WORKING PAPER NO. 277

Expected Bequests and Current Wealth of Older Households

Dimitris Christelis and Guglielmo Weber

March 2011

University of Naples Federico II

University of Salerno

Bocconi University, Milan

CSEF - Centre for Studies in Economics and Finance
DEPARTMENT OF ECONOMICS – UNIVERSITY OF NAPLES
80126 NAPLES - ITALY
Tel. and fax +39 081 675372 – e-mail: csef@unisa.it

CSEF
Centre for Studies in Economics and Finance

WORKING PAPER NO. 277

Expected Bequests and Current Wealth of Older Households

Dimitris Christelis* **and Guglielmo Weber****

Abstract

We use the subjective probabilities of bequests to be given in the future and current asset holdings, as reported in three household surveys (HRS, ELSA, and SHARE) covering thirteen countries, in order to assess whether, and to what extent, households plan to decumulate assets in old age. We model intended bequests as a function of household demographic and economic characteristics, and estimate their expected value using quasi-maximum likelihood methods. By comparing the current wealth holdings with the expected intended bequests we compute the pattern of future saving by households, and assess its cross-country variability with respect to housing wealth.

Acknowledgements: An earlier version of this paper was presented at the RTN conference on "The Economics of Ageing", Venice 6-8 October 2005. We are grateful to Jim Smith for drawing our attention to the topic of this paper, to Dimitris Georgarakos, Stefan Hochguertel, Michael Hurd, Tullio Jappelli, Enrico Rettore, Alessandra Salvan, and Joachim Winter for useful discussions, and Viola Angelini for her assistance with the data. We also thank seminar participants at the NBER Summer Institute, the 1st RAND Workshop on Comparative International Research based on the HRS, ELSA, and SHARE, the Netspar Pension Workshop in Utrecht, the conference on Subjective Probabilities and Expectations at Jackson Lake, Wyoming, the 12th International Conference on Computing in Economics and Finance, and at the universities of Cyprus and Piraeus. This paper uses data from the first wave of SHARE, collected in 2004-2005. The SHARE data collection has been primarily funded by the European Commission through the 5th framework programme (project QLK6-CT-2001-00360 in the thematic programme Quality of Life). Additional funding came from the US National Institute on Aging (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, Y1-AG-4553-01 and OGHA 04-064). Data collection in Austria (through the Austrian Science Fund, FWF), Belgium (through the Belgian Science Policy Office) and Switzerland (through BBW/OFES/UFES) was nationally funded. The SHARE data set is introduced in Börsch-Supan *et al*. (2005); methodological details are contained in Börsch-Supan and Jürges (2005). Christelis acknowledges the financial support provided by the European Community through the 6th Framework Programme projects RII-CT-2006-062193 [SHARE-I3] and CIT4-CT-2006-028812 [SHARE-LIFE], and the 7th Framework Programme projects No. 211909 [SHARE-PREP] and No. 227822 [SHARE-LEAP], and from Netspar. Weber acknowledges financial support from MIUR (PRIN 2005133231 and 2007AC54X5), and from Netspar.

* SHARE, CSEF and CFS

** University of Padua, CEPR and IFS. Corresponding address: Department of Economics "M. Fanno", University of Padua, Via del Santo, 33, 35121 Padova, Italy. Phone: +39 049 827-4271. Fax: +39 049 827-4211. E-mail: guglielmo.weber@unipd.it

Table of contents

1. Introduction

The life-cycle theory predicts that wealth should be fully annuitized to insure longevity risks. If annuity markets are incomplete and elderly individuals face other risks (notably, health risks), however, wealth holdings will include other financial and real assets. Even in this case, the life-cycle model under uncertainty does imply that non-annuitized wealth should be decumulated in old age. The extent to which this happens is an open issue (see Browning and Lusardi, 1996, for a survey of the literature).

In this paper we address this issue using micro-level data from the first wave of the Survey on Health, Aging and Retirement in Europe (SHARE), which was conducted in 2004-5 in eleven European countries and from the 2004 waves of the English Longitudinal Study of Aging (ELSA) and the US Health and Retirement Study (HRS). An interesting feature of these datasets is that we have records of wealth holdings (financial and real), as well as subjective probabilities of leaving bequests. As Hurd and Smith (2002) point out, this implies that we can estimate whether and to what extent households plan to decumulate assets in old age.

There are three questions in HRS, ELSA and SHARE that provide information on intended bequests: they record the probability that the respondent will leave any bequest, a bequest worth more than a first threshold value or a bequest above a second threshold value, higher than the first. We model the expected value of intended bequests as a function of observables, and ask to what extent respondents anticipate decumulating their wealth over the rest of their lives.

The first contribution of our paper is that we use these subjective probabilities as vehicles to calculate the amount of expected bequests given at the end of life as a

function of household demographics, current consumption and wealth, health status, cognition and social interaction indicators. As a result, we can link current wealth with a measure of wealth at the end of life while using a single cross-section. This circumvents the need to assume that the age-wealth profile over the lifetime is given by the cross-sectional profile, i.e., we don't need to assume the absence of cohort effects. The second contribution is that we perform this exercise for thirteen different countries and show how much bequests differ across them, after taking into account differences in inheritance laws across countries. The third contribution is methodological, as we show how one can estimate a multivariate model of fractional (i.e., bounded above and below) variables by using quasi-likelihood estimation methods that are robust to the misspecification of the densities of the dependent variables (in our case, the subjective bequest probabilities).

By comparing the current wealth holdings and the expected intended bequests we can compute the pattern of future saving and compare the results of the aforementioned saving calculations with the predictions of a standard life-cycle model.

The paper is organised as follows: Section 2 describes the key patterns in the expected bequests data and provides details on the estimation strategy. Section 3 presents the data. Section 4 discusses estimation results and presents country-specific wealth-age profiles. Section 5 concludes.

2. Expected bequests

All three survey questionnaires contain three questions on intended bequests: respondents are first asked what chance there is that they leave a bequest worth the first threshold value or more. If they answer zero, then they are asked the probability that

they will leave any bequest; if instead they answer a positive number they are asked the probability of leaving a bequest above the second threshold value. The two threshold values are 50,000 and 150,000 euro for SHARE countries (or the local currency equivalent for non-euro countries), 50,000 and 150,000 pounds for ELSA, and 10,000 and 100,000 dollars for the HRS[1].

The questions are quite clear that real estate and other valuables should be included in the calculation. In the case of couples, the question is asked to both respondents about the probability that "you or your spouse/partner" leave such a bequest. The issue of how to interpret replies in the case of couples is not easily solved. (Hurd and Smith, 2002, use similar questions in HRS, but the exact wording there is "you and your spouse/partner"). Fortunately, no such problem arises for singles.

Each individual then provides answers to two questions, and this allows us to assign a probability to each of the three intervals: (0 – 1st threshold), [1st threshold – 2nd threshold), [2nd threshold – infinity). In the event of an individual answering "zero" to the probability of leaving a bequest in the last two intervals, we are able to assign a probability to a zero-valued bequest equal to one minus the probability of leaving a bequest in the first interval. We shall distinguish between desired and actual expected bequests: desired expected bequests can be negative, whereas reported expected bequests cannot be. Hence, a non-zero probability of no bequests is interpreted as an identical probability of zero or negative desired bequests.

The frequency distribution of the cumulative (i.e., not interval) probabilities is shown in Table 1. We note that approximately 14% of SHARE respondents, 10% of HRS respondents and 8% of ELSA respondents do not intend to leave any bequest,

[1] The full text of the questions can be found in Appendix A.

while the corresponding percentages for leaving a bequest that is above the second threshold with probability equal to one are approximately 20%, 22% and 29%, respectively.

When designing our estimation strategy we must deal with the fact that the information we have consists of the three cumulative probabilities of leaving a bequest above zero, above the lower, and above the upper threshold. From these three cumulative probabilities we compute the probabilities of bequests falling in each of the three intervals, denoted by *p(1)*, *p(2)* and *p(3)*, respectively. From these three probabilities we can also compute as a residual the probability that the desired bequest is less or equal to zero: *p(0)*. Furthermore, for the purposes of estimation, we assume that when someone reports a positive probability *p(2)* of leaving a bequest above the first threshold, then *p(0)* is equal to zero, and $p(1) = 1 - p(2) - p(3)$. Since leaving absolutely nothing at death is unlikely, and passing on debt to heirs impossible, we consider this assumption to be not particularly strong.

Given that probabilities are constrained to lie between zero and one, we have to find a conditional expectation function for them that meets this requirement, and furthermore allows us to estimate the parameters governing the process of the desired expected bequest; these are ultimately our parameters of interest. To that effect, we make the assumption that a particular monotonic transformation of desired expected bequests is a linear function of a vector of observables X, with parameter vector β, and of a normally distributed, homoskedastic disturbance, i.e.,

$$\phi(y_i) = X_i\beta + u_i \qquad (1)$$

where $u_i \sim N(0,\sigma^2)$, and *i* indexes households. In order to approximate normality of the distribution we transform the data using the inverse hyperbolic sine (IHS) transform (see Burbidge *et al.*, 1988), that we specify as follows:

$$\varphi(y) = \ln(y + \sqrt{y^2 + 1}) \tag{2}$$

This function is symmetric around zero, and is equal to zero when the argument is zero.

