two. For this reason I do not use information on the amount in the current version of this paper. Furthermore, all information on inheritances and transfers is given at the household level. It is thus not possible to identify who is the legal heir within the household if it is formed by more than one person. It is however possible to identify individuals living in a household that receives an inheritance or transfer.

Considering the initial sample of 3093 individuals, 26.32% of them (814 individuals) live in a household that receives at least one inheritance or transfer between wave one and wave six while not being retired.[30] I use this information to generate a variable that takes value one if an individual belongs to a household that receives an inheritance or transfer since the previous

[29] For this reason I often refer to inheritances and transfers as just inheritances in the remaining of the document.

[30] All summary statistics on inheritance and transfers reported in this section refer to the initial sample of 3093 individuals. The summary statistics for the samples used in the labour supply and consumption analyses (which are essentially sub-samples of that initial sample) are, to a very large extent, similar to the ones reported here and are not reported in this document for economy of space. They are available upon request.

Figure 3 Probability of Receiving an Inheritance During the Next 10 Years



Notes: Probabilities are measured in wave one and refer to 3041 out of the 3093 initial selected individuals since 52 observations are lost due to non-response of the question on inheritance expectations in the SHARE.

wave.[31] Out of all inheritances and transfers reported, 66.21% come from parents, 9.79% from partners, 4.77% from siblings, 7.73% from uncles and aunts and 2.42% from children. As explained in Section 3, in a life-cycle framework it is crucial to understand whether inheritances are expected or unexpected. The SHARE offers an interesting possibility to take this into account since it asks respondents about the chance of receiving an inheritance within the next ten years. Figure 3 reports the probability of receiving an inheritance in the next ten years as reported in wave one by initial sample of 3093 individuals. I lose 52 individuals due to missing information on expected inheritances, hence Figure 3 provides information on 3041 individuals. The distribution looks very similar to the one reported by Brown *et al.* (2010) using the HRS. It shows that about 50% of individuals report zero chance of receiving an inheritance, with 0.50 and one being the next most common answers.

Table 3 reports the correlation between self-reported probability of receiving an inheritance in wave one and actual receipt of an inheritance or a transfer while being in the sample. Out of those individuals who report zero chance of receiving an inheritance, 12.57% do receive an inheritance or transfer afterwards. These are the ones that are truly surprised by the receipt. For probabilities above zero, the share of individuals who receive a transfer or inheritance increases with the self-reported probability. For those who report absolute certainty, 54.30% receive an inheritance or transfer during the sample period. A slightly stronger correlation is observed when considering the probability of receiving an inheritance larger than fifty thousand Euros.[32] Table 3 suggests that self-reported probabilities of receiving an inheritance are a useful predictor

[31] There are 71 individuals for whom information on inheritance receipt is missing for one wave and five individuals for whom it is missing for two waves. I keep these individuals in the sample and generate an additional value for the transfer variable indicating a missing value.

[32] Note that individuals remain in the sample only as long as they are not reitred. Hence if inheritances received after retirement were also considered, the correlation would be stronger.

Table 3 Expected Versus Received Inheritances

Probability of inheritance receipt during 2004-2014	Sample distribution		Receipt by wave six	
	Any value	Above 50 thousand	Any value	Above 50 thousand
0	49.79%	72.60%	12.48%	19.31%
	(1514)	(2191)	(189)	(423)
0.01-0.49	14.53%	11.46%	22.17%	32.95%
	(442)	(346)	(98)	(114)
0.50	9.08%	4.80%	40.94%	50.34%
	(276)	(145)	(113)	(73)
0.51-0.99	16.38%	7.09%	46.18%	49.07%
	(498)	(214)	(230)	(105)
1	10.23%	4.04%	54.98%	57.38%
	(311)	(122)	(171)	(70)
All	100%	100%	26.34%	26.01%
	(3041)	(3018)	(801)	(785)

Notes: Probability of receiving an inheritance is measured at wave one. Out of the 3093 individuals in the sample reported in Table 1, 52 do not report a probability of receiving an inheritance of any value, and 75 do not report a probability of receiving an inheritance of more than 50 thousand Euros. Out of the individuals who do not report these probabilities, 13 and 29 receive an inheritance or transfer during the sample period respectively.

of actual receipt.[33] However, there is still enough miss-match between expectation and receipt to be able to distinguish between expected and unexpected inheritances.

Following Brown *et al.* (2010), I consider an inheritance received at any point between waves one and six to be unexpected if at wave one the respondent declared a zero chance of receiving an inheritance in the next ten years. If the chance reported is above zero, then I consider the inheritance to be expected. Following this definition, I generate a dummy that takes value one in case of unexpected inheritance and zero otherwise. In a second approach, I generate a variable that in case of receipt takes a value equal to one minus the chance of receiving an inheritance reported in wave one. In that way, I take into account the continuous nature of reported probabilities. Both approaches might be problematic if focal answers are an issue when individuals report inheritance probabilities. For instance, individuals may report a chance of 0.50 when they do not know the answer, or when they believe the chance is above zero but they cannot think of an exact probability. Furthermore, Figure 3 shows some signs of rounding towards 0.50 and one, since the probabilities reported around these values are specially low.[34] However, given the strong correlation between expected and actual receipt reported in Table 3, I assume that self-reported probabilities contain enough useful information to identify unexpected inheritances.

[33] The correlation I find is very similar to the one reported by Brown *et al.* (2010) using HRS. In their data, they can distinguish between inheritances and transfers. Therefore, the fact that I find a similar correlation gives credit to the assumption that most cases of receipt in SHARE correspond to inheritances.

[34] For more on focal answers and rounding in probability questions and the problems they may imply for statistical inference, see de Bresser and van Soest (2013).

