

Adequacy of Saving for Old Age in Europe

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Abstract

This paper contributes to the ESF Forward Look project “Ageing, Health and Pensions in Europe” by providing an overview of policy questions and research literature on the adequacy of saving for old age in European countries. Given the current status and practices, the paper describes remaining knowledge gaps and the requirements in terms of research infrastructures, data, and methodologies to fill such gaps.

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1 Policy questions

Household saving rates and wealth levels are very heterogeneous both across and within countries, varying with respect not only to age, cohort, and time but also to education, family size, health, etc. Given these differences, in what sense is it possible to enquire about the *adequacy* of retirement savings? And on what grounds is the question *relevant*?

The concept of (retirement savings) *adequacy* combines two dimensions: (a) a well-structured institutional design for an efficient sharing and diversification of risks and (b) sensible individual behavior with respect to the time allocation of resources, in a given market and institutional context.

The first aspect is crucial because even rational individuals will accumulate wealth poorly/inefficiently if they are forced to participate in ill-designed pension schemes or if they lack proper instruments and markets. Institutional features are extremely important but difficult to characterise in a single model. In Europe, for example, a wide variety of retirement provisions are in place, with countries varying according to the degree of state intervention, the provision of inter- and intragenerational insurance, the amount of redistribution, and other characteristics (Kim and Lee 2007). Moreover, reforms are modifying the playing field.

Given this diversity, individual saving behaviour is expected to vary not only because of heterogeneous preferences and constraints but also because of the different level of mandated saving, its characteristics, and its substitutability with respect to “discretionary” accumulation. In particular, the pension reform process that started in the 1990s in most, if not all, European countries substantially increased workers’ uncertainty with regard to their replacement rates, typically by shifting from Defined Benefits (DB) to Defined Contribution (DC) formulae. Reforms made future pensions not only less generous, more “self-made,” but also more uncertain and difficult to understand, thus imposing greater costs upon planning ahead.

The issue of retirement savings adequacy is thus relevant for Europe on three grounds: first, because there are differences among countries in the level of mandatory provisions and in the institutional setting for voluntary complementary pensions; second, because reforms are increasing the extent to which individuals are responsible for their own retirement; and third, because “inadequate” decisions can be improved through suitable policies, possibly *targeted* to specific goals/groups.

In this perspective, a few questions deserve to be addressed:

- *What will be the consequences of reforms on the adequacy of retirement provisions?* While a cutback on past promises would seem to undermine the adequacy of pension systems, it could indeed reinforce their adequacy, at least for young and future generations, by restoring conditions of financial sustainability and by attaining both a better incentive structure and a better diversification of risks.
- *How will households’ discretionary savings respond to changes in pension provisions?* As reforms reduce public generosity and transfer risk onto workers, will they be sufficiently encouraged/prepared to fill the gap? The answer depends on how individual decisions are made. Economic theory typically *assumes* that individuals are rational and well-informed and able both to plan ahead and to correctly interpret the rules and incentives provided by policy.
- *Are conventional models really able to capture individual behaviour?* A vast amount of empirical literature has indeed documented significant departures from such an ideal standard because of myopia, inertia, and/or lack of financial literacy. However, according to the standard model, the degree of saving inadequacy depends on how distant individuals are from the rationality paradigm, and in what respects.

- *What can policy do to improve retirement saving choices?* Even though, at a certain date, personal characteristics are given, they can be influenced by both the market (promoting the demand for private insurance products) and by public policies (trying to strengthen attitudes conducive to saving behaviour). In particular, the provision of information on the mechanisms regulating the pension system and the improvement of financial literacy among the population are instruments that can stimulate individuals' *preparedness* for retirement and strengthen the adequacy of their decisions (for example, by acknowledging the *status quo* bias in individual behaviour).

In dealing with these rather broad issues, this paper has chosen to concentrate on *income risk in retirement*, and therefore on pensions, as the main source of security in retirement, disregarding other risks, in particular those connected to participation in the labour market (such as unemployment, disability, and so on), even though lack of resources in retirement is typically the direct consequence of a poor working career. Further, the paper will not explicitly consider the consequences on household savings of heterogeneous health and long term care (LTC) provisions even if, due to incomplete public coverage and imperfect insurance markets, both health and LTC risks add to the precautionary motive of savings. In Europe the health risks of the elderly are generally provided for by national health care systems, and out-of-pocket expenditures are less relevant than in more pro-market countries like the United States. Finally, we will disregard how fiscal incentives might affect retirement saving choices. Even though a vast literature suggests that tax exempted instruments for wealth accumulation mainly attract savings previously held in other forms, rather than spurring the creation of 'new' saving, the issue is far from being settled.

The plan of the paper is the following. After an overview of the most relevant policy questions, Section 2 reviews the major contributions of theoretical and empirical economic analysis in addressing such questions. Section 3 describes the main remaining gaps in knowledge. Sections 4 and 5 discuss respectively the current conditions of existing infrastructures and the requirements in terms of data and methodological innovations. Section 6 suggests what can and should be delivered on the initial policy questions.

2 Major progress in understanding

2.1 Adequacy from the perspective of the pension system

Differences in European retirement provisions are reflected in differences in the age saving profiles. According to Börsch-Supan and Lusardi (2003), for example, these are pronouncedly hump-shaped in the Netherlands, moderately hump-shaped in Germany, almost flat in Italy, and increasing at all ages in the UK. In none of these cases does there seem to be dissaving in old age, as predicted by simple versions of the life cycle model. Without ignoring that other driving forces can be at work in explaining these differences (such as the stringency of borrowing constraints, as measured for example by the average down payment necessary to buy a house¹), part of the variations are the direct effects of the different pension setups: the more generous social security in both Italy and Germany reduces the need to save for retirement during the working age, while the Dutch flat rate pension benefits—with rather lower replacement rates—are at the root of the marked hump-shaped profile in that country.

Thus, a proper understanding of the adequacy of retirement savings cannot but start from pension provisions, which are the main vehicle for the accumulation of retirement wealth, substituting for discretionary savings and creating various (dis)incentives. When looking at pension systems from

¹This appears to drive up savings at young ages in both Germany and Italy and to increase aggregate savings in general with respect to Anglo-Saxon countries and the Netherlands.

an adequacy perspective, more important than benefit levels *per se* is the government's role in promoting/delivering a good *ex ante* allocation/diversification of risks. This entails an institutional framework that, under a financial sustainability constraint:²

- a) provides *efficient* ways to broaden the scope for risk pooling and sharing, not only through public pensions (and other benefits for the elderly, such as survivor benefits), but also through a good regulation/supervision of market provisions;
- b) reduces poverty among the elderly;
- c) encourages *individual awareness* of retirement needs and their capacity to make informed and farsighted decisions, by means of financial literacy programmes and/or appropriate pension design.

As for efficiency (point a), in overlapping generations models a source of market incompleteness comes from the impossibility of individuals to engage in *intergenerational* risk sharing with yet unborn generations: in the absence of such markets, governments substitute for them by establishing, as a vehicle to set up an intergenerational contract, a pay-as-you go (PAYG) method of financing (Shiller 1998; Ball and Mankiw 2007). Risk diversification, however, demands more than just PAYG financing; it requires a good combination of public and private choices as well as good regulation/supervision of market provisions, thus offering a rationale for a *mixed system* (Lindbeck and Persson 2003; Castellino and Fornero 2007). Moreover, the choice between DB or DC formulae should also be carefully considered in pension system design, as it carries important implications in terms of social welfare (Gomes and Michaelides 2003).

Some degree of state intervention is also justified by *intragenerational* risk sharing, with poverty prevention as another way to look at the provision of “adequate” pensions (point b). Even though the scope for intragenerational risk pooling might be reduced by issues such as moral hazard and prior income inequality (which cannot be entirely “cured” by the pension system), there are many practical limitations to the ability of the elderly to diversify their incomes by themselves, which emphasize government's role in providing this kind of risk sharing (Shiller 1998; Barr and Diamond 2008).

Finally, given that public provisions typically cannot fully cover financial needs in retirement, governments should also aim at increasing and improving individuals' ability to make sensible choices, concerning both the age of retirement and the accumulation/investment of personal savings (point c). This can be done not only by fostering individual preparedness, but also by reducing the distortions embedded in pension formulae, and/or by choosing an enhanced choice structure, for example, through an appropriate design of pension default options (Madrian and Shea 2001; Holzmann and Pallarès-Miralles 2005; Lusardi 2008a; OECD 2008).