Under these assumptions, we will express the conditional expectation of the three probabilities *p(1,i)*, *p(2,i)* and *p(3,i)* as a function of $X_i\beta$, i.e.,

$$E[p(j,i) \mid X_i] = G_j(X_i\beta) \quad j = 0,1,2,3 \tag{3}$$

The next step is to specify the form of the conditional expectation functions $G_j(X_i\beta)$. A natural choice would be to use the probabilities of the desired expected bequests being in a given interval as implied by (1), i.e.,

$$\begin{aligned}
G_0(\beta X_i) &= \Phi\left(\frac{0 - X_i\beta}{\sigma}\right) \\
G_1(\beta X_i) &= \Phi\left(\frac{a - X_i\beta}{\sigma}\right) - \Phi\left(\frac{0 - X_i\beta}{\sigma}\right) \\
G_2(\beta X_i) &= \Phi\left(\frac{b - X_i\beta}{\sigma}\right) - \Phi\left(\frac{a - X_i\beta}{\sigma}\right) \\
G_3(\beta X_i) &= 1 - \Phi\left(\frac{b - X_i\beta}{\sigma}\right)
\end{aligned} \tag{4}$$

where Φ denotes the cumulative standard normal distribution, and *a,b* the IHS transformation of the two thresholds.

As *p(0)* can be derived from the other three interval probabilities, we don't use it in our estimation. This does not mean, however, that households who report that there is a positive probability (possibly equal to one) that they will leave no bequests are excluded from the estimation, since the other three probabilities are defined for them as well. Therefore, we use the whole sample for the estimation and not a selected one. Furthermore, given that the conditional expectation of the bequest probabilities is specified using the desired bequests equation (1), which is an equation for a latent variable, we do not face any censoring problem.

Having specified the conditional expectation of the three interval probabilities we perform the estimation using the quasi-maximum likelihood estimation method introduced by Gourieroux *et al*. (1984). This method allows for the consistent estimation of the parameters of the three bequest expectation equations if the conditional expectation functions in (4) are correctly specified, and if the potentially misspecified density of the bequest probabilities belongs to the linear exponential family. This convenient feature of the quasi-maximum likelihood methods allows us to estimate expected bequests by using the fractional regression methods proposed by Papke and Wooldridge (1996). They use the Bernoulli density as the potentially misspecified density of the fractional variables, which correspond in our case to the bequest probabilities that lie in the [0,1] interval. In addition, given that we model three different fractional variables, we use the multivariate quasi maximum likelihood framework proposed by Cameron and Trivedi (2005, p. 150), i.e., our likelihood function is the product of the three potentially misspecified densities. We thus specify the quasi-log-likelihood function for household *i* as

$$\ln L_i(\beta) = p(1,i)\ln G_1(X_i\beta) + (1-p(1,i))\ln(1-G_1(X_i\beta)) + p(2,i)\ln G_2(X_i\beta) + (1-p(2,i))\ln(1-G_2(X_i\beta)) + p(3,i)\ln G_3(X_i\beta) + (1-p(3,i))\ln(1-G_3(X_i\beta)) \quad (5)$$

As Wooldridge (2001) and Cameron and Trivedi (2005) point out, this likelihood leads to consistent estimates because it is equal to the sum of the log likelihoods of the three equations, each of which has a derivative with respect to the parameters equal to zero, under the assumption that the formulation of the conditional expectations in (4) is correct. A zero derivative is a sufficient condition for consistency of the parameters (Cameron and Trivedi, 2005). It is important to note that the specification of the likelihood as the product of the three individual likelihoods is not meant to represent the joint density of the three random variables denoting the bequest expectations (and consequently it is not based on an assumption of independence across the three equations). Furthermore, as Wooldridge (2001) and Cameron and Trivedi (2005) point out, one does not need to specify the joint likelihood of the three random variables, given that consistency of the estimated parameters still obtains as long as the conditional expectations of the three dependent variables are correctly specified. In our case, this assumption is more likely to hold than in most models of fractional variables because both the dependent variables and their conditional expectations (as is clear from (4)) are probabilities, with the latter being derived naturally from the specification of desired bequests described in (1).

It is worth noting that while the conditional expectations $G_j(X_i\beta)$ bear a resemblance to an ordered probit, the likelihood function in (5) is not that of an ordered probit. First of all, there are three different dependent variables (the three bequest expectations) instead of a single one (there is also a fourth bequest probability, as noted

above, which is, however, fully determined by the other three, and thus not modelled independently). Second, the likelihood consists of Bernoulli distributions for fractional variables, as shown in (5). In addition, it is usually the case that in an ordered probit the latent index $X\beta$ has little economic content, whereas in our case it denotes the level of desired bequests. Finally, in a ordered probit one typically estimates only the ratio of the thresholds and coefficients to the standard deviation σ of the error process; in our case, given that we know the thresholds and estimate their ratio to σ (as is clear from (4)), we can identify σ, and thus we can also identify the coefficients β that determine the latent variable denoting desired expected bequests. This is crucial for our purposes because the level of expected bequests is the magnitude that we are ultimately interested in.

A consequence of using possibly misspecified densities for the three bequest probabilities is that we can make inferences for the conditional expectation but for no other features of the density. As a result, we choose to compute the standard errors of our estimates by bootstrap, using 500 replications.

Our regressors include quartiles of financial and real wealth, food consumption, self-assessed health status, number of limitations in activities of daily living (ADLs), having one and more than one child, having any grandchildren, education, employment status, cognition as measured by the score on an immediate recall question, homeownership, the expectation to receive a bequest in ten years, social activities like volunteering and provision of help to relatives and friends, occupational dummies and regional indicators. We perform separate estimations for each country, in order to allow for common cultural and institutional factors that might affect bequests. We also estimate separate models for couples and singles in any country.

In the case of couples, one needs to make a decision whether to use the two partners as separate observations in the regression, and consequently whether to compute the expected bequest separately for the two partners separately. This decision is quite difficult because the relevant question is ambiguous. Let us take a simple case, a married couple with children. The wife is asked the probability that she OR her husband will leave an inheritance worth a particular amount or more. Interpreting her reply is not easy. First of all, it is not clear whether the beneficiary includes her husband or not. The phrasing of the question may suggest not, so that she should consider solely the estate left to her children. Even in this simple case, she should reply keeping in mind two different scenarios, depending on who survives longer between her and her husband. Suppose she is confident to be the survivor. In that case, she should also need to make assumptions on how much financial wealth her husband will pass on to her, and how much real wealth she will receive. If the family home is passed on to her, and non-annuitized financial wealth is relatively small in comparison, she should then answer by giving the probability that she will eventually leave such inheritance. But if financial wealth is relatively large, or if legal restrictions force equal distribution of the estate between the surviving spouse and the children, then this probability may refer to the husband's bequest, or even be the sum of the wife's assessment of the two spouses' probabilities. A similar reply is also elicited from the husband, so the data contain two separate records of the subjective probabilities of the same event.

In our application, we shall assume that the relevant reply is the one given by the spouse with the higher life expectancy. This is consistent with the following interpretation: the two partners know their life expectancy, but have different attitudes to bequeathing wealth. Both partners answer on the basis of their preferences, on the

assumption that their partner will behave the same way as they would. Hence, in a case where the husband is likely to die first, his reply takes into account whatever he intends to leave to the children, and what he expects his wife to leave in the end. The wife provides an answer under the same scenario. Given that the first spouse to die typically leaves most of the estate to the surviving spouse (particularly for home-owners), the relevant reply is the wife's. The opposite happens in the (rarer) case where the husband is likely to survive the wife.

Our parametric approach differs markedly from the approach taken by Hurd and Smith (2002), who rely on much weaker distributional assumptions (they "shift to the left the actual wealth distribution until it matches the three probability points of the bequest distribution, while preserving the shape of the wealth distribution", p. 11), but must assume that all individuals in the same expected bequest bracket intend to dissave at the same rate as the individual who is closest to the lower limit within that bracket. We believe the gains from using conditioning variables should outweigh the costs of the distributional assumptions we have to make.

Once we estimate the parameters β,σ we need to calculate the expected value of the bequest. Conditional on being in one interval (of the possible four), the amount of the bequest is calculated as the sum of the predicted value of the linear index $X\beta$ plus an error drawn from a normal distribution with mean zero and variance σ in such a way as to make the sum lie within the bounds of the interval. To find the unconditional expected value one needs to integrate over the distribution of the intervals, which is known because we know their associated probabilities. This integration is done by simulation. We first divide the unit interval in four parts corresponding to the probabilities of each bequest interval, and then draw from a uniform distribution on the

unit interval. We then determine the bequest interval by examining in which of the four parts of the unit interval the uniform draw lies in, and then compute the bequest amount conditional on being in the given bequest interval as described above. We repeat this procedure 3,000 times and then calculate the average bequest over all draws, which amounts to integrating over the probability distribution of the intervals. This procedure is executed for all singles, and for the partner with the longest expected lifetime in couples.

After estimating expected bequests, E(B), we can compute a measure of expected decumulation, DW, as follows:

$$DW_i = W_i - PV(E(B_i)) \tag{6}$$

where PV denotes present value and W is current total wealth. The present value calculation requires selecting a discount rate (we use 3% as the relevant real rate, following Hurd and Smith, 2002) as well as the length of time over which to discount, which we take to be the expected years of life. We compute expected years of life using country, age and gender-specific survival tables.