6 Results

Tables 4 and 5 show the results I find for the consumption and labour supply analyses.[35] For the consumption regressions there are 39 and 561 households (for couples and singles respectively) that rely for at least one wave on multiple imputations provided by the SHARE. Each household-wave unit with a missing value is assigned with five different imputed values, which are computed following the methodology explained by Christelis (2011). Coefficient estimates and standard errors take into account all five imputations using the combination rules described by Rubin (2004). As explained in Section 4.1, the error term ϵ_{it} captures changes in unobserved taste shifters and individual-specific deviations from the average rate of time preference. The latter can be treated as a randome effect or as a fixed effect. For all regressions I present in this section, the Hausman test fails to reject in all cases the null hypothesis of a random effect. Therefore, I assume each individual deviates from the average rate of time preference in a random way. Assuming as well that changes in taste shifters (observed and unobserved) are fully expected and uncorrelated with inheritance receipt, I impose strict exogeneity in Equation (12) and apply a random effects estimator.

Both Table 4 and Table 5 show that the estimates of the inheritance receipt effect are in all cases not significantly different from zero. For the consumption analysis, the point estimates are positive for singles and negative for couples. The couples estimates are slightly more precise. However, in all cases lack of precision does not allow ruling out rather large effects of the order of 10 to 20 percentage point increases (or decreases) in food consumption growth due to inheritance receipt. Regarding the effect on the intensive margin of labour supply, Table 5 shows that point estimates are very close to zero regardless of the measure of inheritance receipt that I employ. In this case the estimates are more precise compared to the consumption results. Using a 95% confidence level, any effect larger than around a five percentage points change can be ruled out. This result implies that if there is an effect of inheritance receipt on the intensive margin of labour supply it is in any case rather small.

Table 6 reports the results of the retirement analysis. Each panel in Table 6 reports results using a different retirement measure, and each of them provides the short term effect of inheritance receipt, *i.e.* the effect of receipt since the previous wave, and the longer term effect, *i.e.* the effect of receipt at any point during the sample period on retirement in all subsequent waves. When estimating the longer term effect, each individual contributes only one observation to the sample and all control variables are fixed at their level in wave one. In that way, I allow individuals a few more years to respond to inheritance receipt by retiring at some point between receipt and the last wave available.[36] The point estimates for the short term

[35]For economy of space, I just provide coefficient estimates for the explanatory variables of interest. For full regression results, see Tables B1 and B2 in Appendix B. The latter provides full results for regressions in Column 1 of Tables 4, 5 and 6. Results for other columns do not differ significantly. They are available upon request

[36]In calculating both short and longer term effects on retirement I am following the analysis of Brown *et al.* (2010). For the consumption and labour supply responses I do not estimate long term effects in this paper. That is because the mode predicts an immediate effect of the receipt of an unexpected inheritance, while in all further periods the individual will already have adapted her decisions to the new information. An analysis of longer term

Table 4 Effect of Inheritance Receipt on Food Consumption

	Dependent variable: Change log food consumption					
	Singles			Couples		
Variable	(1)	(2)	(3)	(1)	(2)	(3)
Inheritance	0.038			-0.017		
	(0.061)			(0.026)		
Unexpected inheritance (dummy)		0.118			-0.031	
		(0.115)			(0.060)	
Unexpected inheritance (continuous)			0.017			-0.027
			(0.117)			(0.049)
Number of observations	935	935	935	2589	2589	2589
R^2	0.071	0.071	0.070	0.030	0.030	0.031

Notes: All coefficients are estimated using a random effects estimator. Standard errors (clustered at the household level) are reported in parenthesis. There are 39 and 561 households (for couples and singles respectively) that rely for at least one wave on multiple imputations provided by the SHARE. Each unit has five imputed values. Coefficient estimates and standard errors are computed using the combination rules described by Rubin (2004). All regressions include the change in the number of children in the household, the change in the number of parents (of the respondent or her partner) living in the household, the change in health, dummies capturing parental death, as well as country and time dummies. In addition, the features of the forecast error in Equation (8) are captured by the inclusion of the inverse hyperbolic sine of pre-inheritance household net worth, education, age, and subjective survival probabilities. For the couples regressions, all individual level variables are included for both members in the couple. See main text for further details, and Appendix A for variable definitions and summary statistics, and Appendix B for full regression results. *Significant at the 10% level, **significant at the 5% level, ***significant at the 1% level.

Table 5 Effect of Inheritance Receipt on Hours Worked

	Dependent variable: Change log hours worked		
Variable	(1)	(2)	(3)
Inheritance	-0.018		
	(0.019)		
Unexpected inheritance (dummy)		0.004	
		(0.043)	
Unexpected inheritance (continuous)			-0.011
			(0.033)
Number of observations	4591	4591	4591
R^2	0.018	0.017	0.018

Notes: All coefficients are estimated using a random effects estimator. Standard errors (clustered at the individual level) are reported in parenthesis. All regressions include changes in marital status, the change in the number of children in the household, the change in the number of parents (of the respondent or her partner) living in the household, the change in health, and dummies capturing parental death as well as country and time dummies. In addition, the features of the forecast error in Equation (8) are captured by the inclusion of the inverse hyperbolic sine of pre-inheritance household net worth, education, age, and subjective survival probabilities. See main text for further details, and Appendix A for variable definitions and summary statistics, and Appendix B for full regression results. *Significant at the 10% level, **significant at the 5% level, ***significant at the 1% level.