Assessing the adequacy of pension systems *in practice* is very difficult. Suitable indicators, capable of offering a “benchmark degree” of efficient risk diversification, against which to compare actual data are simply absent; moreover, they would be difficult to implement not only because of the mix of insurance and redistributive features that typically characterise pension systems (which requires that other redistributive programmes are included in the assessment) but also because these are never in a steady state, and the transition costs imposed by reforms would have to be taken into account. In general, reforms imply high costs and a long-term process, as, for most countries, the problem is not to decide whether to create *ex novo* a well-diversified and well-balanced system but whether to favour the birth, or the growth, of funded schemes side by side with an already existing, and possibly mature, PAYG one (Castellino and Fornero 2006). Not surprisingly, given the

²Adequacy should always be viewed within a context of financial sustainability, given that it is always possible to increase benefit levels by ignoring—at least for a certain period—the government's intertemporal budget constraint. Financial sustainability, however, “*does not imply fully funded pensions, but only that unfunded obligations are not growing excessively relative to the contribution base*” (Barr and Diamond 2008, p. 10).

difficulties in assessing the overall adequacy of pension systems, approximations, such as poverty rates and aggregate replacement rates, are frequently used.

2.2 Adequacy from the individual/ household perspective

The *normative benchmark* of the economic analysis of household savings is that rational individuals (taking into account the institutional framework in which they operate) plan their consumption decisions over their lifetime (Scholz and Seshadri 2008, p. 4; Browning and Lusardi 1996). Starting from this premise, on a positive level: “*a household is said to be saving adequately if it is accumulating enough wealth to be able to smooth the marginal utility of consumption over time in accordance with the optimizing model of consumption*” (Engen et al. 1999, p. 70).

The stylized version of the life cycle model (LCM), in which individuals save during their working life to provide for consumption in old age, allows for a neat conceptualization of retirement savings adequacy—the annuity value that, under the constraint of life cycle resources, can sustain the preferred consumption path—and lends itself to intuitive and simple measures of adequacy, such as the individual replacement rates, widely used.

Much richer versions of the model have subsequently been exploited by including real-life features such as labour supply decisions and retirement choices; the timing of income receipts; uncertainty over future earnings, rates of return, length of life, and health conditions, all generating scope, even in old age, for *precautionary savings*. Borrowing constraints—although less important in retirement as household wealth reaches its peak—may explain the timing of an individual decision to draw from pensions. Other motives for saving, such as bequests, can also be added to the model. Apart from predicting the smoothing of marginal utilities, an important feature of the model is its ability to distinguish between “*inadequate*” and low levels of saving/wealth. For instance, facing an upward sloping income profile, young people may save little or be borrowing. Similarly, older individuals may have little “*discretionary*” saving because the amount of mandatory saving is already providing for their retirement needs.

The empirical evidence, implicitly or explicitly based on the LCM, is mixed (and largely concentrated on data from the United States). Some studies use reduced forms to project households’ lifetime assets and income paths and derive from them implications for saving adequacy. Results are varied: Kotlikoff et al. (1982), Love et al. (2008) and Hurd and Rohwedder (2008) all find there is no systematic undersaving. On the contrary, according to Haveman et al. (2006) about half of retirees will not have enough resources in retirement to meet their pre-retirement consumption level. Moore and Mitchell (1997) also find that the median household needs to increase its saving rate substantially until the age of retirement to obtain an “adequate” level of wealth for retirement (an additional 16% saving rate to retire at age 62 or 7% to retire at age 65).

Other models are more sophisticated, as optimal household consumption and wealth accumulation profiles are simulated from a structural model and compared to actual data (Bernheim and Scholz 1992; Engen et al. 1999; Munnell et al. 2006; Scholz et al. 2006; Scholz and Seshadri 2008). These papers find that saving is adequate (or even more than adequate) for the large majority of the population and that *under saving* is concentrated among households without a college degree (Bernheim and Scholz 1992) or in the lower part of the wealth/earnings distribution wealth target. More precisely, Scholz et al. (2006) find that only 15.6% of older households in 1992 are below the optimal level of accumulation. This is at odds with the results found by Munnell et al. (2006), who argue that 43% of households are at risk of not being able to maintain their standard of living in

retirement. Although much of the difference seems to be attributable to data and methodological differences (Engen et al. 1999; Scholz et al. 2006), discrepancies remain.³

A different strand of literature—which also provides some evidence on European countries such as Germany, Italy, and the UK—studies the so-called “consumption drop,” i.e., whether or not consumption falls around the time of retirement, and for what reason. This finding would provide *prima facie* evidence against the theoretical predictions of the life cycle, and could be interpreted as evidence of inadequate retirement saving.

Optimal saving, however, does not necessarily mean *smooth consumption*; thus, the drop itself could be “optimal” (Banks et al. 1998; Bernheim et al. 2001; Miniaci et al. 2003). Retirement is typically an anticipated (or even chosen) event that does not come as an unforeseen shock, and there are reasons that justify a fall in consumption, for example, a decrease in work-related expenses. The occurrence of unexpected shocks inducing earlier-than-expected retirement and the possibility of non-separability between consumption and leisure within the per-period utility function provide other explanations for the drop in consumption that are consistent with the standard life cycle framework (Haider and Stephens 2007; Hurd and Rohwedder 2006; Smith 2006). Finally, other works claim that the proper entity to look at is not “expenditure” but true “consumption” (as measured, for instance, by food intake), since retirement provides ample opportunities to economize (Aguiar and Hurst 2005). The existence of the drop itself is thus uncertain. On the whole, this kind of evidence points again to groups at risks, rather than to a general problem of inadequate savings in the general population.

Other studies have concentrated on specific topics, again relevant to the issue of retirement saving adequacy. *Family formation* and, more specifically, *household composition* have always been recognized as important ingredients of saving adequacy not only because of the time-varying number of household members and of economies of scale in consumption,⁴ but also because differently structured households have a different risk tolerance, and thus a different propensity to save (for example, two-earner families are better off than single-earner households with the same income and number of components). Skinner (2007) suggests that having children helps in moderating habits so that accumulation needs are lower for families with children than for families without. Hurd and Rohwedder (2008), after adjusting for demographic factors, find that “*on average and for most of the distribution, couples have adequate resources to finance their consumption in retirement*” (p. 16), while singles (in particular those lacking a high school education) are more at risk of having inadequate resources.

Endogeneity issues should, however, be taken into account, as the very number of household members depends on income and wealth. In this spirit, Scholz and Seshadri (2007) examine the effect of children on wealth accumulation of U.S. households, accounting for endogenous fertility. Their simulated model closely matches the actual wealth and fertility heterogeneity and shows that variation in family size plays an important role in understanding wealth dispersion and that children

³The work by Scholz et al. (2006) is based on the Health and Retirement Study (HRS), which covers Americans age 51 to 61 in 1992, while the study by Munnell et al. (2006) computing the National Retirement Risk Index (NRRRI) is based on the 2004 Survey of Consumer Finances (SCF). A comparable sample is constructed by calculating the NRRRI on the population age 51–61 in 1992 surveyed in the SCF. In this case, the NRRRI takes on the value of 19 percent, meaning that 19 percent of households are at risk of not being able to maintain their standard of living in retirement. This is to be compared with the result by Scholz et al. (2006) that 16 percent of U.S. households had less wealth than their optimal targets.

⁴From a practical point of view, since consumption/saving data are typically collected at the household level, the application of an equivalence scale is commonly used to weight each household member (depending on age and household size) and to convert family expenditure into “adult equivalent” consumption.

have a substantial negative effect on wealth accumulation. Analogously, changes in the family structure can be the unintended consequences of diversely motivated policies.⁵

Wealth (il)liquidity is another important element of saving adequacy, as individuals enter retirement not only with very different wealth levels but also with different wealth compositions. Apart from social security wealth, housing wealth—which is the other major component of wealth in old age—is rather illiquid. The house is an attractive investment because it combines a flow of services with an investment good and, given the low correlation between housing value and financial investment returns, provides scope for portfolio diversification. However, because of its illiquidity and because households do not appear to draw down housing wealth after retirement (or do it at an “insufficient” rate, from the point of view of the theoretical model), housing wealth has often been excluded in empirical works of savings adequacy (Venti and Wise 1991; Bernheim and Scholz 1992).