The variables defined in equation (6) are based in the difference between current wealth and the present value of bequests: this difference would be zero if the individual plans to use all current wealth, suitably invested, to build up the reported expected bequest. For each household with positive wealth, we can compute an average annual saving rate *Sav1* that is of economic interest, as follows:

$$E(B_i) = W_i(1+Sav1_i)^{ETl_i} \Rightarrow Sav1_i = \left(\frac{E(B_i)}{W_i}\right)^{1/ETL_i} - 1 \qquad (7)$$

where *ETL* denotes the expected time to live. In other words, the saving rate defined implicitly in (7) is the rate that, compounded for the expected remaining life, reconciles net worth with expected bequests. Obviously, when there is asset decumulation this rate becomes negative. In contrast to equation (6) and the previous tables, expected bequests are not discounted. This is in line with standard practice, that defines saving as inclusive of the return on wealth. An alternative interpretation of this procedure is that households consider a zero real return on their investments.

While the aforementioned saving rate concept is time-invariant, one can also consider a concept of a saving rate that varies with age, which could arguably correspond better to the life-cycle theory (suffice it to say that the three youngest age groups contain non-negligible proportions of working individuals). For example, younger cohorts might still save for the next 5-10 years, and then dissave at a large rate, resulting in an overall negative compound saving rate. In order, however, to derive saving rates that change with age from cross-sectional data one needs to make assumptions about future behaviour. One could assume, for example, that the saving rate of a given cohort in the future is going to be the same as the saving rate of the cohort that has this age today. In other words, we have to assume that the saving rate (as opposed to wealth levels) does not exhibit any cohort effects. For example, we could assume that a member of the cohort aged 67-73 in Sweden will have the same saving rate (e.g. the median one) in 6 years that a cohort aged 74-80 has today. In order to make these future projections we would also need to assume that there are no time

effects in the saving rate, i.e., that the years 2004 (and 2005 for some countries) were not subject to any shocks that made the saving rates observed in those years untypical.

When we tried making these calculations, however, we sometimes ended up with highly implausible time paths for saving rates and wealth. This could be due to the assumption of the absence of cohort effects in saving rates, or to the assumption that all cohort members will have the same saving rate in the future, while exhibiting substantial heterogeneity in the present.

Up to this point we have not addressed the issue of what happens to household wealth when the first partner in a couple dies. One would expect that a substantial part of those assets remain with the surviving partner (this should be true especially for the main residence), but we would also like to account for the possibility that part of the wealth is transferred to descendants who live outside the household. These bequeathed assets represent a reduction in the household's net worth that is not due to dissaving; therefore, overlooking them would overestimate asset decumulation.

In order to estimate the wealth bequeathed to descendants when the first partner in a couple dies we need to examine the inheritance tax provisions in the countries represented in the three surveys. For example, in continental Europe inheritance law typically sets bounds on how the estate is split among heirs, following the provisions of Napoleon's "Code Civil". Table 3 shows for the countries in Continental Europe the share of bequeathed wealth in two cases: i) if the minimum levels are bequeathed; ii) if the deceased dies without a will.[2] In order to determine the amount bequeathed we assumed that the minimum allowable sums under the law are given to descendants. In

[2] We are grateful to Viola Angelini for providing us with this information.

the case of the US and the England there are no minima as far as we know, so we assume that half of the property belonging to the deceased is passed on to descendants.

Using those assumptions, and by denoting by *TD1* the time of death of the first partner and by k the share of household wealth bequeathed to descendants, one can define a new average saving rate, *Sav2*, that takes into account this wealth "leak", and thus reflects asset decumulation net of this "leak" (obviously *Sav2* will be equal to *Sav1* in the case of singles). We know that household wealth (denoted by W^{TD1}) at the death of the first partner, but before the inheritance is given to the descendants, is going to be equal to

$$W_i^{TD1_i} = (1+Sav2_i)^{TD1_i} \cdot W_i \tag{8}$$

We also know that expected bequests given at the time of death of the second partner are equal to

$$E(B)_i = (1+Sav2_i)^{ETL_i - TD1_i} \cdot (1-k) \cdot W_i^{TD1_i} \tag{9}$$

By combining (8) and (9) one can easily solve for *Sav2*:

$$\begin{aligned} &E(B)_i = (1+Sav2_i)^{ETL_i - TD1_i} \cdot (1-k) \cdot (1+Sav2_i)^{TD1_i} \cdot W_i \Leftrightarrow \\ &E(B)_i = (1+Sav2_i)^{ETL_i} \cdot (1-k) \cdot W_i \Leftrightarrow Sav2_i = \left(\frac{E(B)_i}{(1-k) \cdot W_i} \right)^{\frac{1}{ETL_i}} - 1 \end{aligned} \tag{10}$$

As is clear from (7) and (10), taking into account the bequest given at the death of the first partner to the descendants results in an increased saving rate, due to the subtraction of this wealth "leak" from asset decumulation.

The HRS, ELSA and SHARE provide information also on expected bequests received. In ELSA and SHARE households are asked first what is the probability that they will receive any inheritance in the next ten years, and, if applicable, what is the probability that they will receive an inheritance above a certain threshold (50,000 pounds for ELSA and 50,000 Euros for SHARE). In the HRS households are first asked whether they expect to receive any bequest, and if they answer affirmatively they are then asked the amount that they expect to receive. The distribution of the answers on the probabilities of receiving an inheritance in ELSA and SHARE can be seen in Table 2. The vast majority of respondents do not expect to receive any inheritance (76% for SHARE countries , 67% for ELSA while in the HRS 66% of respondents respond negatively to the question whether they expect to receive a bequest or not).

3. The data

We use data from eleven countries participating in the first wave of SHARE, namely Sweden, Denmark, Germany, the Netherlands, Belgium, France, Switzerland, Austria, Italy, Spain and Greece. SHARE is a new survey of individuals aged 50 and above, who are asked questions on a variety of issues, including physical and mental health, children, income, assets, expectations, social activities and financial transfers given and received (see Börsch-Supan *et al*. (2005) for an extended discussion of the survey). We also use data from the 2004 wave of the HRS (RAND public use files), and of the ELSA. The overall sample consists of 37,688 households (13,255 in HRS, 5,200

in ELSA and 19,233 in SHARE) where at least one individual is 50 or over, for a total of 59,267 eligible individuals.

We use information from the three aforementioned questions on expected bequests, as well as from questions on various asset holdings, on self-reported health, on food consumption, and on children. All three datasets contain imputed values, which we include in our analysis. We perform our own imputations for some variables for which imputations are not found in the public release of the data (more details can be found in Appendix B). Multiple imputations are available for SHARE, but not for HRS and ELSA; therefore, we use multiple imputation methods for SHARE countries as described in Rubin (1987).

We exclude from our calculations households that contain persons other than the head (and the partner in couples) aged fifty and above, as in this case there is no obvious way to determine how the household wealth will be divided for bequest purposes. Since we condition our analysis on demographics, the above exclusion should not bias our results, but care should be taken to keep in mind that our sample does not cover "untypical households" (siblings, widows living with unmarried children). We also exclude those who do not have or do not report any assets.

Table 4 presents country-levels descriptive statistics for a number of variables that we use in this paper, for the sample used in the estimation (i.e., in households with couples one partner is included). For the most part, these statistics are simple averages of indicator variables, but the last six lines present median household net worth, net financial assets, real assets, yearly food consumption, and the number of observations (divided in couples and singles).

We note that the U.S. and Switzerland have the younger sample, while Italy, Spain and England the oldest. Sweden, Denmark, and Belgium have the largest proportion of households with at least one grandchild. The highest proportion of retired persons (above 50%) can be found in Austria, Sweden, Denmark, and England, while the lowest in Spain and the Netherlands. In the US, Sweden, and Switzerland we find the highest proportion of employed while in Austria, Italy, Spain and Greece the lowest. The countries with the highest proportion of individuals who have finished post-secondary education are Denmark, Belgium, and Germany, while Switzerland, Spain, Italy and England have on average less than 10% of such respondents. There is remarkable variety in the self-reporting of health, with Sweden having the lowest prevalence of bad health (14% for the respondent and for her/his partner) while Italy and Spain have the highest with roughly 43% for the respondent and his/her partner. Roughly 55% of households in the Sweden report providing help to relatives and friends, while 30% or fewer do so in Greece, Spain, and England. The US and the Netherlands have a high proportion of households engaging in volunteering (roughly 35%) while Greece and Spain have the lowest with less than 10%. The U.S. has the highest score on the recall test with an average of 5.7, while Italy and Spain the lowest with 2.6 and 2.3, respectively. The median household reports a zero probability of receiving a bequest in the next ten years but the average probability differs substantially across countries, with Sweden, Denmark, Belgium, and Switzerland at roughly 20% while Austria and Italy have a mean lower than 10%. Median net worth is highest in England, and then Belgium and Switzerland with values of approximately 250 thousand and 200 thousand dollars (adjusted for differences in purchasing power parity),

respectively, while the countries with the lowest net worth are Sweden and Germany with 90 thousand and 93 thousand dollars respectively.[3]

4. Estimation Results

For each country, we use quasi-maximum likelihood estimation for interval probabilities, under the assumption that expected bequests depend on the covariates already described is Section 2.1. Separate equations were estimated for singles and for the partner with the higher expected time to live within couples. For the latter case, we also add as covariates for expected bequests the self-reported health, and the number of ADLs of the partner.

