Adequacy of Saving for Old-Age in Europe*

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1 Conceptual issues and policy questions

According to the intertemporal model of consumption, individuals plan their consumption by taking into account the entire path of (expected) lifetime income, plus initial assets. In the stylized life cycle version of the model (LCM), individuals save during their working life to provide for consumption in the old-age.[1] Although saving for retirement is probably the single most important reason prompting individuals to accumulate wealth, other motives for saving are also relevant and can be accommodated into the standard model (Browning and Lusardi, 1996); differences in preferences and "taste for saving" (farsightedness, risk aversion, prudence, preference for bequest etc.) can also be incorporated.

With these modifications, the intertemporal model is better suited to explain why saving rates and wealth levels are so heterogeneous among the population – varying not only with respect to age (cohort/time), but also education, family size (and number of children), health and so on – and why wealth is so low for some groups (e.g. the young). Given these large differences, in which sense can we ask whether people have accumulated/are accumulating an *adequate* amount of retirement savings? And on which grounds is the question *relevant*?

The concept of (saving) adequacy should, in our view, combine two dimensions: a) sensible individual behavior with respect to the intertemporal allocation of resources in a given market and institutional context, and b) a well structured institutional design for an efficient sharing and diversification of risks, given individual preferences. This last point is also crucial, because even rational individuals can accumulate wealth poorly/inefficiently if they do not have the proper instruments and markets to do so.

The theory typically *assumes* that individuals are rational and able to plan their saving decisions over their lifetime horizon; this is the *normative* benchmark of many papers on savings (Scholz and Seshadri, 2008, p. 4). A vast amount of empirical literature, however, has documented departures from such an ideal standard due, for example, to myopia, inertia, and lack of financial literacy. Thus, the degree of saving inadequacy depends on how distant individual behaviour is from that benchmark. Moreover, saving decisions can be influenced by both the financial and insurance markets and by public policies. 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 saving. Whether these policies aiming to encourage greater individual responsibility should be preferred to imposing mandatory participation in a pension scheme is still an open issue. Thus the question about the adequacy is relevant for shaping policy measures and for targeting them to specific goals/groups.

For every individual, saving decisions entail some knowledge and/or expectations about the future evolution of compulsory retirement savings, to be withdrawn in retirement as a pension/annuity (Jappelli and Modigliani, 2003), as well as of goods and services provided by the state in the form of in-kind health services and other benefits such as long term care (LTC), if available.

[1] The provision of resources for the future is carried out not only by adjusting the saving/consumption margin but also through variation in the labour supply.

This brings into the picture institutional features, which are perhaps more difficult to characterize in a single model. With respect to the individual lifetime planning, the institutional setting defining scale and features of pension and health care systems is – to some extent – exogenous; from the point of view of the government, however, the provision of public benefits/services depends on factors such as: sustainability of public expenditure (intertemporal budget constraint); confidence in the ability of individuals to provide for their old-age; extent of market imperfections; public concern about poverty and redistributive preferences.

Even restricting our attention to Europe, a wide variety of arrangements for retirement provisions are in place, with countries varying widely according to the degree of state intervention, the provision of inter and intra-generational insurance, the amount of redistribution, and other characteristics (Kim and Lee 2007). Given these differences, individual behaviour is expected to differ not only because of preferences and individual resources but also due to the level of state-mandated saving and the access to private insurance. The degree of substitutability between "discretionary" and "mandatory" saving should also be considered (Borsch-Supan Brugiavini, 2001; Disney, 2000; Jappelli, 1995). Ideally, the assessment of the adequacy of household savings should be done in combination with the assessment of the adequacy of public pension provisions.

Health and LTC risks are also a very important motive to save, for example for precautionary reasons due to the lack of formal insurance, while housing equity is normally considered the best hedge against future catastrophic health care expenses (Skinner, 2007). In the analysis that follows, however, we will not consider health care and LTC provisions, mainly because the health risks of the elderly are generally taken care of in Europe and provided by national health care systems. Out of pocket health expenditure is also less relevant in Europe than in countries like the US. Finally it is less clear whether a public versus private provision of heath care increases efficiency, as it is normally assumed in a pension system. We will furthermore concentrate our attention to income risk in retirement and therefore on pension provisions, partially neglecting other risks connected to participation in the labour market (such as unemployment, disability, and so on) even though a lack of resources in retirement is typically the direct consequence of a poor working career.