Financial markets, however, have developed instruments to extract equity from a home and to transform it into more liquid forms: mortgage refinancing, mortgage equity withdrawals, and reverse mortgages offer a variety of cash-flow profiles that can improve a household’s ability to finance its preferred consumption path (Muellbauer 2007). These new instruments are, however, still rarely used, as households maintain a preference for living in the home, at least until a health shock forces them to move, and rarely plan to use their housing wealth to finance consumption in retirement (Lusardi and Mitchell 2007a).

The availability of *annuities* is another essential aspect of retirement saving adequacy. Social security wealth is annuitized by definition, and typically delivers (price) indexed benefits. However, economic theory states that, because of the “mortality premium,” annuities dominate (the return offered by other) financial assets, so that individuals should annuitize all their retirement wealth to remove both the risk of outliving their resources and the risk of leaving unintended bequests (Yaary 1965). Davidoff et al. (2003) show, however, that, when markets are incomplete, the arbitrage-like dominance argument does not hold any longer, and full annuitization is not the best strategy. While the theory seems unable to answer questions about the “optimal fraction” of annuitized wealth, simulation exercises show that annuities are quite valuable to individuals (in terms of Money’s Worth Measures (MWR),⁶ Geanakoplos et al. 2000) even when the optimal consumption trajectories differ substantially from the time paths of annuity payouts.

In practice, annuity markets are thin, as many problems limit individuals’ propensity to annuitize, including the potential need to pay for uninsured medical expenses or for a nursing home, and provide a rationale for preference of lump sums (Turra and Mitchell 2004; Sinclair and Smetters 2004; Kifmann, 2008), while risk pooling within a couple/family decreases the value of annuitization for married couples (Brown and Poterba 2000, Dushi and Webb 2004). Selection effects—estimated by the difference between MWR calculated from annuitant and from population-wide mortality tables—and administrative costs could also restrain the demand by making annuities too expensive. Researchers have calculated the MWR of annuities: although not equal to one (corresponding to the actuarial fair price), they are not very far from it, suggesting that cost is hardly the main reason for the limited demand. Although the complexity and the riskiness of the product may act as a further disincentive, in practice, it seems impossible to explain the lack of demand by remaining within the boundaries of rational models. Psychological factors—i.e., a preference for lump sums *as such* and other forms of “irrational” or bounded rational behaviour like hyperbolic discounting—are likely to be at work. This opens the path for a different analysis of saving decisions, not necessarily consistent with optimizing behaviour and rational choices (Brown 2009).

⁵ Smith (2008) recalls the role of the welfare system in providing incentives for male heads to separate from the original families, leaving these with female heads and creating new households.

⁶ The ratio of the expected present value of the future payment stream associated with an annuity to its purchase price.

2.3 Retirement planning, information about pensions, and financial literacy

A growing literature has documented significant departures from the model and pointed to behavioural and psychological factors that limit individual planning ability.

One simple and direct way to examine whether, consistent with the predictions of theoretical models of saving, individuals look ahead and make plans for the future is to study the extent of retirement planning. Lusardi (1999) looked at that evidence using data from the 1992 HRS, which surveyed respondents age 51 or older. She found that as many as one-third of respondents had not thought about retirement at all. While some of this behaviour may be perfectly rational, it is nevertheless surprising that the majority of older respondents had not given any thought to retirement, even when only five to ten years away from it. Lack of planning is concentrated among specific groups of the population, such as those with low educational attainment, African-Americans, Hispanics, and women. These are potentially vulnerable groups, who are less likely to save for retirement. These findings are not specific to a particular time period or a specific survey and have been reported in various studies (Lusardi and Mitchell 2007a; Yakoboski and Dickemper 1997).

Lack of planning has not been documented in the United States only. The 2006 Attitudes toward Pensions survey undertaken by the UK Department of Work and Pensions shows that most people recognized the importance of saving and setting money aside for retirement. However, even though many people had concerns about their retirement income and recognized the need to save, actions did not always match intentions. This was particularly true of younger respondents, those with low incomes, and those with self-reported lower life expectancies. For instance, only half of respondents used information and advice in planning for retirement, and of those who received a State Pension Forecast, very few had taken any action. Levels of worry about retirement income were significantly higher among older age groups, women, and those with fewer financial resources (Clery et al. 2007). Although comparisons are difficult, the picture looks slightly better than it did a decade earlier, when a qualitative survey carried out on behalf of the Department of Social Security documented fears about the very existence of a state pension in the future (Hedges 1998).

Another way to examine whether and how much individuals prepare for retirement and plan for the future is to look at how much they know about crucial components of a saving plan. For example, two very important elements of total wealth holdings are pension and Social Security wealth; in the United States as well as in some European countries such as the Netherlands (Gustman and Steinmeier 1999; Alessie et al. 1995), pension and Social Security account for about half of total wealth accumulation.

Earlier studies indicated that workers were woefully uninformed about their pensions and the characteristics of their pension plans (Mitchell 1988; Gustman and Steinmeier 1989). Given that most pensions in the past were DB pensions and workers had to make few or no decisions about their pension contributions, lack of knowledge is perhaps not surprising. However, recent data from the HRS show that workers continue to be uninformed about the rules and the benefits associated with their pensions, despite the shift from DB to DC pensions, which has given more retirement saving responsibility to workers (Gustman and Steinmeier 2004). Gustman et al. (2009) compare the types of pensions reported by workers (whether DB, DC, or a combination of both) with employer reports and data from Watson Wyatt, with which it is possible to correctly identify the pension type from firm data. They study different time periods, from the 1980s (when DB plans were prevalent) to the recent period (when DC plans gained popularity). They show that workers are consistently mistaken and confused about the type of pension they have.

Knowledge about Social Security is also scanty. Only 43 percent of respondents in the sample of older workers used by Gustman and Steinmeier (2004) even ventured a guess about their expected Social Security benefits, and many respondents knew little about the rules governing Social Security.

Findings from the UK seem less worrisome, albeit not entirely comforting. Results from the English Longitudinal Study of Ageing (ELSA) show that 40% of individuals age 50–59 with a DB employer pension do not know the accrual rate of their pension plan, 30% cannot tell how much they expect to receive from this pension, and 30% do not know whether their pension benefit will go up by more or less than prices after their retirement. However, they do not feel a major lack of information, as about 70% report having received enough information (Banks and Oldfield 2006).

One reason individuals do not engage in planning or are not knowledgeable about pensions or the terms of their financial contracts is that they lack financial literacy. Bernheim (1995, 1998) was one of the first to emphasize that most individuals lack basic financial knowledge and numeracy. Several surveys covering the U.S. population or specific subgroups have consistently documented very low levels of economic and financial literacy. Lusardi and Mitchell (2006) devised a special module on financial literacy for the 2004 HRS⁷ that measures basic financial knowledge related to the workings of interest rates, the effects of inflation, and the concept of risk diversification.⁸ Findings from this module reveal an alarmingly low level of financial literacy among older individuals in the United States (50 and older). Only 50% of respondents in the sample were able to correctly answer two simple questions about interest rates and inflation, and only one-third of respondents were able to correctly answer these two questions and a question about risk diversification. Financial illiteracy is particularly acute among the elderly, African-Americans and Hispanics, women, and those with low educational attainment (a common finding in the surveys of financial literacy).⁹

Similar modules on financial literacy have been added to some European surveys, such as the Italian Survey of Household Income and Wealth (SHIW) and the Dutch DNB Household Survey (DHS). On average, only 47% percent of Italian families correctly answer some basic financial literacy questions and only 27% are able to cope with the compound interest question (Fornero et al. 2008). Dutch households did somewhat better, as at least 70% correctly answered basic questions and, on average, correctly answered about four quizzes out of five (Van Rooij et al. 2007). However, even among Dutch households, the level of financial knowledge is not high.