Table 5a reports estimated coefficients for couples in four particular countries, the US, Sweden, Denmark, and Germany. We see from Table 5 that the most important associations relate to real wealth: expected bequests are higher for all couples that are in the third or fourth real wealth quartile. Financial wealth plays a role in the US, Sweden and Denmark, whereas food at home consumption (introduced as a proxy for living standards) is important in the US and in Germany. The number of children and grandchildren do not have an impact in general (with the exception of Germany), while other characteristics of the person likely to survive longer and their partner have a significant coefficient only in some cases. Bad health is associated with lower expected bequests in the US and Germany (less strongly), while bad health of the partner does not have an effect in any country. Recall ability (an indicator of cognitive capacities) has a positive effect in the US; engagement in voluntary activities on the other hand is not significant. A strong, positive association for the non-zero expectation of receiving

[3] The two main reasons why net worth of US households appears somewhat low are: i) the substantial depreciation of the dollar relative to the euro that was already in effect in 2004; ii) the relatively high price level in the US compared to most of the other countries.

bequests is found for couples in the US and Sweden (as is also the case in Belgium, France and England), but not in other countries, while for singles the association is in general not significant.

Tables 5b and 5c show similar results for the remaining nine countries. We see that real wealth and home ownership play a major role in most countries. Financial wealth, instead, plays a role only for the rich (i.e., for those in highest quartile, while only occasionally for those in the second highest quartile) – and no role in Switzerland, Austria, Italy and Spain. Recall matters in Austria, Spain, and England, while no significant associations are found for the number of children and grandchildren (with the exception of France, Greece, and England), and for employment status. Finally, higher education matters in Belgium, Italy and Greece.

The estimation results for singles (available upon request) are similar to those of couples, with the strongest associations being again those with real wealth.

On the basis of the regressions for expected bequests given, we predict expected bequests for each household in the estimation sample. Table 6 presents median expected bequests of couples (panel A), single males (panel B) and single females (panel C) by country.[4] We notice that there is considerable heterogeneity across countries in our predictions, which suggests that our estimation procedure does not introduce artificial uniformity in our predictions.

Of course some account should be taken of differences in life-expectancy. Median expected bequests should be expressed in present value terms, taking into account the expected length of life (the largest between the two partners in the case of

[4] For this calculation and for all the ones that follow we exclude households with very low net worth (less than 100 dollars), because they are likely to behave very differently than the rest and because ratios to net worth that are going to be used below are not defined or do not make sense when net worth is zero or negative.

couples). As already discussed, we apply a 3% real discount rate. At least for couples, shown in Table 7, we see that in many countries expected bequests increase with age. This should not be interpreted as evidence that age has a positive effect on bequests: households where both partners are alive at a relatively advanced age are typically richer, and their bequests reflect this. A similar argument can be made for singles as well, even though in this case there are two effects at work (richer women survive more than poorer women, and become single later). In all cases, cohort effects are also present, and work in the opposite direction (older individuals belong to poorer cohorts). Finally, given that older households have a shorter expected time to live, they also have fewer years to draw down their assets.

If we want to start interpreting our results on expected bequests in an economically interesting way, we must compare them with some indicator of wealth. We choose the simplest possible indicator, net worth, which is equal to the sum of net financial and real assets. A more comprehensive measure of wealth would include human capital (defined as the present value of future earnings and pension income), but human capital cannot be bequeathed.

In Table 8 we compute the median difference by country and age group between household net worth and the present value of expected bequests. This difference shows the total expected asset decumulation of the household during its remaining life. We notice that for younger age groups in the Netherlands, Belgium, France, Switzerland and England there exists substantial expected decumulation of wealth, whereas households in Sweden, Denmark and Germany expect to draw down their wealth much less.

This calculation, however, does not show how important the amounts of bequests are compared to the households' financial position. Hence, in Table 9 we report the median and 75th percentiles of the ratio of the present value of bequests to total wealth (financial plus real). We do this by country and age group. We note that in most countries there are less than 100 observations in the last age group (aged 81 or more), and thus we omit the results from this group. In the table, ratios in excess of unity imply that present value of expected intended bequests exceeds current wealth, indicating an intention to save in old age. Whether this intention reflects (a change in) preferences towards bequests or poor health is an open issue. Börsch-Supan and Stahl (1991) were the first to address this issue by looking at German data and pointing out that elderly people may find it hard to consume their annuity income because of poor health – the SHARE data, however, highlight Germany as one of those countries where some dissaving is present.

The last column of Table 9 reports the median and 75th percentile of the ratio of real net worth to total net worth. In all countries the median ratio exceeds .5, and in all but in the US, Sweden, Denmark, Germany, the Netherlands and Switzerland, the 75th percentile is greater or equal to .95, confirming the key role played by housing wealth in households total wealth (the elderly are often house rich but cash poor). When housing wealth is dominant, and equity withdrawal is difficult, we may expect bequests to be a large fraction of current wealth. Indeed, in those countries (the US, Germany, the Netherlands and Switzerland) where the median ratio is relatively low, expected bequests of individuals past retirement age are also low at the median. Relatively low bequests, however, are also found in France, where real wealth has a dominant role,

whilst relatively high expected bequests are reported in Sweden and Denmark (especially for older cohorts), where housing wealth is relatively less important.

In Table 10 we report the medians of two annual saving rates for couples, namely the average saving rate gross of bequests given to descendants at the death of the first partner partner (*Sav1*, or unadjusted saving rate) and the one net of those bequests (*Sav2*, or adjusted saving rate). We report these rates for those aged 60 and above, since in earlier ages households are more likely to still accumulate wealth; therefore, calculating an average saving rate over their remaining lifetime makes little sense. One notices that saving rates gross of bequests given to descendants are always negative. Relatively high dissaving rates (5% or more) are found in the 74-80 age class in the US, Netherlands, France, and Switzerland, and, to a lesser extent (2%-5%), in Denmark, Belgium, Austria, Greece and Italy. The lowest dissaving is found in England (1%). Taking into account the bequests given to descendants makes a substantial difference for all countries (except for Sweden), close to 1.5% on average.

Table 10 also shows the average annual saving rate for singles, i.e., *Sav1* (*Sav2* is equal to *Sav1* in the case of singles). We observe very high dissaving for those aged 74-80 (10% or more) for Germany, the Netherlands, Austria, Italy and Spain, while lower dissaving occurs again in Belgium and England. The lowest dissaving occurs in Denmark.

Another key issue that may explain difference in saving behaviour is the role played by inter-vivos transfers. So far, we have treated future transfers to children or grandchildren (or even parents) as consumption, and ignored future receipts of financial transfers from children, friends and relatives. As a result, our projected wealth decumulation patterns may be overestimated in some households due to financial

transfers given, at least in those countries where the amounts are relatively large. An interesting topic for future research is to relate the relative role played by bequests and inter-vivos transfers to tax and inheritance legislation.

5. Conclusions

In this paper we have documented to what extent households in the US and twelve European countries plan to use their wealth to sustain their consumption in old age, and to what extent they use it to leave bequests to their children.

Our approach permits us to calculate the amount households plan to bequeath by exploiting the information given by questions on the probability of leaving bequests over certain values. We can thus calculate the expected wealth decumulation over the life-cycle using a cross-sectional survey, as we can compute a measure of the stock of wealth at the end of life, and compare it with the current one. This calculation is achieved through the use of quasi-maximum likelihood methods in order to estimate a multivariate model of fractional variables. In addition, the knowledge of the thresholds of the amounts of expected bequests allows us to identify the level of expected bequests.

Our results indicate that real wealth plays a major role in determining expected bequests, particularly in those countries where (second) mortgage markets are poorly developed. On the other hand, financial wealth plays a role mostly for the rich (highest quartile), and is typically less strong than real wealth. Most households plan to consume a non-negligible fraction of their wealth in all countries. However, past a certain age a fourth of all European respondents expect to bequeath more than half to nearly all of their wealth. We also find that, when examining saving behaviour, it is important to

account for bequests given to descendants when the first partner in a couple passes away.

An issue that we leave for future research is whether bequeathing patterns are determined by family traditions (as argued in Cox and Stark, 2005). We have seen that the expectation to receive a bequest has, in a number of countries, a positive effect on the expected value of bequests left to one's heirs. Hence, an interesting question to address is whether the amount of total wealth received over the course of the life cycle has a similar effect, and whether it makes a difference whether such receipts were in terms of real or financial wealth.

References

Börsch-Supan A, Brugiavini A, Jürges H, Mackenbach J, Siegriest J, Weber G. 2005. *Health, Aging and Retirement in Europe: first results from the Survey of Health, Aging and Retirement in Europe*. Mannheim Research Institute for the Economics of Aging: Mannheim.

Börsch-Supan A, Jürges H. 2005. *Health, Aging and Retirement in Europe – Methodology*. Mannheim Research Institute for the Economics of Aging: Mannheim.

Börsch-Supan A, Stahl K. 1991. Life Cycle Savings and Consumption Constraints. *Journal of Population Economics* **4**: 233-255.

Browning M, Lusardi A. 1996. Household Saving: Micro Theories and Micro Facts. *Journal of Economic Literature* **34**: 1797-1855.

Burbidge JB., Magee L, Robb A. 1988. Alternative Transformations to Handle Extreme Values of the Dependent Variable. *Journal of the American Statistical Association* **83**: 123-127.

Cameron, CA, Trivedi PK. 2005. *Microeconometrics: Methods and Applications*. Cambridge University Press: Cambridge.

Christelis D. 2011. Imputation of Missing Data in Waves 1 and 2 of SHARE. CSEF Working Paper, University of Naples Federico II.