Table 6 Effect of Inheritance Receipt on Retirement

(a)	Dependent variable: Narrow retirement					
	Short term effect			Longer term effect		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Inheritance	-0.006			-0.046**		
	(0.016)			(0.016)		
Unexpected inheritance (dummy)		0.015			0.044	
		(0.033)			(0.030)	
Unexpected inheritance (continuous)			0.013			-0.045**
			(0.027)			(0.021)
Number of observations	7994	7994	7994	3093	3093	3093
Log Pseudolikelihood	-3115	-3115	-3115	-932	-934	-933
Pseudo R^2	0.287	0.287	0.287	0.395	0.394	0.395

(b)	Dependent variable: Broad retirement					
	Short term effect			Longer term effect		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Inheritance	0.003			-0.022*		
	(0.019)			(0.013)		
Unexpected inheritance (dummy)		0.021			-0.028	
		(0.038)			(0.024)	
Unexpected inheritance (continuous)			0.028			-0.039**
			(0.030)			(0.017)
Number of observations	7349	7349	7349	3093	3093	3093
Log Pseudolikelihood	-3297	-3297	-3297	-888	-880	-881
Pseudo R^2	0.228	0.228	0.228	0.335	0.336	0.335

(c)	Dependent variable: Retired before expected					
	Short term effect			Longer term effect		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Inheritance	-0.008			-0.034		
	(0.008)			(0.019)		
Unexpected inheritance (dummy)		0.002			-0.006	
		(0.018)			(0.033)	
Unexpected inheritance (continuous)			-0.012			-0.033
			(0.015)			(0.027)
Number of observations	7120	7120	7120	2663	2663	2663
Log Pseudolikelihood	-1388	-1388	-1389	-1042	-1041	-1040
Pseudo R^2	0.102	0.102	0.102	0.064	0.064	0.068

Notes: Marginal effects (evaluated at the sample means) from a probit model are reported with standard errors (clustered at the household level) in parenthesis. All regressions include controls for age, gender, marital status, age of the partner, educational level, presence of children and grandchildren, parental death, health status, household income and wealth, sector of employment, type of occupation, pre-sample period inheritance receipt as well as country and time dummies. See main text for further details, and Appendix A for variable definitions and summary statistics, and Appendix B for full regression results. *Significant at the 10% level, **significant at the 5% level, ***significant at the 1% level.

effect are in all cases very close to zero, rarely implying an increase (decrease) larger than 1% in the probability of retirement due to inheritance receipt. Regarding the longer term effect, there are a few estimates that are significantly different from zero. The significant estimates are negative, suggesting that inheritance receipt delays retirement. However, the effect is significant only when not considering retirement expectations.[37] It is therefore not appropriate to view this as a causal effect. When retirement expectations are taken into account, *i.e.* in Panel (c) of Table 6, the estimates of the longer term effect become not significantly different from zero. In this case I can rule out any change in the probability of retiring significantly larger than around three percentage points in the short term and around five percentage points in the longer term.

The retirement results suggest that the SHARE does not offer enough statistical power to reject the results by Brown *et al.* (2010). The latter find, when not taking into account inheritance and retirement expectations, that inheritance receipt is related with increases in the chance of retiring of about two percentage points in the short term and about four percentage points in the longer term. When taking into account inheritance and retirement expectations, they find a point estimate of about five percentage points. These are effects of a magnitude that I cannot rule out given the precision of my estimates. Using the SHARE, Eder (2016) finds a significant increase in the probability of being retired at wave four of five percentage points as a response to inheritance receipt between waves one and four, regardless of whether the latter is expected or unexpected. However, Eder (2016) does not exploit information on labour market status provided in wave two. Table 6 shows that his result does not stand when introducing waves two, five and six in the analysis. Regarding previous results on the effect of inheritance receipt on the intensive margin of labour supply by *e.g.* Joulfaian and Wilhelm (1994), Sila and Sousa (2014), and Bø *et al.* (2018) find either a small effect or an effect that is not statistically significant. When significantly different from zero, their findings cannot, in most cases, be ruled out by the results in Table 5. However, in this case the outcomes are not directly comparable due to methodological differences.

7 Conclusions and Discussion

In this paper I investigate the effect of receiving an inheritance on behavioural responses of older Europeans. Employing waves one to six of the SHARE, I differentiate between expected and unexpected inheritances and estimate their effect on consumption, labour supply and retirement. The results show that the estimated effects are in all cases not significantly different from zero. Regarding the results of the analyses on retirement and the extensive margin of labour supply, I reject (at the 95% level of confidence) any jump in the relative change of hours worked much larger than five percentage points, and any change in the probability of retiring larger than five percentage points when taking into account retirement expectations. These results allow ruling

effects in these cases, as well as a study of why they could take place, is left for future work.

[37] As explained in Section 5.1, I lose 430 observations due to lack of information on retirement expectations. When I exclude this observations from the samples used in Panels (a) and (b) of Table 6, the change in the results is negligible.

any substantially large effects, and imply that the findings by Brown *et al.* (2010), who conclude that inheritance receipt increases chances of retiring by around five percentage points, cannot be clearly rejected using the SHARE. However, they are compatible with most of the literature on labour supply and retirement effects of inheritance receipt, since the latter usually reports effects that are either very small or not significantly different from zero.[38] Regarding the consumption analysis, the estimates are less precise and thus it becomes more difficult to draw conclusions.

The results that I find are compatible with different explanations. First of all, given that I do not find substantial effects on labour supply and retirement, which seems to be the general trend in the literature, the results are compatible with individuals smoothing the effect of an inheritance over time. If inheritances are not very large in general, and individuals still expect to live many years after receiving them, this smoothing behaviour will lead to very small immediate effects, that could nevertheless accumulate over time. Unfortunately, the SHARE does not provide enough information on the inheritance amounts. The latter are only available for those inheritances received between waves one and two. Table 7 shows the distribution of these amounts and how they correlate with pre-inheritance wealth. Out of the 2604 households initially observed in wave one, 326 report to have received an inheritance between waves one and two, out of which 29 do not provide the inherited amount.