Lack of knowledge may be inconsequential, if, for example, individuals rely on the help of others to make decisions, or if knowledge (or the type of precise knowledge derived from the above questions) has little effect on behaviour. In fact, as illustrated in Lusardi (2008a) very few respondents rely on the advice of experts to make financial decisions. Most importantly, lack of financial literacy has important consequences for wealth accumulation. Those who are not literate are less likely to plan and less likely to accumulate wealth (Lusardi and Mitchell 2006, 2007a). Similarly, Stango and Zinman (2007) show that those who are not able to correctly calculate interest rates out of a stream of payments end up borrowing more and accumulating lower amounts of wealth. Moreover, those who are less literate are more likely to borrow using high-cost instruments and are more likely to have problems with debt (Lusardi and Tufano 2008). Hilgert et al. (2003) also document a positive link between financial knowledge and financial behaviour. Van Rooij et al. (2007) and Kimball and Shumway (2006) find that financially sophisticated households are more likely to participate in the stock market. Agarwal et al. (2007) show that financial mistakes are most

⁷ For a detailed discussion of the importance of financial literacy, see Lusardi (2008b).

⁸ For a discussion of the measurement of financial literacy and the extent of measurement error in financial literacy data, see Van Rooij et al. (2007).

⁹ See Lusardi and Mitchell (2007b) for a review.

prevalent among the young and elderly, who are also among those displaying the lowest amount of financial knowledge.

Several programs and tools have been developed to facilitate saving and overcome the problems of lack of literacy and information and the complexity of saving decisions. Box 1 illustrates some of them.

Box 1—Tools to make life easier

Acknowledging that saving for the long term is often problematic has led economists to devise ways to help individuals perform complex calculations or commit to saving plans. Below, we present some examples:

- **Planners.** Devising optimal saving plans requires complex and lengthy computations. Hence, several tools have been developed to make this task less cumbersome. Some of these software programmes combine advice on life cycle planning and portfolio choice (e.g., Morningstar and Financial Engines). Some are very simple (e.g., Ballpark E\$estimate and Morningstar, which compute the target saving rate using as inputs only age, the amount of retirement savings, and annual income), while others are more detailed (e.g., Financial Engines). One notable example is ESPlanner—developed by Laurence Kotlikoff—which takes into account not only Social Security benefits and pension plans, but also savings accounts, housing and other real estate, and taxation.
- **Planning Aids.** Lusardi et al. (2009) devised a seven-step planning aid that describes to new hires in a large not-for-profit institution what they have to do to open a supplementary retirement account. In addition to breaking down the enrolment process into simple steps, the aid provides information about the pension scheme, such as the minimum and maximum amount that employees can contribute, the three pension providers employees have to choose from, and the rules of the on-line enrolment process. Consistent with the fact that many employees lack even basic information about pensions and often claim they do not know where to start when considering retirement saving decisions, this programme resulted in a sharp increase in supplementary retirement accounts.
- **Automatic enrolment and “locking in.”** One way to stimulate participation and contribution to pensions is to automatically enrol workers in employer-provided pension plans. Thus, rather than let workers choose whether or not to *opt in*, employers enrol workers and let them choose whether or not to *opt out* of a pension plan. This simple but ingenious method proved to be very effective in increasing pension participation. For example, according to Madrian and Shea (2001), after a company implemented a change in its 401(k) plan and automatically enrolled its new hires in the plan, pension participation went from 37% to 86%. Not only has the increase been very large but participation rates have remained high for several years (Choi et al. 2004, 2006). Even legislators took notice of this remarkable success, and the 2006 Pension Protection Act made it much easier for firms to automatically enroll their workers in pension plans.
- **Save More Tomorrow.** Similar to the automatic enrolment programme described earlier, in this programme workers commit themselves to automatic increases of their pension fund contributions every time they obtain a pay rise (Thaler and Benartzi 2004). As in automatic enrolment, the idea behind this mechanism is to overcome self-control problems and inertia faced by many workers. The increase in contribution is usually set to be slightly smaller than the increase in earnings, so that workers do not suffer from a reduction (in absolute terms) in their paychecks.

3 Remaining gaps in knowledge: main challenges

3.1 Understanding saving behaviour

Inadequate outcomes for whom? A few remarks can be drawn from the survey of the literature carried out in section 2 on (in)adequate outcomes. The *first* has to do with the empirical evidence. According to most (U.S.) studies, the issue of inadequate retirement saving does not appear to be as serious as one could expect, since the majority of households behave more or less according to theoretical prediction. Those who do not are not only under savers, but also *over savers*. Moreover the former group—which Scholz et al. (2006) estimate, as of 1992, at about one-sixth of older Americans—are quite easily identified, being largely concentrated among the less educated and those at the bottom of the wealth or earnings distribution. This would suggest that *targeted actions* could be sufficient to tackle the problem. The *second* remark has to do with methodology: some optimization models tend to underrate the great heterogeneity in saving behaviour, which could explain why they tend to yield fairly similar results. In this respect, the most ambitious attempt comes from the far-reaching methodology experimented with in Scholz et al. (2006), which combines the rigour of an optimization framework with the full distribution of household saving behaviour. However, its implementation is fairly complex and similar results have been obtained with much simpler techniques, such as the one used in Hurd and Rohwedder (2008). A *third* observation is on results, which seem to be characterized by a stark dichotomy: whereas models point to groups at risk of inadequate resources in retirement, the most recent literature on financial literacy suggest that ignorance is widespread and that even college graduates often fail on basic questions. Lack of knowledge could be overcome by resorting to financial advice external to the family, but the evidence on planning, again, shows that as much as 30% of the U.S. close-to-retirement population has never thought about retirement and that only 18% were able to develop a saving plan and stick to it (Lusardi and Mitchell 2007a). Not surprisingly, lack of planning is present in the same vulnerable groups that display poor ability to save.

Adopting a more pragmatic research strategy. Rather puzzlingly, then, many households manage to plan adequately knowing very little about their own finances. Further evidence is therefore needed to reconcile these findings and to obtain a unified and consistent message from different strands of research. The basic life-cycle model has been successfully extended to account for various real life features and has contributed to widen our understanding of saving behaviour; progress has been made in both the modelling of intertemporal choices and in the methodological strategy, i.e., looking at the whole life cycle rather than just at the few years around retirement; using an optimization criteria to establish adequacy targets; and simulating life-cycle patterns for each household rather than looking at mean/median households. The model, however, still suffers from severe limitations (Stiglitz 2008).

Perhaps the best strategy in order to understand why (a fraction of) households appear to save “inadequately” is to consider conventional models as only part of the story and to continue the investigation of documented behavioural and psychological factors, by acknowledging that the diversity of decision-making mechanisms and a deeper integration into the theoretical framework of suggestions coming from other disciplines—namely psychology—can help explain household saving behaviour. For instance, while conventional analysis interprets “inadequacy” as the gap between actual accumulation and that predicted by theory, behavioural economists can help in understanding why this gap occurs. Overconfidence, lack of self-control, inertia, mental accounting, dynamically inconsistent time preferences, reliance on “rules of thumb” and other so-called “anomalies” can all rather arbitrarily enter an otherwise rational plan (Thaler 1994; Laibson 1998) and explain specific aspects of saving behaviour that are still poorly understood.

3.2 A “smorgasbord” of open issues

i. *Charting age-varying needs and constraints.* Retirement is often thought of as a uniform period. However, there is substantial variation in consumption, in needs (for example health-related expenditures are likely to become substantial late in retirement), and in the degree of work activity

carried out at home and on the market during the “inactive” part of life. A deeper exploration of the varying needs, resources, and constraints faced by the elderly is necessary, as is the design of products and policies addressed to them, but evidence of consumption and saving behaviour in late retirement is still scarce and requires large and European-specific data sets which are currently being constructed (see below).

ii. *Why are annuities so uncommon?* Annuitization should dominate but is rarely *chosen*: why do the elderly tend to deplete their wealth at a slower pace than the theory predicts would be optimal and why is the (voluntary) take-up of annuities so low, despite their hedging characteristics against longevity risk? One possible explanation is that annuities are a too-complex product, entailing numerous margins of choice (when to start drawing down, how to draw down, what type of annuity) that individuals, particularly the elderly, do not seem to appreciate.

iii. *How are health and long term care (LTC) risks valued by the elderly?* Health and LTC risks are paramount and burdened with uninsurable components. Important differences across countries in the public coverage of health and LTC needs in old age determine differences in the amount of precautionary savings accumulated to face unforeseen medical expenses, as well as in the importance of intra family informal insurance arrangements (with consequences on women’s participation in the labour market). The uncertainty related to the arrival of health shocks might be one of the reasons (in addition to altruism and a bequest motive) that induce individuals to prefer lump sums rather than annuities and to run down their resources slowly.