Cox D, Stark O. 2005. Bequests, Inheritances and Family Traditions. CRR WP 2005-09, Boston.

Gouriéroux C, Monfort A, Trognon A. 1984. Pseudo Maximum Likelihood Methods: Theory. *Econometrica* **52**: 681-700.

Hurd M, Smith JP. 2002. Expected Bequests and Their Distribution. NBER Working Paper 9142.

Kennickell A. 1991. Imputation of the 1989 Survey of Consumer Finances: Stochastic Relaxation and Multiple Imputation. Proceedings of the Section on Survey Research Methods, American Statistical Association.

Papke LE, Wooldridge JM. 1996. Econometric Methods for Fractional Response Variables with an Application to 401(K) Plan Participation Rates. *Journal of Applied Econometrics* **11**: 619-632.

Rubin DB. 1987. *Multiple Imputation for Nonresponse in Surveys.* John Wiley and Sons: New York.

St.Clair P, Blake D, Bugliari D, Chien S, Hayden O, Hurd M, Ilchuk S, Kung F, Miu A, Panis C, Pantoja P, Rastegar A, Rohwedder S, Roth E, Carroll J,

Zissimopoulos J. 2008. RAND HRS Data Documentation, Version H. Mimeo, RAND Center for the Study of Aging.

Wooldridge JM. 2001. *Econometric Analysis of Cross Section and Panel Data*. MIT Press: Cambridge.

Appendix A. Questions on expected bequests

A.1. HRS

In the RAND HRS files the following three questions on inheritances are found:

1. Including property and other valuables that you might own, what are the chances that you [and your (husband/wife/partner)] will leave an inheritance totalling $10,000 or more?
2. What are the chances that you (and your (husband/wife/partner)) will leave an inheritance totalling $150,000 or more?
3. What are the chances that you (and your (husband/wife/partner)) will leave any inheritance?

In the original HRS there appears also a question, asked after (2), that reads:

2a. What are the chances that you (and your (husband/wife/partner)) will leave an inheritance totalling $500,000 or more?

First the respondent is asked (1), then if he gives a positive answer (2), and if she answers positively (2) she is asked (2a). If she answers zero to (1) then she is asked (3)

A.2. ELSA

In ELSA the three questions are essentially identical to the ones in the HRS with the exception of the amounts:

1. Including property and other valuables that you (and your husband/wife/partner) might own, what are the chances that you (and your husband/wife/partner) will leave an inheritance totalling £50,000 or more?
2. What are the chances that you and your husband/wife/partner will leave an inheritance totalling £150,000 or more?

3. What are the chances that you and your husband/wife/partner will leave any inheritance?

As in the HRS, first the respondent is asked (1), then if she answers positively she's asked (2), otherwise she's asked (3).

A.3. SHARE

In SHARE the same three questions as in HRS and SHARE are again asked. For countries that do not use the euro (Denmark and Sweden), the thresholds are set to similar, round figures in the local currency.

The questions that refer to the probability of leaving an inheritance are as follows:

1. Including property and other valuables, what are the chances that you or your husband/wife/partner will leave an inheritance totalling 50,000 euro or more?
2. Including property and other valuables, what are the chances that you or your husband/wife/partner will leave any inheritance?
3. Including property and other valuables, what are the chances that you or your husband/wife/partner will leave an inheritance totalling 150,000 euro or more?

If the respondent gives a zero answer to (1) she is then asked (2), while only if she gives a positive value as an answer to (1) is she asked (3).

Appendix B. The use of imputed data

In the public release of the SHARE data one can find imputations of missing values for assets, income, education, self-reported health, and food consumption. These imputations are performed by using a multivariate sequential approach that aims to preserve the correlation structure in the original data (a description of the SHARE imputations can be found in Christelis, 2011). The SHARE imputation procedure is

analogous to the one implemented in the US Survey of Consumer Finances (Kennickell, 1991). Five imputed values are created for each missing one, and hence we adjust our estimation procedures for multiple imputation.

There no imputations in the official release of the SHARE data for the variables denoting probabilities of bequests given and received, recall, and social activities. We impute the missing values of these variables by regressing them on the demographic and economic variables that have been part of the main SHARE imputation process. We generate five imputed values for each missing observation, in order match the five implicate datasets in SHARE.

For the HRS, we use the datasets created by the RAND Center for the Study of Aging, in which single imputation is performed using methods described in St. Clair *et al.* (2008). These imputations involve mainly the income and wealth variables. In order to perform imputation of the missing values of the remaining variables in our model we again regress each variable to be imputed on several demographic and economic variables found in the RAND data.

For ELSA, we use the imputations of the financial variables that can be found in the publicly available data.

Table 1. Distribution of Replies – Expected Bequests Given

Case	SHARE	HRS	ELSA
p1=1 & p2=1 & 0<p3<1	0.057	0.117	0.123
p1=1 & p2=1 & p3=0	0.064	0.053	0.049
p1=1 & 0<p2<1 & p3=0	0.143	0.149	0.087
p1=1 & 0<p2<1 & 0<p3<1 & p2>p3	0.108	0.214	0.140
p1=1 & 0<p2<1 & 0<p3<1 & p2=p3	0.080	0.092	0.127
p1=1 & p2=1 & p3=1	0.195	0.222	0.286
0<p1<1 & p2=0 & p3=0	0.148	0.046	0.084
p1=1 & p2=0 & p3=0	0.073	0.009	0.029
p1=0 & p2=0 & p3=0	0.133	0.096	0.077

Notes: Numbers represent the prevalence of each case.
P1: probability of leaving a positive bequest
P2: probability of leaving a bequest above the first threshold value
P3: probability of leaving above the second threshold value

Table 2. Distribution of Replies – Expected Inheritance Received

Case	SHARE	ELSA
p1=1 & p2=1	0.016	0.033
p1=1 & 0<p2<1	0.006	0.006
0<p1<1 & 0<p2<1	0.101	0.212
0<p1<1 & p2=0	0.105	0.071
p1=1 & p2=0	0.014	0.006
p1=0 & p2=0	0.757	0.672

Notes: Numbers represent the prevalence of each case.
P1: probability of receiving a positive inheritance
P2: probability of receiving an inheritance above the first threshold value

Table 3. Inheritance law provisions for amount bequeathed to the surviving spouse and descendants

Countries	Legal base	Beneficiaries	Statutory reserve	Intestacy
Austria	Allgemeines Bürgerliches Gesetzbuch	children	1/2 of the share under intestacy	2/3 if there is a surviving spouse 1 otherwise.
		spouse	1/2 of the share under intestacy	1/3 if there are descendants, 2/3 otherwise (the other third goes to the ascendants).
Belgium	Code Civil	descendants	1/2 if one, 2/3 if two, 3/4 if three or more	Nude property of the estate.
		spouse	Usufruct in 1/2 of the property of the estate, which might be over the children's reserved share. Note that under some conditions the surviving spouse may be disinherited.	Usufruct of the property of the estate.
Denmark	Arveloven	descendants	1/2 of the share under intestacy	2/3 if there is a surviving spouse 1 otherwise.
		spouse	1/2 of the share under intestacy	1/3 if there are descendants, 1 otherwise.
France	Code Civil	descendants	1/2 if one, 2/3 if two, 3/4 if three or more.	Either 3/4 of the property or nude property of the whole estate
		spouse	Only if there are neither descendants nor ascendants: 1/4.	If there are descendants: either 1/4 of the property or usufruct of the whole estate. If there are no descendants but only ascendants: 1/2 of the property.
Germany	Bürgerliches Gesetzbuch	descendants	1/2 of the share under intestacy (*Pflichtteil*). This is not a share of the estate but a monetary compensation in lieu of inheritance.	3/4 (under separate and community property) or 1/2 (under *zugewinngemeinschaft*)
		spouse	1/2 of the share under intestacy (*Pflichtteil*). This is not a share of the estate but a money compensation in lieu of inheritance.	Under separate and community property: 1/4 if there are relatives in the first *erbklassen* or order (descendants), 1/2 if there are only relatives in the second order (parents, siblings and their descendants), 1 otherwise. Under *zugewinngemeinschaft*: 1/2, 3/4 and 1 respectively.
Greece	Αστικος Κωδικας	descendants	1/2 of the share under intestacy	3/4 if there is a spouse, 1 otherwise
		spouse	1/4 if there are descendants, 1/2 if there are no descendants but only the parents.	1/4 if there are descendants, 1/2 if there are no descendants but only the parents, 1 otherwise.

continues

Table 3. Inheritance law provisions for amount bequeathed to the surviving spouse and descendants-continued