Table 7 shows that the likelihood of receiving an inheritance increases with wealth but not very substantially. However, recipients tend to be wealthier than non-recipients and inherited amounts increase with pre-inheritance wealth. More interestingly, Table 7 shows that inheritances tend to represent about one tenth of pre-inheritance wealth, and that inheritance-wealth ratios increase with pre-inheritance wealth. Even though inheritances are transitory shocks that can be large, Equation (8) shows that what matters is not their absolute amount but their relation to previous wealth and future income streams, as well as to expected remaining lifetime. The evidence in Table 7 suggests that, specially for the wealthiest, inheritances do not represent a substantial increase in lifetime income. Nevertheless, more research needs to be done to fully understand the relation between inherited amounts, previous wealth, future income streams and life expectancy to fully grasp how relevant is the impact of inheritances on lifetime income.

Secondly, the results I find are compatible with substantially large effects of inheritances on consumption. The lack of precision of the estimates does not allow ruling out effects of up to 20 percentage point jumps in food consumption growth due to inheritance receipt. Previous evidence on this effect is very scarce and thus there is no benchmark to which my results can be compared. Intuitively, it make sense to think of larger responses in consumption compared to labour supply and retirement decisions, since the latter are usually restricted by labour market and social security regulations, while consumption might be more discretionary. This is not captured by the theoretical model presented in this paper, it does provide however a plausible explanation for the possibility of larger responses in consumption.

The SHARE date are not rich enough to perform a full study on consumption, it does

[38] See Cox (2014) for a review of this literature.

Table 7 Prevalence of Inheritance and Contribution to Wealth

	Percentage who inherit	Inheritance amount		Wealth				Inheritance-wealth ratio	
				Recipients		Non-recipients			
		Median	Mean	Median	Mean	Median	Mean	Median	Mean
Total	12.98%	21.75	51.44	233.91	366.94	189.1	296.16	0.09	0.14
Wealth ≤ 0									
Total	10.58%	10.86	33.01	-28.60	-40.62	-10.40	-24.99		
Wealth > 0									
Q1	12.18%	15.84	32.27	52.77	51.37	37.76	41.58	0.30	0.63
Q2	10.36%	21.72	39.61	148.11	149.29	155.55	152.09	0.15	0.27
Q3	14.18%	20.01	50.37	297.63	295.21	274.28	278.12	0.07	0.17
Q4	15.64%	38.75	76.10	663.54	889.61	582.17	796.20	0.06	0.09
Total	13.09%	21.72	52.08	250.60	383.99	198.43	311.78	0.09	0.14

Notes: The unit of observation is the household and all monetary amounts are given in thousands of Euros. Inheritance amounts are reported conditional on receipt and refer to those received between wave one and wave two of the SHARE by the 2604 households included in the initial sample described in Section 5. Out of these, there are 326 households who received an inheritance. There 39 households for whom it is not known whether they received one, these are excluded from the table. There are 29 households who received an inheritance but do not know the amount, these are excluded only when reporting inheritance amounts. Wealth refers here to household net worth at wave one, *i.e.* before receiving the inheritance.

however allow distinguishing between food consumption inside of the household and food consumption outside of the household. A very preliminary analysis of these data suggests that food consumption outside of the household is more responsive to inheritances than food consumption inside of the household. However, due to the frequent presence of zeros in food consumption outside of the household, one needs to build a model that considers different types of goods (normal goods versus luxury goods) and allows for corner solutions. More research needs to be done in the future to fully understand whether inheritances increase consumption and whether certain types of goods are more affected than others.

Thirdly, the results are compatible with a line of research which claims that bequest planning is linked with the experience of inheriting. This has been explored by Cox and Stark (2005) and more recently by Stark and Nicinska (2015). The latter use the SHARE and test the implications of a model that includes in the utility function the term $\alpha(B-I)$, where B refers to the bequest parents leave to their children, I is the inheritance parents themselves receive and α is a parameter measuring the effect of family tradition on bequest behaviour. This model implies that receiving an inheritance increases the incentive to leave a bequest. In their empirical analysis, the authors find that inheriting has a positive impact on the intention to bequeath even after controlling for the increase in wealth that it implies. Incorporating this argument in the model I present in this paper would leave less room for the behavioural responses that I consider, which is compatible with the small effects that I actually find.

In summary, the results that I find seem to agree with the stylized fact reported in the literature stating that inheriting does not have substantially large effects on labour supply and retirement. However, it is difficult to tell whether this is because individuals have a low taste for leisure, because of tight labour market regulations, or because inheritances are actually small in general in relation to lifetime income. In addition my results cannot rule out large effects on consumption, and they are compatible with a model that incorporates a family tradition term in the utility function. More research needs to be done in the future to incorporate additional trade-offs in the model and better understand how individuals react to inheritance receipt.

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Appendices

A Estimation Samples, Variable Definitions and Summary Statistics

Table A1 Number of Observations Estimation Samples

	Individuals	Households	Individual-wave units	Household-wave units
Narrow retirement	3093	2604	7994	6760
Broad retirement	3093	2604	7349	6201
Retired before expected	2663	2249	7120	6013
Consumption (singles)	-	431	-	935
Consumption (couples)	-	1317	-	2589
Labour supply	2082	1764	4591	3601

Notes: The narrow retirement and broad retirement samples form the baseline sample. All other samples are sub-samples of the base line sample. For more details, see Section 5 in the main text.

Table A2 Variable Definitions

Variable	Definition
Narrow retirement	Dummy variable indicating whether respondent retired between waves $t-1$ and t. Considers as retirement transitions to labour market status *retired* from any other labour market status. For the classification of labour market statuses in the SHARE, see Table 2.
Broad retirement	Dummy variable indicating whether respondent retired between waves $t-1$ and t. Considers as retirement transitions from *employed* or *self-employed* to any other labour market status. For the classification of labour market statuses in the SHARE, see Table 2.
Retired before expected	Dummy variable indicating whether respondent retired between waves $t-1$ and t. Considers as retirement transitions from *employed* or *self-employed* to any other labour market status, as long as they take place before expected as of wave one. For the classification of labour market statuses in the SHARE, see Table 2.
Change log food consumption	Change in the natural logarithm of household food consumption between waves $t-1$ and t.
Change log hours worked	Change in the natural logarithm of weekly hours worked (regardles of contracted hours) between waves $t-1$ and t.