iv. *Is housing equity an obstacle to consumption smoothing?* Home ownership decreases very slowly with age, suggesting that housing equity is typically regarded as a hedge against future catastrophic health care expenses (Skinner 2007). According to the standard LCM, home owners (particularly older ones) enjoy a positive wealth effect after an increase in the price of houses and should thus increase their consumption of both housing services and other commodities by some fraction of the increase. This does not seem to happen in Europe (Calcagno et al. 2008), with the possible exception of the UK. Why? Markets and products that make housing wealth more liquid exist (reverse mortgage) and could be fostered.

v. *What is the role of household composition in regard to saving?* Another determinant of the household consumption path along the life cycle relates to the variation of the demographic characteristics of the household. As we have anticipated in section 2.1, the analysis of consumption patterns often takes into account family composition and its changes. However, more attention should be given to the relationship between demographics and the path of wealth accumulation, not only by including an altruistic or strategic bequest motive into the theoretical framework but by truly integrating saving and fertility decisions.

vi. *What is the link between micro and macro dimensions?* As we have shown in section 2, saving adequacy concerns two dimensions: the ability of public social protection systems to deliver adequate benefits (and services) in old age and the individual ability to save for one’s own future. These two aspects should be further integrated, especially by looking at the link between efficient risk diversification and individual optimization.

4 Current state of play of European research infrastructures and networks

Household saving in general is among the topics of quality research carried out by many institutions¹⁰ in recent decades, even though little research has been conducted specifically on the

¹⁰ We are not considering university departments or research departments of central banks, many of which have been forerunners in providing both data, based on surveys of household saving, and analysis.

issue of retirement saving adequacy. Box 2 contains a list of the institutions that are most active on these issues.

In addition, the creation of research networks is among the most successful initiatives to foster collaboration and exchange among European researchers. Most of these networks came together within the structure of an international organization (most often the EU) that provided funding. Box 3 reports the main initiatives in this field.

Box 2 – Research centers committed to research on saving and pensions

Independent institutions

CASE: the Center for Social and Economic Research is an independent nonprofit institute founded in Warsaw in 1991 that has carried out projects on social policies in Europe, especially in eastern European countries (<http://www.case.com.pl/>).

CeRP: founded in 1999 as a joint project of the University of Turin and the Compagnia di San Paolo, the Center for Research on Pensions and Welfare Policies has a specific focus on pension economics and the economics of ageing (<http://cerp.unito.it/>).

IFS: the Institute for Fiscal Studies, based in London, carries out quality research in various fields, including household consumption and saving (<http://www.ifs.org.uk>).

MEA: the Mannheim Research Institute for the Economics of Aging analyzes the micro- and macroeconomic aspects of demographic change. MEA is part of the Department of Economics of Mannheim University (<http://www.mea.uni-mannheim.de>).

Netspar: this is an independent network for research and education in the field of pensions, ageing, and retirement and is located at Tilburg University (<http://www.netspar.nl>).

NIESR: the National Institute of Economic and Social Research is an independent research institution founded in 1938 and located in London. It undertakes, among other things, research on pensions and aging (<http://www.niesr.ac.uk>).

OEE: The European Savings Institute/Observatoire de l'Épargne Européenne was launched as a nonprofit association in September 1999 with the main objective of collecting European saving-related information and encouraging studies and research contributing to the public debate (<http://www.oee.fr>).

Public research centres or parts of international organizations

European Centre for Social Welfare Policy, based in Vienna, is a UN-affiliated intergovernmental organization concerned with all aspects of social welfare policy and research (<http://www.euro.centre.org>).

SCP: the Netherlands Institute for Social Research is a governmental agency that conducts research into the social aspects of all areas of governmental policy. The main fields studied are health, welfare, social security, the labour market, and education, with a particular focus on the links between them (<http://www.scp.nl>).

Box 3 – Research networks in the areas of aging

RTN: the Research Training Networks—financed under the Research Framework Programmes of the European Union—provide the means for research teams of recognised international stature to link up, in the context of a well-defined collaborative research project, in order to formulate and implement a structured training programme for researchers in a particular field of research.¹¹ (<http://cordis.europa.eu/mariecurie->

¹¹ An example of an RTN in our field of interest is the “Microdata Methods and Practice” network, supported by the EU 6th Research Framework and Marie Curie Research Training Actions. The main partners are: Centre for Microdata Methods and Practice (cemmap), Institute for Fiscal Studies, London; Centre for Applied Microeconometrics (CAM), University of Copenhagen; Centro de Estudios Monetarios y Financieros (CEMFI), Madrid; Centre National de la Recherche Scientifique (CNRS-EUREQua), Université Paris 1; Tinbergen Institute, Erasmus University Rotterdam,

actions/rtn/home.html). Also the **TMR** (Training and Mobility of Researchers programmes) are financed under the Research Framework Programmes of the European Union.

ENEPRI: the European Network of Economic Policy Research Institutes was created in 2000 at the initiative of the Centre for European Policy Studies (CEPS) and brings together 24 economic policy research institutes from most of the EU-27 countries. The goals of the network are to foster international diffusion of existing research, coordinate research plans, conduct joint research, and increase public awareness of the European dimension of national economic policy issues, including ageing, health, and retirement.

MIPAA: The Madrid International Plan of Action on Ageing promoted by the United Nations Population Fund (UNFPA) gathers the international community to respond to the challenges of population ageing. The implementation of the MIPAA involves the setting up of new bodies focused on ageing; policy guidelines and legislation; research and education; and awareness raising. At the European level, the main activities undertaken by member states of the European Commission for Europe (ECE) include the mainstreaming of ageing issues, the integration of older persons into society, the reform of social protection systems (financial sustainability, poverty prevention, provision of adequate benefits), the increase in employment rates of older workers, the provision of lifelong learning, and support towards a better quality of life and independent living (UNFPA, 2008). Within this framework the European Centre for Social Welfare Policy develops and collects indicators to monitor the implementation of the MIPAA.

5 Required research infrastructures, methodological innovations, data, networks, and consequences for research policy

5.1 Data requirements

Empirical evidence on European countries, on which to base ad hoc policies directed at improving retirement resources, is badly needed. The knowledge gaps relate to the extent of possible saving shortfalls and their distribution among the population, particularly in connection to the effects of the phasing in of recent pension reforms. While lack of suitable data is certainly the single most important factor in the gap, this could also reflect, particularly in continental Europe, a lack of concern given the strong paternalistic approach of traditional welfare states.

As for data, Campbell (2006) “designs” the ideal data set for household financial analysis. Adapting Campbell’s list to the study of household saving and adding some elements, the main characteristics of an ideal data set for evidence-based policy research could be the following:

- *Coverage:* the data set should relate to a representative sample of the entire population, especially by age and wealth.
- *Variables:* for each household, the data set should measure consumption, income, wealth, transfers (from family and friends as well as from the government), and bequests. Consumption, income, and wealth measurement should be sufficiently disaggregated to distinguish among main categories. It should also include information regarding expectations, preferences (especially risk aversion), and the extent of financial literacy.
- *Quality:* the data should be reported with a high level of accuracy. This raises two issues. First, the achievement of a high level of accuracy concerning wealth data might entail some degree of over sampling of the wealthier both because they hold most of the population wealth and in order to acquire sufficient information about the tails of the distribution. Second, the lower the quality of the data collected, the heavier the imputation effort needed. Therefore, eliciting complete and reliable answers—especially as far as wealth is concerned—is key. Great effort has been put into recent surveys (e.g., HRS and SHARE) to

improve data quality by means of unfolding brackets, vignettes, etc. These methods proved successful and could be adopted in all future data collection efforts.

- *Temporal dimension*: the data set should contain at least a longitudinal component. Panel data have the advantage of allowing the researcher to control for unobserved heterogeneity (i.e., a household may save a lot because it likes saving). However, population composition changes over time and re-interviewing the same people might lead to an issue of losing representativeness of the sample, which is an important element for policy research. The tension between panel data and repeated cross-sections may be solved by having both components.