Countries	Legal base	Beneficiaries	Statutory reserve	Intestacy
Italy	Codice Civile	descendants	with spouse: 1/3 if one, 1/2 if more than one	with spouse: 1/2 if one, 2/3 if more than one
			with no spouse: 1/2 if one, 2/3 if more than one	with no spouse: 1
		spouse	1/2 if there are no descendants, 1/3 if there is one child, 1/4 if more than one	1/2 if there is one descendant, 1/3 if more than one. If there are no descendants but only ascendants or siblings, the spouse obtains 2/3.
Netherlands	Burgerlijk Wetboek, Boek 4	descendants	The spouse receives the whole estate and the children receive their share in the form of a non-payable claim (1/2 of the property of the estate)	The surviving spouse is in the same position as the children and they take equal shares.
Spain	Código Civil	descendants	2/3	The children inherit the whole estate but the surviving spouse obtains the usufruct of 1/3 of the property.
		spouse	Usufruct of 1/3 of the property of the estate if there are descendants, 1/2 if there are no descendants but only ascendants, 2/3 if there are only other relatives.	Usufruct in 1/3 of the property of the estate if there are descendants, 1/2 if there are no descendants but only ascendants, 2/3 if there are only other relatives.
Sweden	Ärvdabalk (1958:637)	descendants	1/2 of the share under intestacy. Note that the surviving spouse is not entitled to a forced share.	The surviving spouse obtains all assets. At the death of the surviving spouse, children obtain half of the property. If there is no surviving spouse, the whole estate goes to the descendants.
Switzerland	Schweizerisches Zivilgesetzbuch	descendants	3/4 of the share under intestacy (1 with no spouse, 1/2 otherwise)	1/2 if there is a spouse, 1 otherwise
		spouse	1/2 of the share under intestacy (1/2 if there are descendants, 3/4 if there are no descendants)	1/2 if there are descendants, 3/4 if there are no descendants but

Table 4 – Descriptive statistics – estimation sample

Variable	USA	Sweden	Denmark	Germany	Netherlands	Belgium	France
Aged 60 and less	0.47	0.37	0.41	0.34	0.41	0.35	0.37
Aged 61-75	0.33	0.35	0.36	0.44	0.37	0.41	0.38
Aged 75 and above	0.19	0.27	0.23	0.21	0.22	0.24	0.26
At least one child	0.89	0.89	0.88	0.82	0.87	0.88	0.89
At least one grandchild	0.70	0.71	0.72	0.65	0.64	0.71	0.67
Retired	0.40	0.54	0.52	0.50	0.28	0.44	0.49
Self-employed	0.06	0.03	0.01	0.02	0.02	0.02	0.02
Dependent worker	0.37	0.36	0.36	0.26	0.25	0.19	0.26
Homeowner	0.77	0.69	0.69	0.51	0.55	0.80	0.72
High school graduate	0.61	0.26	0.38	0.53	0.20	0.24	0.26
Post-secondary degree	0.20	0.20	0.33	0.21	0.16	0.22	0.17
Self-reported fair of bad health	0.27	0.14	0.26	0.40	0.28	0.28	0.35
Partner self-reported fair of bad health	0.24	0.14	0.25	0.53	0.30	0.28	0.36
Number of ADL's	0.29	0.22	0.19	0.18	0.20	0.23	0.19
Partner number of ADL's	0.22	0.26	0.21	0.78	0.77	0.34	0.35
Provides help to relatives and friends	0.52	0.55	0.48	0.33	0.44	0.48	0.49
Engages in some voluntary activity	0.34	0.28	0.26	0.18	0.35	0.26	0.25
Recall score	5.63	3.81	4.18	3.61	3.72	3.22	3.09
Probability to receive a bequest	0.17	0.21	0.19	0.12	0.15	0.19	0.15
Net Worth (Median, ppp-adjusted dollars)	162,943	89,635	101,247	93,383	139,133	199,631	183,551
Net Financial Assets (Median, ppp-adjusted dollars)	30,000	15,348	13,009	14,680	15,178	15,496	8,376
Real Assets (Median, ppp-adjusted dollars)	135,000	81,858	113,466	64,998	153,806	159,963	164,491
Food Consumption (Yearly median, ppp-adjusted dollars)	3,640	3,066	3,403	4,198	3,764	4,933	4,966
Number of couples	6,484	1,861	1,108	1,736	1,754	2,310	1,968
Number of singles	6,771	678	524	590	530	883	860

continues

Table 4 – Descriptive statistics – estimation sample – continued

Variable	Switzerland	Austria	Italy	Spain	Greece	England
Aged 60 and less	0.41	0.35	0.33	0.33	0.31	0.31
Aged 61-75	0.40	0.43	0.45	0.43	0.47	0.43
Aged 75 and above	0.19	0.22	0.22	0.24	0.21	0.26
At least one child	0.86	0.83	0.86	0.87	0.88	0.82
At least one grandchild	0.53	0.69	0.59	0.67	0.57	0.69
Retired	0.42	0.60	0.47	0.27	0.37	0.56
Self-employed	0.05	0.03	0.05	0.03	0.02	0.03
Dependent worker	0.34	0.16	0.14	0.17	0.19	0.20
Homeowner	0.55	0.56	0.75	0.88	0.84	0.74
High school graduate	0.37	0.46	0.19	0.07	0.23	0.17
Post-secondary degree	0.07	0.19	0.06	0.08	0.10	0.08
Self-reported fair of bad health	0.16	0.29	0.43	0.44	0.32	0.31
Partner self-reported fair of bad health	0.21	0.33	0.44	0.42	0.26	0.27
Number of ADL's	0.10	0.16	0.23	0.25	0.19	1.25
Partner number of ADL's	0.45	0.79	0.46	0.46	0.20	0.91
Provides help to relatives and friends	0.36	0.40	0.48	0.21	0.27	0.14
Engages in some voluntary activity	0.25	0.14	0.24	0.08	0.06	0.13
Recall score	4.14	3.48	2.57	2.26	3.19	5.50
Probability to receive a bequest	0.20	0.08	0.09	0.11	0.10	0.14
Net Worth (Median, ppp-adjusted dollars)	193,083	108,105	149,616	146,800	114,773	247,087
Net Financial Assets (Median, ppp-adjusted dollars)	38,580	4,860	3,375	2,278	2,482	18,088
Real Assets (Median, ppp-adjusted dollars)	192,095	88,557	146,241	145,427	110,988	217,523
Food Consumption (Yearly median, ppp-adjusted dollars)	4,892	3,888	5,400	5,857	4,467	3,585
Number of couples	616	1,226	1,463	1,381	1,828	2,716
Number of singles	281	686	457	494	846	2,484

Note: All numbers represent weighted means, unless otherwise indicated.

Table 5a – Estimation results for couples in the US, Sweden, Denmark, and Germany

Variable	USA			SWEDEN			DENMARK			GERMANY		
	coeff	std. err		coeff	std. err		coeff	std. err		coeff	std. err	
Age 61-75	0.080	0.073		-0.088	0.074		0.070	0.114		0.185	0.117	
Age 75+	0.157	0.111		0.086	0.103		0.080	0.184		0.245	0.176	
Female	-0.342	0.104	***	0.017	0.070		-0.042	0.148		-0.060	0.123	
Has one child	0.254	0.172		-0.051	0.151		0.242	0.249		0.047	0.159	
Has two or more children	-0.139	0.147		-0.175	0.146		-0.034	0.223		0.022	0.156	
Has grandchildren	-0.043	0.082		-0.010	0.072		0.101	0.111		0.218	0.101	**
2nd quartile of food consumption	0.178	0.098	*	-0.181	0.135		0.012	0.247		0.336	0.162	**
3d quartile of food consumption	0.254	0.098	***	-0.118	0.127		-0.039	0.248		0.212	0.159	
4thd quartile of food consumption	0.394	0.091	***	-0.084	0.127		-0.102	0.240		0.399	0.158	**
2nd quartile of net financial assets	0.286	0.082	***	0.085	0.086		0.054	0.139		0.079	0.128	
3d quartile of net financial assets	0.874	0.090	***	0.169	0.085	*	0.229	0.150		0.117	0.163	
4thd quartile of net financial assets	1.631	0.108	***	0.499	0.081	***	0.547	0.126	***	0.059	0.138	
2nd quartile of real assets	0.235	0.129	*	0.254	0.133	*	0.173	0.249		-0.085	0.154	
3d quartile of real assets	1.219	0.139	***	0.873	0.141	***	0.735	0.269	***	0.626	0.267	**
4thd quartile of real assets	2.079	0.149	***	1.501	0.159	***	1.151	0.280	***	1.336	0.293	***
Retired	-0.085	0.079		0.185	0.107	*	-0.103	0.156		-0.124	0.120	
Self-employed	0.100	0.132		0.114	0.203		-0.564	0.430		0.163	0.362	
Dependent worker	-0.272	0.085	***	-0.042	0.104		-0.464	0.148	***	0.138	0.117	
Homeowner	0.154	0.135		0.094	0.110		0.320	0.198		0.652	0.220	***
High school graduate	0.086	0.081		0.127	0.063	**	0.051	0.113		0.016	0.109	
Post-secondary degree	0.489	0.117	***	0.242	0.071	***	0.160	0.129		0.111	0.141	
Self-reported fair of bad health	-0.280	0.075	***	-0.058	0.089		-0.070	0.115		-0.184	0.098	*
Partner self-reported fair of bad health	-0.032	0.070		-0.092	0.119		-0.199	0.105	*	-0.115	0.105	
Number of ADL's	-0.155	0.045	***	-0.089	0.050	*	-0.012	0.117		-0.069	0.109	
Partner number of ADL's	-0.013	0.034		-0.038	0.041		0.077	0.071		0.009	0.055	
Recall score	0.063	0.021	***	0.009	0.015		0.017	0.024		0.023	0.025	
Provides help to relatives and friends	-0.090	0.060		0.035	0.060		-0.043	0.115		0.077	0.111	
Engages in some voluntary activity	0.042	0.064		0.027	0.062		0.055	0.103		0.215	0.117	*
Probability to receive a bequest	0.588	0.100	***	0.192	0.075	**	0.211	0.128	*	0.227	0.153	
σ	2.608	0.037	***	1.018	0.032	***	1.066	0.053	***	1.523	0.067	***
No. of observations	6,484			1,455			646			1,377		