Table A2 Variable Definitions (Continuation)

Variable	Definition
Inheritance	Inheritance or transfer larger than five thousand Euros received by a member of the household between waves $t-1$ and t. 0: Not received;1: Received; 2: Do not know.
Unexpected inheritance (dummy)	Inheritance or transfer larger than five thousand Euros received by a member of the household between waves $t-1$ and t when probability of inheritance receipt was reported to be zero at wave one. 0: Not received; 1: Received; 2: Do not know.
Unexpected inheritance (continuous)	If an inheritance or transfer larger than five thousand Euros is received by a member of the household between waves $t-1$ and t, takes value equal to the difference between one and probability of inheritance receipt reported at wave one. If no inheritance or transfer is received, takes value one.
Age category	1: age $<$ 55; 2: 55$\geq$ age $<$ 60; 3: 60 $\geq$ age $<$ 65, 4: age $\geq$ 65.
Gender	Dummy variable indicating whether the individual is female.
Marital status	1: Married, living with the spouse; 2: Registered partnership; 3: Married, not living with the spouse; 4: Never married; 5: Divorced; 6: Widowed.
Age category partner	0: no partner; 1: age $<$ 55; 2: 55 $\geq$ age $<$ 60; 3: 60 $\geq$ age $<$ 65, 4: age $\geq$ 65.
Children	Dummy variable indicating the presence of children.
Grandchildren	Dummy variable indicating the presence of grandchildren.
Mother death	Dummy variable indicating the death of the respondent's mother between waves $t-1$ and t.
Father death	Dummy variable indicating the death of the respondent's father between waves $t-1$ and t.
Education	International standard classification of education (ISCED) 1997. 0: None; 1: Primary education or first stage of basic education; 2: Lower secondary education or second stage of basic education; 3: Upper secondary education; 4: Post-secondary non-tertiary education; 5: First stage of tertiary education; 6: Second stage of tertiary education; 7: Do not know.
Poor health	Dummy variable indicating poor health.
Health improved	Dummy variable indicating individual moved out of poor health status between waves $t-1$ and t.

Table A2 Variable Definitions (Continuation)

Variable	Definition
Health worsened	Dummy variable indicating individual moved to poor health status between waves $t-1$ and t.
Household income	Total yearly income of the household.
Household wealth	Total household net worth.
Sector	Sector of employment. 0: Labour market status is not employed; 1: Private sector; 2: Public sector; 3: Self-employed; 4: Labour market status is employed but sector is unknown.
Occupation	International standard classification of occupation (ISCO). 1: Legislators, senior officials and managers; 2: Armed forces; 3: Professionals; 4: Technicians and associate professionals; 5: Clerks; 6: Service workers and shop and market sales workers; 7: Skilled agricultural and fishery workers; 8: Craft and related trades workers; 9: Plant and machine operators and assemblers; 10: Elementary occupations; 11: Do not know.
Previous transfer	Inheritance or transfer above five thousand Euros already received before wave one.
Marital status transition	Change in marital status between waves $t-1$ and t. 1: Married or registered partnership to separated or divorced; 2: Married or registered partnership to widowed; 3: Separated or divorced to married or registered partnership; 4: Widowed to married or registered partnership.
Change children in household	Change in the number of children living in the household between waves $t-1$ and t.
Change parents in household	Change in the number of parents of the respondent living in the household between waves $t-1$ and t.
Survival probabilities	Subjective probability of surviving up to the following 10 to 15 years.
Missing survival	Dummy indicating missing information on the subjective probability of surviving up to the following 10 to 15 years. If *missing survival* equals one, *survival probabilities* is set to zero in the regression analysis.
Country	1: Austria; 2: Germany; 3: Sweden; 4: Spain; 5: Italy; 6: France; 7: Denmark; 8: Switzerland; 9: Belgium.

Table A3 Summary Statistics

Variable	Mean	Median	Std. Dev.	Min	Max.
Consumption Analysis Singles					
Change log food consumption	-0.035	-0.025	0.558	-3.292	3.064
Inheritance	0.101	-	-	-	-
Unexp. inheritance (dummy)	0.015	-	-	-	-
Unexp. inheritance (continuous)	0.041	0	0.170	0	1
Consumption Analysis Couples					
Change log food consumption	-0.044	-0.043	0.458	-2.315	2.009
Inheritance	0.138	-	-	-	-
Unexp. inheritance (dummy)	0.031	-	-	-	-
Unexp. inheritance (continuous)	0.057	0	0.204	0	1
Labour Supply Analysis					
Change log hours worked	-0.034	0	0.381	-3.114	3.738
Inheritance	0.140	-	-	-	-
Unexp. inheritance (dummy)	0.026	-	-	-	-
Unexp. inheritance (continuous)	0.057	0	0.202	0	1
Retirement Analysis					
Narrow retirement	0.293	-	-	-	-
Broad retirement	0.345	-	-	-	-
Retired before expected	0.083	-	-	-	-
Inheritance	0.127	-	-	-	-
Unexp. inheritance (dummy)	0.026	-	-	-	-
Unexp. inheritance (continuous)	0.053	0	0.198	0	1

Notes: For economy of space only summary statistics on dependent variables and main explanatory variables are provided. Summary statistics for control variables are available upon request. Summary statistics for *narrow retirement*, *broad retirement* and *retired before expected* are based on the short term regressions, *i.e.* Columns 1 to 3 in Table 6. Summary statistics for inheritance variables in the retirement analysis are based on the *narrow retirement* regression, *i.e.* Pabel (a) of Table 6.