At the European level some surveys focusing on household income and wealth already exist:

- **ECHP / EU-SILC**. The European Community Household Panel (ECHP) is a panel survey that ran for eight years from 1994–2001 in the EU15. It has currently been replaced by the European Union Statistics on Income and Living Conditions (EU-SILC). The EU-SILC was launched in 2004 in 13 Member States (Belgium, Denmark, Estonia, Greece, Spain, France, Ireland, Italy, Luxemburg, Austria, Portugal, Finland, and Sweden). This first release of the cross-sectional data mainly refers to income reference year 2003 with fieldwork carried out in 2004. The EU-SILC reached its full scale extension with the 25 Member States plus Norway and Iceland in 2005. It will be completed by Turkey, Romania, Bulgaria, and Switzerland.
- **LIS**. As an attempt to put together all European sources, the Luxembourg Income Study (LIS) is a cross-national data archive on household income from a large number of European and non-European countries. An effort has been made to harmonize and standardize the micro-data from the different surveys in order to facilitate comparative research. Since 2007 the Luxembourg Wealth Study (LWS) has been used to collect household wealth micro-data (from a smaller set of countries compared to LIS).
- **SHARE**. The only data set on household income and wealth collected at the European level is the Survey of Health, Ageing and Retirement in Europe (SHARE). It is a longitudinal data set collecting data representative of the population age 50 and over in 10 EU countries (Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Spain, Sweden) plus Switzerland and Israel. The second wave also includes the Czech Republic and Poland. At present, two waves are available.

A recent initiative is under way to respond to the need for truly comparable European micro-data on household income and wealth. The Household Finance and Consumption Project, promoted by the European Central Bank (ECB), aims at creating a comprehensive survey on household finances and consumption (HFC) for the Euro area.¹² Should this be implemented, it would have some advantageous characteristics with respect to the already available data sets:

- cross-country comparability (this is to be achieved via harmonization of existing surveys, such as the Italian SHIW or the German SAVE, and via implementation of new surveys in the countries that don't have one yet, and therefore do not appear in the LIS/LWS);
- representative of the entire population (while SHARE is representative only of the population age 50 and over);
- covers wealth, income, consumption, and employment (ECHP did not cover consumption);

At the current stage of the project, the HFC survey would also have some potential drawbacks—such as the non-synchronization between countries and the lack of information on financial

¹² Further information can be found at http://www.ecb.europa.eu/home/html/researcher_hfcn.en.html#about.

literature—mainly in order to minimize the monetary costs of data collection and the burden to respondents.

5.2 Methodological innovations required

A major required methodological innovation concerns the link between different, but related, disciplines in the field of social sciences (and to some extent among economic fields). As we have seen, the driving forces of household saving are far from being fully explained and there are many unresolved issues, including the link between the so-called optimizing and behavioural approaches, the latter drawing many insights from the psychological literature. This draws attention to how important a stronger relation between economics, sociology, psychology, and other social sciences could be in achieving a better understanding of household behaviour. It should be effective, and not just pay “lip service” to a trendy attitude.

6 What (and when) can we deliver on policy questions?

i. *What will be the consequences of reforms on the adequacy of retirement savings?* There is no necessary trade-off between sustainability and adequacy. Although mainly induced for sustainability reasons, European pension reforms as such may not be a direct threat to adequacy, as long as they address past distortions. Reforms are reducing future replacement rates, making room for discretionary savings; they are also reducing annuitization, thus leaving individuals more exposed to longevity risks. Conversely, they reduce distortions (particularly towards early retirement), introduce greater freedom of choice, and, by diversifying financial sources, move towards a better-diversified pension design.

ii. *How will household discretionary savings respond to changes in pension provisions?* On the basis of the theoretical predictions of conventional models, workers should work longer and save more in response to a reduction in mandated saving, thus “spontaneously” fill the gap created by reforms. We do not have enough evidence supporting this conclusion, and we do not know whether the policy will have (negative) unintended consequences (for example, by increasing the number of poor or conversely by increasing the future fiscal cost of supporting elderly people). Reforms affect the younger cohorts more than the older ones, but the young also have to face more uncertainty and greater flexibility in the labor market, and the joint effects of all these changes weaken simple tests of pension reform effects on household savings. By transferring risks to the individuals, reforms are likely to affect the poor more than the rich, who are better placed to face risks; the homothetic preferences typically adopted by LCM, however, neutralize the distinction. The same is true for the effects of the greater freedom of choice that will characterise future pensions: it is likely to increase the variability of responses and diminish the predictive power of the model.

iii. *Are conventional models really able to capture individual behaviour?* The answer is mixed. The life cycle model is rigorous, rich, and flexible and has proved capable of accommodating important facts of life, such as the relevance of precautionary saving in old age. Its limitations, however, increasingly suggest alternative paths, such as recourse to experimental economics. Also because of these limitations, we cannot simply transfer to Europe the (mostly American) evidence suggesting that the large majority of households behave according to the model and that only a (limited) fraction of households fail to plan adequately for retirement. The existence of data sets specifically focused on European countries would help provide an answer to the question of the extent and distribution of a saving gap.

iv. *What can policy do to improve retirement saving choices?* Lack of empirical knowledge creates uncertainty for policies directed at inducing workers to participate in (and adequately contribute to)

complementary pension plans. Should these policies be general or should they mainly be targeted to specific groups at risk? While the former suggestion seems supported by evidence of widespread financial illiteracy and inability to plan, the LCM would suggest more selective policies. Financial education programmes should be adopted (see Box 4) and carefully designed default options should always be present in complex choice situations, along with safety nets for the less fortunate. Further, policy measures should vary according to age, given the different phases of the life cycle faced by the young and the old. In building retirement savings, the young face liquidity constraints and, because of pension reform, a normative framework in transition. Therefore they should be provided with the instruments to make the best possible saving decisions. First, they should be aware of the opportunities, as well as risks, offered by financial markets and should receive the education and guidance to be able to make informed judgments (see again Box 4). Second, to encourage longevity insurance, annuities should be as cheap, easy, and safe as possible, and the government could try to solve many of the problems that make individual annuities expensive, complex, and risky (Munnell and Sunden 2004). The elderly, on the other hand, face a different kind of liquidity constraint: they normally own the house they live in, which is their main but scarcely liquid asset. Instruments to make housing equity more liquid should become more appealing, also through cost reduction. This is a matter for policies (particularly at a local level), as well as for markets.

Box 4 – Financial education programmes

As pension reforms are granting workers greater freedom of choice in deciding how to manage their retirement savings, individuals need to acquire the instruments to exercise their choices. Aware that workers display limited financial literacy and know little about their pensions, employers, policy makers, and nonprofit institutions in the United States and in Europe have undertaken financial education programmes. Mixed evidence of the effectiveness of these programmes (as shown by Bernheim and Garrett 2003; Duflo and Saez 2004; Lusardi 2004; Clark and D’Ambrosio 2009; and Schreiner and Sherraden 2007) suggests that widespread financial illiteracy cannot be “cured” by a one-time benefit fair or a single seminar and that a “one-size-fits-all” education programme will do little to stimulate saving.

To this end, in 2005 the OECD Council approved its *Recommendation on Principles and Good Practices for Financial Education and Awareness* (OECD 2005). The principles and good practices were designed to provide guidance on improving financial awareness and education in OECD and non-OECD countries. They concern the need to target national priority issues—such as basic savings, private debt management, or insurance—the need to raise awareness among the population about financial risks and ways to protect against them, as well as the need to improve financial institutions’ accountability.

7 References

Agarwal, Sumit, John Driscoll, Xavier Gabaix, and David Laibson (2007). “The Age of Reason: Financial Decisions over the Lifecycle”, mimeo, Harvard University.

Aguiar Mark, and Erik Hurst (2005). “Consumption versus Expenditure”, *Journal of Political Economy* 113(5), 919–948.

Alessie Rob, Annamaria Lusardi, and Arie Kapteyn (1995). “Saving and Wealth Holdings of the Elderly,”, *Research in Economics* 49, September 1995, 293–315.

Ball Laurence, and N. Gregory Mankiw (2007). “Intergenerational Risk Sharing in the Spirit of Arrow, Debreu, and Rawls, with Applications to Social Security Design”, *Journal of Political Economy* 115(4), 523–547.