Table 5b – Estimation results for couples in the Netherlands, Belgium, France, and Switzerland

Variable	NETHERLANDS		BELGIUM		FRANCE		SWITZERLAND	
	coeff	std. err	coeff	std. err	coeff	std. err	coeff	std. err
Age 61-75	1.126	0.632 *	0.159	0.137	-0.086	0.134	-0.028	0.217
Age 75+	2.685	1.123 **	0.313	0.177 *	-0.335	0.196 *	-0.307	0.350
Female	0.501	0.882	-0.142	0.155	0.200	0.179	0.243	0.280
Has one child	1.120	1.177	0.184	0.213	0.475	0.246 *	-0.539	0.347
Has two or more children	0.896	1.002	0.080	0.203	0.470	0.234 **	-0.280	0.299
Has grandchildren	-0.165	0.609	0.092	0.130	-0.060	0.118	0.267	0.210
2nd quartile of food consumption	-0.483	1.259	0.005	0.196	0.196	0.197	0.382	0.395
3d quartile of food consumption	0.120	1.167	0.075	0.164	0.278	0.162 *	0.084	0.441
4thd quartile of food consumption	0.115	1.150	0.029	0.155	0.334	0.180 *	0.394	0.408
2nd quartile of net financial assets	1.850	1.168	0.171	0.152	0.123	0.134	-0.055	0.299
3d quartile of net financial assets	3.095	1.024 ***	0.377	0.153 **	0.258	0.142 *	-0.264	0.332
4thd quartile of net financial assets	4.620	1.077 ***	0.631	0.169 ***	0.484	0.159 ***	0.063	0.295
2nd quartile of real assets	3.238	1.166 ***	0.466	0.228 **	0.020	0.245	0.171	0.250
3d quartile of real assets	6.530	1.622 ***	1.379	0.244 ***	0.620	0.274 **	0.858	0.399 **
4thd quartile of real assets	9.580	1.698 ***	1.667	0.254 ***	0.751	0.283 ***	1.556	0.422 ***
Retired	-1.024	0.761	0.061	0.127	0.241	0.133 *	0.363	0.294
Self-employed	-0.432	1.435	-0.051	0.379	0.373	0.464	-0.254	0.379
Dependent worker	-0.370	0.620	-0.044	0.143	-0.225	0.134 *	0.007	0.233
Homeowner	10.442	1.157 ***	0.342	0.226	0.464	0.223 **	0.316	0.323
High school graduate	-0.156	0.622	0.055	0.119	0.147	0.118	0.357	0.184 *
Post-secondary degree	-0.904	0.733	0.353	0.143 **	0.244	0.159	0.472	0.346
Self-reported fair of bad health	-0.755	0.607	-0.029	0.128	-0.116	0.114	-0.077	0.256
Partner self-reported fair of bad health	0.878	0.637	-0.021	0.130	-0.174	0.125	-0.302	0.322
Number of ADL's	0.067	0.563	-0.012	0.081	-0.020	0.107	0.066	0.229
Partner number of ADL's	-0.158	0.298	-0.001	0.086	-0.049	0.083	0.109	0.164
Recall score	0.135	0.130	0.034	0.028	0.031	0.029	-0.018	0.047
Provides help to relatives and friends	-0.628	0.506	0.045	0.109	0.031	0.146	-0.071	0.199
Engages in some voluntary activity	0.521	0.549	-0.157	0.122	0.039	0.180	0.122	0.216
Probability to receive a bequest	1.137	0.708	0.343	0.162 **	0.378	0.166 **	0.450	0.272 *
σ	7.747	0.527 ***	2.000	0.084 ***	1.634	0.075 ***	1.674	0.117 ***
No. of observations	1,404		1,617		1,211		424	

Table 5c – Estimation results for couples in Austria, Italy, Spain, Greece, and England

Variable	AUSTRIA		ITALY		SPAIN		GREECE		ENGLAND	
	coeff	std. err	coeff	std. err	coeff	std. err	coeff	std. err	coeff	std. err
Age 61-75	-0.095	0.168	0.226	0.131 *	0.012	0.123	0.110	0.087	-0.071	0.071
Age 75+	-0.173	0.274	0.056	0.203	-0.014	0.169	-0.027	0.126	-0.015	0.117
Female	0.236	0.174	0.070	0.166	0.099	0.133	-0.090	0.114	-0.238	0.102 **
Has one child	-0.288	0.276	0.096	0.252	-0.029	0.219	0.414	0.167 **	0.116	0.093
Has two or more children	-0.074	0.275	0.207	0.242	0.023	0.206	0.541	0.153 ***	-0.044	0.090
Has grandchildren	0.120	0.167	-0.063	0.118	-0.042	0.116	-0.032	0.089	0.165	0.072 **
2nd quartile of food consumption	0.302	0.385	0.011	0.207	0.348	0.158 **	0.023	0.116	-0.183	0.183
3d quartile of food consumption	0.286	0.332	0.229	0.173	0.284	0.149 *	0.176	0.119	-0.154	0.181
4thd quartile of food	0.324	0.339	0.327	0.186 *	0.410	0.164 **	0.071	0.112	-0.085	0.182
2nd quartile of net financial	-0.270	0.295	0.178	0.232	0.203	0.197	0.108	0.122	0.168	0.071 **
3d quartile of net financial assets	-0.210	0.290	0.116	0.215	0.078	0.200	0.144	0.127	0.348	0.079 ***
4thd quartile of net financial	-0.170	0.260	0.240	0.247	0.219	0.197	0.437	0.133 ***	0.609	0.083 ***
2nd quartile of real assets	-0.071	0.254	0.329	0.305	0.251	0.142 *	0.333	0.109 ***	-0.208	0.228
3d quartile of real assets	0.416	0.302	1.211	0.328 ***	0.685	0.156 ***	0.649	0.132 ***	0.718	0.228 ***
4thd quartile of real assets	0.861	0.326 ***	1.415	0.340 ***	0.903	0.175 ***	1.250	0.127 ***	0.971	0.232 ***
Retired	-0.014	0.172	0.008	0.123	-0.098	0.123	-0.047	0.088	0.070	0.073
Self-employed	-0.052	0.400	-0.194	0.268	-0.432	0.318	0.010	0.221	0.053	0.157
Dependent worker	0.112	0.228	-0.030	0.185	0.070	0.158	-0.114	0.094	-0.094	0.078
Homeowner	0.805	0.197 ***	0.273	0.308	-0.051	0.197	-0.005	0.118	0.982	0.234 ***
High school graduate	0.063	0.154	0.237	0.154	-0.016	0.199	0.189	0.084 **	-0.118	0.067 *
Post-secondary degree	-0.007	0.208	0.607	0.306 **	-0.191	0.203	0.412	0.128 ***	-0.018	0.099
Self-reported fair of bad health	-0.026	0.164	0.050	0.105	0.016	0.096	-0.014	0.086	0.004	0.069
Partner self-reported fair of bad	0.128	0.206	-0.061	0.120	-0.050	0.115	0.082	0.089	-0.003	0.063
Number of ADL's	-0.140	0.199	-0.047	0.075	-0.087	0.052 *	-0.124	0.103	-0.022	0.023
Partner number of ADL's	0.040	0.129	-0.059	0.043	0.017	0.061	-0.024	0.056	-0.028	0.022
Recall score	0.096	0.034 ***	0.016	0.028	0.066	0.029 **	0.008	0.020	0.035	0.016 **
Provides help to relatives and	-0.010	0.148	-0.004	0.127	0.122	0.123	0.075	0.114	-0.049	0.068
Engages in some voluntary	-0.018	0.234	0.022	0.172	0.277	0.210	0.061	0.204	0.077	0.081
Probability to receive a bequest	0.421	0.307	-0.215	0.228	0.232	0.192	0.121	0.160	0.302	0.086 ***
σ	1.672	0.104 ***	1.713	0.085 ***	1.517	0.063 ***	1.117	0.042 ***	1.513	0.044 ***
No. of observations	699		1,262		1,166		1,118		2,716	

Table 6. Median undiscounted predicted bequests given

Country	50-54	55-59	60-66	67-73	74-80
			Panel A: Couples		
U.S.A.	209,188	214,025	173,251	159,243	133,651
Sweden	101,797	99,834	94,709	87,992	88,051
Denmark	137,807	151,563	122,952	144,354	88,308
Germany	89,851	121,368	96,338	93,617	102,878
Netherlands	93,745	128,359	87,888	49,128	25,216
Belgium	201,805	230,448	166,088	163,572	115,995
France	130,692	137,577	99,022	97,067	86,881
Switzerland	80,896	199,701	149,499	67,962	77,244
Austria	118,677	68,552	88,728	91,055	89,670
Italy	90,013	104,641	164,232	105,465	113,911
Spain	200,028	178,465	152,375	161,409	131,428
Greece	129,653	126,589	116,109	110,634	83,256
England	390,875	394,037	335,637	281,895	294,290
			Panel B: Single Males		
U.S.A.	73,173	75,098	73,811	44,895	44,149
Sweden	73,160	72,787	37,351	59,131	86,833
Denmark	87,878	77,251	86,525	24,567	83,944
Germany	17,821	11,800	2,094	94,158	88,140
Netherlands	88,717	94,453	69,541	5,088	6,274
Belgium	56,989	78,579	141,651	89,152	148,056
France	97,541	95,250	93,602	61,237	61,392
Switzerland	15,797	77,318	68,287	47,961	111,791
Austria	26,111	3,881	76,944	98,659	1,708
Italy	102,156	129,522	47,825	105,409	19,359
Spain	89,952	76,864	922	140,709	128,775
Greece	109,177	114,048	111,603	65,553	110,025
England	163,925	219,638	251,636	141,723	135,194
			Panel C: Single Females		
U.S.A.	48,445	41,701	39,496	37,624	36,634
Sweden	41,544	64,524	63,267	34,145	25,458
Denmark	58,867	42,424	67,155	55,155	22,895
Germany	57,055	18,263	19,139	392	61
Netherlands	67,765	49,539	4,022	10	4,775
Belgium	40,279	89,405	90,299	87,460	91,375
France	74,223	91,044	38,512	74,815	30,777
Switzerland	19,407	23,486	43,671	47,603	20,559
Austria	35,342	13,497	30,441	7,151	7,990
Italy	21,675	104,776	102,009	28,627	32,055
Spain	117,985	115,369	6,138	5,110	47,204
Greece	108,779	108,413	98,143	71,980	58,152
England	175,493	221,444	201,590	176,934	125,911

Note: Amounts represent the weighted medians of the calculated expected bequests without any discounting into the present, and expressed in ppp-adjusted dollars.