B Full Regression Results

Table B1 Results Consumption and Labour Supply Analysis

		(1) Change log food consumption (singles)	(2) Change log food consumption (couples)	(3) Change log hours worked
Inheritance	1	0.038	-0.017	-0.018
		(0.061)	(0.026)	(0.019)
	2	0.116	-0.027	0.009
		(0.209)	(0.094)	(0.049)
Change children in household		0.112**	0.030	-0.011
		(0.045)	(0.017)	(0.012)
Change parents in household		0.075	-0.062	0.091
		(0.128)	(0.101)	(0.096)
Health worsened		-0.004	-0.140	-0.049
		(0.203)	(0.090)	(0.078)
Health improved		0.247*	0.037	-0.160
		(0.133)	(0.116)	(0.097)
Mother death		-0.091	0.052	-0.002
		(0.083)	(0.039)	(0.023)
Father death		-0.078	0.085*	-0.006
		(0.107)	(0.050)	(0.034)
Lagged household wealth (arsinh)		0.010**	-0.003	0.001*
		(0.005)	(0.002)	(0.001)
Age category	2	-0.001	0.027	-0.017
		(0.667)	(0.033)	(0.017)
	3	0.001	0.054	-0.044**
		(0.069)	(0.033)	(0.017)
	4	-0.003	0.071	-0.176***
		(0.086)	(0.044)	(0.032)
Survival probabilities		-0.101	0.019	-0.009
		(0.103)	(0.055)	(0.032)
Missing survival		-0.137	0.024	0.009
		(0.15)	(0.087)	(0.045)
Education	1	0.049	-0.011	-0.009
		(0.123)	(0.080)	(0.064)
	2	0.044	0.019	-0.009
		(0.118)	(0.079)	(0.063)
	3	-0.033	0.058	-0.034
		(0.119)	(0.080)	(0.062)
	4	0.027	-0.004	-0.029
		(0.129)	(0.088)	(0.068)

Table B1 Results Consumption and Labour Supply Analysis (Continuation)

		(1) Change log food consumption (singles)	(2) Change log food consumption (couples)	(3) Change log hours worked
	5	0.016	0.056	-0.026
		(0.123)	(0.081)	(0.062)
	6	-0.227	-0.012	-0.041
		(0.183)	(0.139)	(0.081)
	7	-0.638	0.097	-0.029
		(0.295)	(0.115)	(0.070)
Wave	4	0.173	0.043	-0.042
		(0.138)	(0.081)	(0.039)
	5	-0.028	0.006	0.011
		(0.057)	(0.028)	(0.016)
	6	-0.026	0.033	0.026
		(0.068)	(0.037)	(0.017)
Germany		-0.044	0.015	-0.024
		(0.102)	(0.054)	(0.038)
Sweden		0.007	0.093	-0.015
		(0.093)	(0.051)	(0.038)
Netherlands		-0.219	-0.033	-0.035
		(0.112)	(0.060)	(0.039)
Spain		-0.067	0.047	0.012
		(0.113)	(0.058)	(0.044)
Italy		-0.176	-0.035	-0.014
		(0.121)	(0.057)	(0.044)
France		-0.007	0.048	-0.002
		(0.103)	(0.061)	(0.039)
Denmark		0.060	0.075	-0.008
		(0.097)	(0.054)	(0.036)
Switzerland		0.045	0.085	0.006
		(0.094)	(0.055)	(0.044)
Belgium		0.021	0.077	-0.017
		(0.100)	(0.053)	(0.038)
Observations		935	2589	4591
R^2		0.074	0.030	0.018

Notes: All coefficients are estimated using a random effects estimator. Standard errors (clustered at the household level) are reported in parenthesis. In Columns 1 and 2 , there are 39 and 561 households (for couples and singles respectively) that rely for at least one wave on multiple imputations provided by the SHARE. Each unit has five imputed values. Coefficient estimates and standard errors are computed using the combination rules described by Rubin (2004). For the couples regressions, all individual level variables are included for both members in the couple. For economy of space, here only results for one household representative are reported. Estimates of the partner variables are available upon request. For economy of space estimates of the effect of changes in marital status on labour supply are not reported here. They are available upon request. See Tables A2 and A3 for variable definitions and summary statistics. *Significant at the 10% level, **significant at the 5% level, ***significant at the 1% level.

Table B2 Results Retirement Analysis

		(1) Narrow retirement	(2) Broad retirement	(3) Retired before expected
Inheritance	1	-0.019 (0.056)	0.007 (0.054)	-0.073 (0.075)
	2	0.039 (0.159)	0.077 (0.156)	0.004 (0.228)
Gender		-0.074* (0.041)	0.055 (0.040)	-0.067 (0.055)
Lagged marital status	2	-0.146 (0.112)	-0.172 (0.106)	-0.140 (0.153)
	3	-0.036 (0.190)	-0.197 (0.184)	0.249 (0.235)
	4	0.034 (0.186)	-0.121 (0.179)	-0.037 (0.251)
	5	0.178 (0.176)	-0.067 (0.171)	0.275 (0.236)
	6	0.369** (0.187)	0.117 (0.183)	0.276 (0.253)
Age category	2	0.892*** (0.114)	0.513*** (0.073)	0.683*** (0.137)
	3	1.949*** (0.116)	1.323*** (0.078)	1.200*** (0.140)
	4	3.267*** (0.126)	2.524*** (0.093)	1.222*** (0.155)
Age category partner	1	0.157 (0.175)	-0.009 (0.168)	0.224 (0.233)
	2	0.300* (0.170)	0.172 (0.165)	0.222 (0.228)
	3	0.375** (0.170)	0.255 (0.165)	0.168 (0.229)
	4	0.317* (0.174)	0.176 (0.170)	0.181 (0.235)
Children		-0.190*** (0.073)	-0.221*** (0.070)	-0.220** (0.092)
Grandchildren		0.153*** (0.040)	0.194*** (0.039)	0.105** (0.053)
Mother death		0.079 (0.067)	-0.032 (0.066)	0.128 (0.084)
Father death		-0.072 (0.090)	-0.100 (0.084)	-0.096 (0.120)