Banks James, Richard Blundell, and Sarah Tanner (1998). “Is There a Retirement-Savings Puzzle?” *The American Economic Review* 88(4), 769–788.

Banks, James, and Zoe Oldfield (2006). “Understanding pensions: cognitive function, numerical ability and retirement saving”, IFS WP06/05;

Barr, Nicholas, and Peter Diamond (2008). “Reforming Pensions”, Center for Retirement Research, Boston College, WP#2008–26

Bernheim, Douglas (1995). “Do Households Appreciate Their Financial Vulnerabilities? An Analysis of Actions, Perceptions, and Public Policy”, *Tax Policy and Economic Growth*, Washington, DC: American Council for Capital Formation, pp. 1–30.

Bernheim, Douglas (1998). “Financial Illiteracy, Education and Retirement Saving”, in Olivia S. Mitchell and Sylvester Schieber (eds.), *Living with Defined Contribution Pensions*, Philadelphia: University of Pennsylvania Press, pp. 38–68.

Bernheim, Douglas, and Daniel Garrett (2003), “The Effects of Financial Education in the Workplace: Evidence from a Survey of Households,” *Journal of Public Economics*, 87, pp.1487–1519.

Bernheim, Douglas, and John Karl Scholz (1992). “Private Saving and Public Policy”, NBER WP 4215.

Bernheim, Douglas, Jonathan Skinner and Steven Weinberg (2001). “What Accounts for the Variation in Retirement Wealth Among US Households?” *The American Economic Review* 91(4), 832–857.

Börsch-Supan, Axel, and Annamaria Lusardi (2003). “Saving: Cross-National Perspective”, in Axel Börsch-Supan (ed.), *Life-Cycle Savings and Public Policy: A Cross-National Study in Six Countries*, Elsevier Science.

Brown, Jeffrey (2009). “Understanding the Role of Annuities in Retirement Planning”, in A. Lusardi (ed.), *Overcoming the Saving Slump: How to Increase the Effectiveness of Financial Education and Saving Programs*, forthcoming University of Chicago Press.

Brown Jeffrey, and James Poterba (2000) “Joint Life Annuities and Annuity Demand by Married Couples”, *Journal of Risk and Insurance* 67 (December 2000), 527–554.

Browning Martin, and Annamaria Lusardi, (1996). “Household Saving: Micro Theories and Micro Facts”, *Journal of Economic Literature*, 34(4), 1797–1885.

Calcagno, Riccardo, Elsa Fornero, and Mariacristina Rossi (2008). “The Effect of House Prices on Household Saving: The Case of Italy”, CeRP Working Paper 76/08.

Campbell, John (2006), “Household Finance”, *Journal of Finance* 61(4), 1553–1604.

Castellino, Onorato, and Elsa Fornero (2006). “Private Pension in Europe and in the United States: A Comparison of Recent and Likely Future Developments”, *The ICAFI Journal of Employment Law* iv(4), 8–34.

Castellino, Onorato, and Elsa Fornero (2007). “Pension Reform in Europe. Some Observations on Franco Modigliani’s Contribution”, in A. Muralidhar and S. Allegrezza (eds) *Reforming European Pension Systems*, Dutch University Press.

Choi, James, David Laibson, Brigitte Madrian, and Andrew Metrick (2004). “For Better or For Worse: Default Effects and 401(k) Savings Behavior”. Forthcoming in *Perspectives in the Economics of Aging*, edited by David A. Wise. Chicago, IL: University of Chicago Press, 2004.

Choi, James, David Laibson, Brigitte Madrian, and Andrew Metrick (2006). “Saving for Retirement on the Path of Least Resistance”, in Ef McCaffrey and Joel Slemrod (eds.), *Behavioral Public Finance: Toward a New Agenda*, New York: Russell Sage Foundation, pp. 304–351.

Clark, Robert and Madeleine d’Ambrosio (2009). “Adjusting Retirement Goals and Saving Behavior: The Role of Financial Education,” in A. Lusardi (ed.), *Overcoming the Saving Slump: How to Increase the Effectiveness of Financial Education and Saving Programs*, forthcoming University of Chicago Press.

Clery, Elizabeth, Stephen McKay, Miranda Phillips, and Chloe Robinson, (2007). *Attitudes to pensions: The 2006 survey*, Department for Work and Pensions, Research Report No 434.

Davidoff, Thomas, Jeffrey Brown, and Peter Diamond (2003). “Annuities and Individual Welfare”, MIT Working Paper 03–15.

Duflo, Esther, and Emmanuel Saez (2004). “Implications of Pension Plan Features, Information, and Social Interactions for Retirement Saving Decisions,” in Olivia S. Mitchell and Stephen Utkus (eds.), *Pension Design and Structure: New Lessons from Behavioral Finance*, Oxford: Oxford University Press, pp. 137–153

Dushi, Irena, and Anthony Webb (2004). “Annuitization: Keeping Your Options Open”, CRR Working Paper 2004-04.

Engen Eric, William Gale, and Cori Uccello (1999). “The Adequacy of Household Saving”, *Brookings Papers on Economic Activity*, No.2, pp. 65–187.

Fornero, Elsa, Annamaria Lusardi, and Chiara Monticone (2008). “Maestro di Risparmio Cercasi”, *LaVoce.info*, 23/06/2008 (<http://www.lavoce.info/articoli/pagina1000476.html>)

Geanakoplos, John, Olivia Mitchell, and Stephen Zeldes (2000). “Social Security Money's Worth”, NBER Working Paper n. 6722.

Gomes, Francisco, and Alexander Michaelides (2003). “Aggregate Implications of Social Security Reform”, Prepared for the Fifth Annual Joint Conference of the Retirement Research Consortium “Securing Retirement Income for Tomorrow’s Retirees” May 15–16, 2003, Washington, D.C.

Gustman, Alan, and Thomas Steinmeier (1989). “An Analysis of Pension Benefit Formulas, Pension Wealth and Incentives from Pensions”, *Research In Labor Economics* 10, 53–106.

Gustman, Alan, and Thomas Steinmeier (1999). “Effects of pensions on savings: Analysis with data from the Health and Retirement Study”, *Carnegie-Rochester Conference Series on Public Policy* 50, 271–324.

Gustman, Alan, and Thomas Steinmeier (2004). “What People Don’t Know about their Pensions and Social Security”, in William Gale, John Shoven and Mark Warshawsky (eds.), *Private Pensions and Public Policies*, Washington, D.C.: Brookings Institution, pp.57–125.

Gustman, Alan, Thomas Steinmeier, and Nahid Tabatabai (2009). “Do Workers Know about Their Pensions? Comparing Workers’ and Employers’ Pension Information,” in Annamaria Lusardi (ed), *Overcoming the Saving Slump: How to Increase the Effectiveness of Financial Education and Saving Programs*, forthcoming, University of Chicago Press.

Haider Steven, and Melvin Stephens, (2007). “Is There a Retirement-Consumption Puzzle? Evidence Using Subjective Retirement Expectations”, *The Review of Economics and Statistics* 89(2), 247–264.

Haveman, Robert, Karen Holden, Barbara Wolfe, and Shane M. Sherlund (2006). “Do Newly Retired Workers in the United States Have Sufficient Resources to Maintain Well-Being?” *Economic Inquiry* 44(2), 249–264.

Hedges, Alan (1998). *Pensions and Retirement Planning*, Department of Social Security, Research Report No 83.

Hilgert, Marianne, Jeanne Hogarth, and Sondra Beverly (2003). “Household Financial Management: The Connection between Knowledge and Behavior”, *Federal Reserve Bulletin*, pp. 309–322.

Holzmann, Robert, and Montserrat Pallarès-Miralles (2005). “The Role, Limits of, and Alternatives to Financial Education in Support of Retirement Saving in the OECD, Eastern Europe and beyond”, The World Bank, Prepared for presentation at the Sixth Annual Conference “Individual Behavior with Respect to Retirement Saving” 14 October 2005 at the CeRP, Turin, Italy.

Hurd, Michael, and Susann Rohwedder (2006). “Some Answers to the Retirement-Consumption Puzzle” RAND Working Paper Series No.WR-342.

Hurd, Michael, and Susann Rohwedder (2008). “Adequacy of Resources in Retirement”, Prepared for the 10th Annual Joint Conference of the Retirement Research Consortium “Creating a Secure Retirement System”, August 7–8, 2008, Washington, D.C.