Table 7. Median discounted predicted bequests given

Country	50-54	55-59	60-66	67-73	74-80
			Panel A: Couples		
U.S.A.	80,030	99,024	91,761	99,211	96,509
Sweden	40,641	45,271	50,466	54,152	61,596
Denmark	58,573	75,927	67,694	91,383	64,015
Germany	35,752	55,301	52,103	57,149	76,223
Netherlands	36,676	59,159	45,697	30,614	18,611
Belgium	80,341	105,189	86,248	101,907	82,178
France	51,941	60,738	52,448	59,380	60,286
Switzerland	31,979	91,415	76,672	42,236	55,268
Austria	50,372	32,110	49,002	59,059	65,630
Italy	35,266	47,291	84,018	64,511	81,306
Spain	77,505	80,547	80,804	100,782	92,874
Greece	58,308	63,939	70,023	74,183	63,368
England	168,151	183,818	181,165	176,403	216,255
			Panel B: Single Males		
U.S.A.	33,458	39,180	41,285	30,328	34,005
Sweden	33,109	35,959	22,241	39,503	66,333
Denmark	38,409	39,844	50,044	17,356	64,336
Germany	8,190	5,805	1,254	64,117	65,584
Netherlands	39,939	48,075	42,254	3,577	4,668
Belgium	26,426	41,616	83,912	61,568	116,035
France	45,746	48,150	53,851	43,499	47,052
Switzerland	7,153	41,562	41,795	34,463	88,249
Austria	12,558	2,110	46,553	69,657	1,332
Italy	46,041	65,628	28,935	72,417	14,774
Spain	41,318	41,318	869	101,082	101,656
Greece	52,331	62,168	70,788	47,268	87,144
England	78,160	109,016	144,891	95,471	105,272
			Panel C: Single Females		
U.S.A.	19,952	19,336	20,733	23,586	26,463
Sweden	16,178	29,140	35,029	22,188	19,048
Denmark	25,700	20,262	38,428	35,174	16,741
Germany	23,425	8,309	10,915	251	46
Netherlands	26,878	22,822	2,218	6	3,364
Belgium	15,642	39,121	47,309	53,339	66,658
France	29,259	39,756	21,586	43,665	22,012
Switzerland	8,226	11,087	24,068	30,619	15,549
Austria	14,494	6,235	16,948	4,699	6,123
Italy	8,793	44,924	54,274	16,895	24,053
Spain	45,010	51,335	3,118	3,445	33,724
Greece	46,454	55,390	57,303	48,737	45,498
England	74,470	103,483	107,175	114,193	92,142

Note: Amounts represent the weighted medians of the present value of the calculated expected bequests, expressed in ppp-adjusted dollars.

Table 8. Median Decumulation, all families

Country	50-54	55-59	60-66	67-73	74-80
U.S.A.	106,266	119,821	121,855	132,218	98,494
Sweden	66,698	66,409	87,681	52,957	26,724
Denmark	85,474	84,406	96,610	45,487	21,983
Germany	60,816	85,242	72,004	50,189	25,599
Netherlands	137,040	129,601	108,456	38,694	21,354
Belgium	137,498	146,084	132,453	103,744	57,224
France	125,312	145,888	132,523	114,039	90,237
Switzerland	104,289	184,070	176,521	128,041	77,738
Austria	101,945	67,261	76,360	41,410	37,026
Italy	105,400	125,521	106,146	64,012	47,677
Spain	119,027	134,858	126,119	92,147	75,245
Greece	100,721	89,044	71,681	44,617	35,526
England	126,456	157,674	150,738	96,591	46,418

Note: Amounts represent the weighted median of the difference between current net worth and the presented value of the calculated expected bequests, and are in ppp-adjusted dollars.

Table 9. Bequest and Real Wealth Ratios, 50th and 75th percentiles, all families

Country	Bequest Ratio					Real Wealth Ratio
	50-54	55-59	60-66	67-73	74-80	Total Sample
U.S.A.	0.324	0.329	0.292	0.301	0.334	0.635
	0.556	0.512	0.451	0.459	0.547	0.906
Sweden	0.336	0.392	0.364	0.422	0.619	0.660
	0.617	0.623	0.552	0.668	0.911	0.866
Denmark	0.373	0.362	0.404	0.537	0.651	0.691
	0.661	0.708	0.641	0.715	0.918	0.905
Germany	0.311	0.310	0.306	0.370	0.326	0.560
	0.580	0.587	0.556	0.641	0.772	0.894
Netherlands	0.189	0.253	0.183	0.080	0.052	0.587
	0.517	0.556	0.519	0.534	0.720	0.904
Belgium	0.301	0.364	0.391	0.456	0.549	0.834
	0.535	0.590	0.553	0.664	0.854	0.965
France	0.339	0.263	0.283	0.307	0.301	0.893
	0.609	0.497	0.502	0.579	0.723	0.977
Switzerland	0.209	0.264	0.221	0.249	0.355	0.583
	0.393	0.497	0.406	0.525	0.717	0.870
Austria	0.316	0.208	0.329	0.373	0.341	0.845
	0.600	0.589	0.596	0.725	0.819	0.978
Italy	0.262	0.323	0.397	0.454	0.496	0.956
	0.568	0.597	0.624	0.733	0.844	1.000
Spain	0.395	0.390	0.286	0.399	0.350	0.977
	0.817	0.857	0.754	0.937	1.018	0.997
Greece	0.336	0.426	0.473	0.574	0.606	0.972
	0.581	0.621	0.691	0.879	0.964	1.000
England	0.469	0.490	0.465	0.560	0.652	0.839
	0.602	0.622	0.610	0.736	0.869	0.950

Note: The bequest ratio is equal to the weighted ratio of the present value of expected bequests to net worth. The real wealth ratio is equal to the weighted ratio of net real assets (home minus housing debts, other real estate, own business, vehicles and excluding vehicles) to net real assets plus gross financial assets.

Table 10. Median compound saving rates

Country	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	COUPLES						SINGLES		
	60-66		67-73		74-80		60-66	67-73	74-80
	Unadjusted saving rate	Adjusted saving rate	Unadjusted saving rate	Adjusted saving rate	Unadjusted saving rate	Adjusted saving rate	Unadjusted saving rate	Unadjusted saving rate	Unadjusted saving rate
U.S.A.	-0.028	-0.016	-0.042	-0.026	-0.063	-0.044	-0.026	-0.046	-0.067
Sweden	-0.020	-0.020	-0.028	-0.028	-0.017	-0.017	-0.013	-0.015	-0.016
Denmark	-0.021	-0.013	-0.012	0.000	-0.022	-0.007	-0.007	-0.013	-0.006
Germany	-0.020	-0.012	-0.018	-0.008	-0.020	-0.005	-0.085	-0.171	-0.317
Netherlands	-0.043	-0.031	-0.074	-0.059	-0.183	-0.162	-0.059	-0.280	-0.233
Belgium	-0.014	0.001	-0.019	0.003	-0.028	0.004	-0.007	-0.014	-0.011
France	-0.032	-0.014	-0.046	-0.026	-0.074	-0.048	-0.024	-0.032	-0.053
Switzerland	-0.044	-0.036	-0.066	-0.055	-0.075	-0.062	-0.036	-0.039	-0.036
Austria	-0.025	-0.018	-0.020	-0.010	-0.025	-0.011	-0.035	-0.106	-0.223
Italy	-0.010	0.001	-0.014	-0.001	-0.021	-0.001	-0.015	-0.041	-0.113
Spain	-0.010	0.007	-0.011	0.012	-0.028	0.007	-0.136	-0.118	-0.108
Greece	-0.012	-0.002	-0.010	0.004	-0.025	-0.004	-0.010	-0.013	-0.021
England	-0.007	0.005	-0.011	0.005	-0.009	0.014	-0.006	-0.005	-0.012

Note: The saving rates are the median weighted compound rates that reconcile the current net worth with the estimated expected bequests. For couples, the adjusted saving rate takes into account the inheritance given after one of the partners passes away, which is not considered as negative saving.