Table B2 Results Retirement Analysis (Continuation)

		(1) Narrow retirement	(2) Broad retirement	(3) Retired before expected
Lagged poor health		0.315 (0.195)	0.597** (0.259)	0.406* (0.239)
Health worsened		0.121 (0.127)	0.994*** (0.118)	0.108 (0.161)
Health improved		-0.311 (0.242)	-0.437 (0.307)	-0.504 (0.307)
Education	1	0.048 (0.157)	0.156 (0.157)	0.061 (0.227)
	2	0.079 (0.157)	0.232 (0.157)	0.066 (0.227)
	3	0.075 (0.156)	0.162 (0.155)	0.002 (0.226)
	4	0.029 (0.180)	0.076 (0.179)	0.088 (0.252)
	5	-0.059 (0.159)	0.003 (0.159)	0.000 (0.230)
	6	-0.364 (0.253)	-0.303 (0.249)	0.014 (0.346)
	7	-0.139 (0.205)	0.028 (0.203)	-0.048 (0.371)
Lagged household income		-0.054 (0.034)	-0.062* (0.033)	-0.038 (0.048)
Lagged household wealth		-0.001 (0.003)	-0.006** (0.003)	-0.001 (0.004)
Lagged sector	1	-0.124* (0.069)		-0.355*** (0.084)
	2	0.034 (0.076)	0.070* (0.041)	-0.362*** (0.094)
	3	-0.633*** (0.083)	-0.396*** (0.055)	-0.610*** (0.108)
	4	0.582 (0.382)	0.845** (0.401)	0.541 (0.520)
Occupation	1	0.545*** (0.171)	0.588*** (0.165)	0.027 (0.223)
	2	-0.040 (0.066)	-0.065 (0.063)	-0.069 (0.087)
	3	0.161** (0.065)	0.084 (0.063)	0.139* (0.085)

Table B2 Results Retirement Analysis (Continuation)

		(1) Narrow retirement	(2) Broad retirement	(3) Retired before expected
	4	0.072	0.068	0.084
		(0.077)	(0.075)	(0.099)
	5	-0.105	-0.063	-0.102
		(0.078)	(0.075)	(0.105)
	6	0.131	0.137	0.031
		(0.114)	(0.109)	(0.156)
	7	0.123	0.170**	0.121
		(0.084)	(0.081)	(0.107)
	8	0.222**	0.273***	0.076
		(0.099)	(0.098)	(0.128)
	9	-0.096	0.011	-0.184
		(0.089)	(0.086)	(0.120)
	10	-0.017	0.056	-0.300
		(0.147)	(0.143)	(0.251)
Previous transfer	1	0.135***	0.077**	0.130***
		(0.037)	(0.037)	(0.049)
	2	0.698	0.336	0.038
		(0.246)	(0.241)	(0.361)
Wave	4	0.111**	0.050	0.029
		(0.046)	(0.044)	(0.060)
	5	-0.411***	-0.375***	-0.263***
		(0.055)	(0.053)	(0.074)
	6	-0.519***	-0.489***	-0.371***
		(0.061)	(0.061)	(0.084)
Germany		-1.019***	-0.683***	-0.644***
		(0.106)	(0.104)	(0.119)
Sweden		-1.412***	-1.151***	-1.00***
		(0.105)	(0.102)	(0.121)
Netherlands		-0.954***	-0.609**	-0.884***
		(0.109)	(0.106)	(0.132)
Spain		-1.295***	-0.789***	-0.992***
		(0.118)	(0.114)	(0.146)
Italy		-0.721***	-0.448***	-0.652***
		(0.110)	(0.108)	(0.129)

Table B2 Results Retirement Analysis (Continuation)

	(1) Narrow retirement	(2) Broad retirement	(3) Retired before expected
France	-0.483***	-0.315***	-0.802***
	(0.104)	(0.102)	(0.124)
Denmark	-1.306***	-0.953***	-1.016***
	(0.105)	(0.101)	(0.121)
Switzerland	-1.313***	-0.983***	-0.929***
	(0.119)	(0.115)	(0.140)
Belgium	-0.715***	-0.444***	-0.724***
	(0.099)	(0.098)	(0.115)
Observations	7994	7349	7120
Pseudo R^2	0.287	0.228	0.102

Notes: All coefficients are estimated using a probit model. For marginal effects (evaluated at the sample means) of the variable *inheritance*, see Table 6 in the main text. Standard errors (clustered at the household level) are reported in parenthesis. See Tables A2 and A3 for variable definitions and summary statistics. *Significant at the 10% level, **significant at the 5% level, ***significant at the 1% level.