Kifmann, Mathias (2008). “The Design of Pension Pay Out Options When the Health Status During Retirement is Uncertain”, CESifo Working Paper Series No. 2211.

Kim, Kyo-seong, and Yeonjung Lee (2007). “A qualitative comparative analysis of strategies for an ageing society, with special reference to pension and employment policies”, *International Journal of Social Welfare* 17(3), 225–235.

Kimball, Miles, and Tyler Shumway (2006). “Investor Sophistication, and the Participation, Home Bias, Diversification, and Employer Stock Puzzles”, mimeo, University of Michigan.

Kotlikoff, Laurence, Avia Spivak, and Lawrence Summers (1982). “The Adequacy of Savings”, *American Economic Review* 72 (5), 1056–1069.

Laibson, David (1998). “Life-cycle consumption and hyperbolic discount functions”, *European Economic Review* 42, 861–871.

- Lindbeck, Assar, and Mats Persson (2003). “The Gains from Pension Reform”, *Journal of Economic Literature* 41(1), 74–112.
- Love, David, Paul Smith, and Lucy McNair (2008). “A New Look at the Wealth Adequacy of Older U.S. Households”, Finance and Economics Discussion Series 2008-20, Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington, D.C.,
- Lusardi, Annamaria (1999). “Information, Expectations, and Savings for Retirement”, in Henry Aaron (ed.). *Behavioral Dimensions of Retirement Economics*, Washington, D.C.: Brookings Institution and Russell Sage Foundation, 81–115.
- Lusardi, Annamaria (2004). “Savings and the Effectiveness of Financial Education,” in Olivia S. Mitchell and Stephen Utkus (eds.). *Pension Design and Structure: New Lessons from Behavioral Finance*, Oxford: Oxford University Press, 157–184.
- Lusardi, Annamaria (2008a). Household Saving Behavior: the Role of Financial Literacy, Information and Financial Education Programs, NBER Working Paper No. 1382..
- Lusardi, Annamaria, (2008b). “Financial Literacy: An Essential Tool for Informed Consumer Choice?” NBER Working Paper No. 14084.
- Lusardi, Annamaria, Punam Anand Keller, and Adam M. Keller (2009). “New Ways to Make People Save: A Social Marketing Approach”, in A. Lusardi (ed). *Overcoming the Saving Slump: How to Increase the Effectiveness of Financial Education and Saving Programs*, University of Chicago Press.
- Lusardi, Annamaria, and Olivia S. Mitchell (2006). “Financial Literacy and Planning: Implications for Retirement Wellbeing”, Working Paper, Pension Research Council, Wharton School, University of Pennsylvania.
- Lusardi, Annamaria, and Olivia S. Mitchell (2007a). “Baby Boomer Retirement Security: The Role of Planning, Financial Literacy, and Housing Wealth”, *Journal of Monetary Economics* 54, 205–224.
- Lusardi, Annamaria, and Olivia Mitchell (2007b). “Financial Literacy and Retirement Preparedness. Evidence and Implications for Financial Education,” *Business Economics*, January 2007, 35–44.
- Lusardi, Annamaria, and Peter Tufano (2008). “Debt Literacy, Financial Experiences and Overindebtedness”, Working Paper, Dartmouth College.
- Madrian, Brigitte, and Dennis Shea (2001). “The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior,” *Quarterly Journal of Economics* 116, 1149–1525.
- Miniaci Raffaele, Chiara Monfardini, and Guglielmo Weber (2003). “Is There a Retirement Consumption Puzzle in Italy?”, IFS WP 03/14.
- Mitchell, Olivia (1988). “Worker Knowledge of Pensions Provisions,” *Journal of Labor Economics* 6, 21–39.

Moore, James , and Olivia Mitchell (1997). “Projected Retirement Wealth And Savings Adequacy In The Health And Retirement Study”, NBER Working Paper No. 6240.

Muellbauer, John (2007). “Housing, credit and consumer expenditure”, paper prepared for the Kansas Federal Reserve Symposium, 31st August – 1st September 2007.

Munnell, Alicia H., and Annika Sunden (2004). *Coming Up Short: The Challenge of 401(k) Plans*, Brookings Institution Press.

Munnell, Alicia, Anthony Webb, and Luke Delorme (2006). “A New National Retirement Risk Index,” An Issue in Brief, Center for Retirement Research at Boston College, June, No. 8.

OECD (2008). *Improving Financial Education and Awareness on Insurance and Private Pensions*, OECD, Paris.

OECD (2005) *Improving Financial Literacy: Analysis of Issues and Policies*, OECD, Paris..

Scholz John Karl, and Ananth Seshadri (2007). “Children and Household Wealth”, mimeo.

Scholz John Karl, and Ananth Seshadri (2008), “Are All Americans Saving 'Optimally' for Retirement?”, prepared for the 10th Annual Joint Conference of the Retirement Research Consortium “Creating a Secure Retirement System” August 7-8, 2008 Washington, D.C.

Scholz John Karl, Ananth Seshadri, and Surachai Khitatrakun, (2006). “Are Americans Saving ‘Optimally’ for Retirement?”, *Journal of Political Economy* 14(4), 607–643.

Schreiner, Mark, and Michael Sherraden (2007). *Can the Poor Save? Saving and Asset Building in Individual Development Accounts*, New Brunswick, NJ: Transaction Publishers.

Shiller, Robert (1998). “Social Security and Institutions for Intergenerational, Intragenerational and International Risk Sharing”, paper prepared for the Carnegie–Rochester Public Policy Conference, April 24–25, 1998.

Sinclair, Sven, and Kent Smetters (2004). “Health Shocks and the Demand for Annuities”, Congressional Budget Office, Technical Paper Series: No. 2004-09.

Skinner, Jonathan (2007). “Are you sure you are saving enough for retirement?” *Journal of Economic Perspectives* 21(3), 59–80.

Smith, Sarah (2006). “The Retirement-consumption Puzzle and Involuntary Retirement: Evidence from the British Household Panel Survey”, *The Economic Journal* 116.

Smith, Vernon (2008). “How to improve the outcome of individual choices – the lessons of experimental economics”, Trends in Savings and Wealth, Features, http://www.savingsandwealth.com/features/improve_the_outcome_of_individual_choices.jhtml

Stango, Victor, and Jonathan Zinman (2007). “Fuzzy Math and Red Ink: When the Opportunity Cost of Consumption is Not What It Seems”, Working Paper, Dartmouth College.

Stiglitz, Joseph (2008). “Uncertainties in the life cycle and how they should be addressed”, Trends in Savings and Wealth, Features, http://www.savingsandwealth.com/features/uncertainties_in_the_life_cycle.jhtml

Thaler, Richard (1994). “Psychology and Savings Policies”, *The American Economic Review* 84(2), Papers and Proceedings of the Hundred and Sixth Annual Meeting of the American Economic Association (May 1994), pp.186–192.

Thaler, Richard, and Shlomo Benartzi (2004). “Save More Tomorrow: Using Behavioral Economics to Increase Employee Savings”, *Journal of Political Economy* 112(1) Part 2: S164–87.

Turra, Cassio, and Olivia Mitchell (2004). “The Impact of Health Status and Out-of-Pocket Medical Expenditures on Annuity Valuation”, WP 2004-2, Philadelphia, PA: Pension Research Council.

UNFPA (2008) (ed.). “The Madrid International Plan of Action on Ageing: Where Are We Five Years Later?”, The WDA-HSG Discussion Paper Series on Demographic Issues No. 2008/2, United Nations Population Fund.

Van Rooij, Maarten, Annamaria Lusardi, and Rob Alessie (2007). “Financial Literacy and Stock Market Participation”, NBER Working Paper n. 13565.

Venti, Steven, and David Wise (1991). “Aging and the Income Value of Housing Equity”, *Journal of Public Economics* 44: 371-395.

Yaari, Menahem (1965). “Uncertain Lifetime, Life Insurance, and the Theory of the Consumer”, *The Review of Economic Studies* 32(2): 137–150.

Yakoboski, Paul, and Jennifer Dickemper (1997). “Increased Saving but Little Planning: Results of the 1997 Retirement Confidence Survey”, *EBRI Issue Brief* 191, November.