C Theoretical Framework (Extensions)

C.1 Closed Form Solutions

As shown in Section 3.2, the first order conditions of the optimization problem yield an expression for c_s and l_s in terms of λ. As Equations (6) and (7) show, consumption and leisure at any other period can be expressed as a function of c_s and l_s respectively. Substituting Equations (4) to (7) into the budget constraint (3) and solving for λ yields the expression

$$\lambda = \left(\sum_{t=s}^{R-1} \frac{D_t}{(1+\rho)^{t-s}} + \theta \sum_{t=R}^{L} \frac{D_t}{(1+\rho)^{t-s}} \right) \times \left(\frac{I_n}{(1+r)^{n-s}} + \sum_{t=s}^{R-1} \frac{w_t T}{(1+r)^{t-s}} + \sum_{t=R}^{L} \frac{y(R)}{(1+r)^{t-s}} + A_{s-1} \right)^{-1}, \tag{C.1}$$

which shows how shows how lambda captures all relevant information affecting c_s and l_s from all periods other than s. Substituting (A.1) in Equations (4) and (5) allows writing the optimal solutions for c_s and l_s as

$$c_s = \left(\sum_{t=s}^{R-1} \frac{D_t}{(1+\rho)^{t-s}} + \theta \sum_{t=R}^{L} \frac{D_t}{(1+r)^{t-s}} \right)^{-1} \times \left(\frac{I_n}{(1+r)^{n-s}} + \sum_{t=s}^{R-1} \frac{w_t T}{(1+r)^{t-s}} + \sum_{t=R}^{L} \frac{y(R)}{(1+r)^{t-s}} + A_{s-1} \right) D_s \theta, \tag{C.2}$$

$$l_s = \left(\sum_{t=s}^{R-1} \frac{D_t}{(1+\rho)^{t-s}} + \theta \sum_{t=R}^{L} \frac{D_t}{(1+\rho)^{t-s}} \right)^{-1} \times \left(\frac{I_n}{(1+r)^{n-s}} + \sum_{t=s}^{R-1} \frac{w_t T}{(1+r)^{t-s}} + \sum_{t=R}^{L} \frac{y(R)}{(1+r)^{t-s}} + A_{s-1} \right) D_s (1-\theta) w_s \tag{C.3}$$

which show how consumption and leisure depend positively on I_n. Equations (4) and (5) can be used to find optimal leisure and consumption for all periods other than s. How I_n is allocated across periods depends on the relative values of r ρ, and how it is allocated between consumption and leisure within every period depends on θ. In that case

C.2 Derivation of the Forecast Error

Equation (8) provides the expression of the forecast error for the case in which R is fixed. In that case, λ^n and λ^s differ only because of the inclusion of I_n in λ^n. If the retirement age is affected by the inheritance receipt, they also differ because of $R^n \neq R^s$. λ^n and λ^s can be expressed as

$$\lambda^n = \left(\sum_{t=n}^{R^n-1} \frac{D_t}{(1+\rho)^{t-n}} + \theta \sum_{t=R^n}^{L} \frac{D_t}{(1+\rho)^{t-n}} \right)$$
$$\times \left(I_n + \sum_{t=n}^{R^n-1} \frac{w_t T}{(1+r)^{t-n}} + \sum_{t=R^n}^{L} \frac{y(R^n)}{(1+r)^{t-n}} + A_{n-1}(1+r) \right)^{-1} = \frac{X^n}{Y^n}, \tag{C.4}$$

$$\lambda^s = \left(\sum_{t=n}^{R^s-1} \frac{D_t}{(1+\rho)^{t-n}} + \theta \sum_{t=R^s}^{L} \frac{D_t}{(1+\rho)^{t-n}} \right)$$
$$\times \left(\sum_{t=n}^{R^s-1} \frac{w_t T}{(1+r)^{t-n}} + \sum_{t=R^s}^{L} \frac{y(R^s)}{(1+r)^{t-n}} + A_{n-1}(1+r) \right)^{-1} = \frac{X^s}{Y^s}. \tag{C.5}$$

Using (A.4) and (A.5) the forecast error can be expressed as

$$\nu_t = \frac{\lambda^s}{\lambda^n} = \frac{X^s Y^n}{X^n Y^s}. \tag{C.6}$$

Considering the case in which the retirement age is revised downwards, *i.e.* $R^n < R^s$, the difference between Y^n and Y^s is given by I_n plus the change in future income streams implied by retiring earlier. The latter can be written as

$$Q_1 = \sum_{t=R^n}^{R^s-1} \frac{y(R^n) - w_t T}{(1+r)^{t-n}} + \sum_{t=R^s}^{L} \frac{y(R^n) - y(R^s)}{(1+r)^{t-n}} < 0, \tag{C.7}$$

which is negative since the present value of full retirement income increases with R, and the earlier the individual retires the less years she will receive wage income. The difference between X^n and X^s is implied by the fact that, for a given year, consumption expenditure if retired differs from the addition of consumption expenditure and the wage value of leisure if working. This difference can be expressed as

$$Q_2 = \sum_{t=R^n}^{R^s-1} \frac{D_t(\theta - 1)}{(1+\rho)^{t-n}} \leq 0, \tag{C.8}$$

which is also negative as long as $0 \leq \theta < 1$. This results shows that if leisure provides some utility, *i.e.* θ is not equal to one, in this model being retired is always cheaper than being employed. That is because during retirement leisure is free, while during working life it has a cost. Taking into account that $Y^n = Y^s + B_n + Q_1$ and $X^n = X^s + Q_2$, the forecast error can be written as

$$\nu_t = \frac{X^s}{X^s + Q_2} \frac{Y^s + B_n + Q_1}{Y^s}. \tag{C.9}$$

A negative Q_1 reduces ν_t, while a negative Q_2 increases ν_t. This two effects are thus offsetting each other. That is because on the one hand retiring earlier reduces lifetime income, but, on the other hand, it frees up resources since being retired is cheaper than being employed.If Q_1 is large enough relative to Q_2 such that it exactly offsets I_n, then $\ln \nu_t = \ln 1 = 0$. In that case the inheritance is spent completely on retiring earlier and there no consumption and leisure responses. If R is fixed then $Q_1 = Q_2 = 0$ and (A.9) becomes

$$\nu_t = \frac{I_n}{Y^s} + 1, \tag{C.10}$$

where substituting in the expression for Y^s delivers the same expression as in Equation (8).