The role of uncertainty should not be underplayed and it is related to other aspects of the economic environment. Pension reforms – by shifting pension formulae from Defined Benefits (DB) to Defined Contribution (DC) systems – substantially increased workers' uncertainty with regards to their replacement rates. When there was one major source of retirement income (i.e., a public mandatory pension) and the pension formula was of the DB type, determining the amount of pension benefits was a relatively easy task.[2] Reforms made pension systems more difficult to understand and demanded greater efforts to both collect and process information. This greater complexity also introduced an element of uncertainty over future benefits, thus increasing the costs (and reducing the incentives) to plan ahead.

[2] In the case of Italy, in the old system, pension benefits were determined by simply multiplying the number of years of "seniority" by 2 per cent of an average of the last wages; workers could thus anticipate a replacement ratio within the range 70 (for 35 years of seniority) and 80 per cent of "last" wages.

1.1 Adequacy from the individual/ household perspective

To assess adequacy of saving for retirement, one can refer directly to optimization theory or to measures which are somehow related (sometimes in a weaker way) to an optimizing model. In order to compare them, we will use the key equations of each approach: i.e. the Euler equation and the replacement rates.

1.1.1 The optimization principle

According to Engen et al. (1999, p. 70): "*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*". The Euler equation is the optimality condition implied by the model:

$$\max E_t \sum_{j=0}^{T-t} \beta^j U(C_{t+j}, Z_{t+j})$$
$$s.t. A_{t+j+1} = A_{t+j}(1+R_{t+j}) + Y_{t+j} - C_{t+j}$$

where $\beta = 1/(1+\delta)$ and δ indicates the individual intertemporal discount rate, $U(.)$ is a utility function depending on consumption C, as well as on the household demographic characteristics Z (e.g. household composition), and where A represents the stock of assets that grow from one period to the next according to the interest rate R, and Y is labour income.

From the first-order conditions, the following Euler equation is obtained:

$$U'(C_t, Z_t) = E_t\left[U'(C_{t+1}, Z_{t+1})\beta(1+R_{t+1})\right]$$

where the marginal utility of consumption at time t is equal to the expected (discounted present value of the) marginal utility of consumption in period $t+1$. The inclusion of household composition is relevant both because of the particular risk placed on singles (e.g. survivors) in retirement and because changes in the family composition help explaining why a lower consumption in retirement can be optimal (Scholz and Seshadri, 2007) .

This simple framework has been enriched by adding real life complexities such as labour supply decisions; uncertainty over future earnings and interest rates, the length of life and the health status; borrowing constraints; bequest and other motives for saving etc. (the most ambitious attempt is provided by Scholz, Seshadri and Khitatrakun, 2006). The main lessons to be drawn from this model are that the optimal intertemporal allocation of consumption requires the smoothing of marginal utility over time, and that low savings may be related with a number of individual "characteristics" (for instance, the young may save little or nothing or may be borrowing; older individuals may have little "discretionary" savings because the amount of "mandatory" saving is considered adequate to their retirement needs). Thus, the model helps thus distinguishing between an "inadequate" versus a low level of saving/wealth, which can be perfectly consistent with optimizing behaviour.

1.1.2 Uncertainty and market imperfections

Retirement risks are of paramount importance and models that ignore risk can provide, at best, only illustrative examples. When considering retirement provisions, *earning risk* is one of the most important risk to consider; conversely, at retirement, the main risks facing an individual are longevity and health risks. There are also other risks to be considered, such as political risks and interest rate risks. These risks can be diversified to a different degree, both depending on their nature and the market structure; while insurance can be bought in the market and/or is provided by the state, it is often imperfect, incomplete and costly.

Borrowing constraints. According to the model, individuals' wealth reaches its peak at the time of retirement. Thus, borrowing constraints are typically not biding in the old age. However, for those individuals that accumulate primarily via Social Security and pensions, wealth may be rather illiquid.

Wealth (il)liquidity. Individuals enter retirement not only with very different levels but also with different composition of wealth; social security (plus private pension) wealth is typically a substantial fraction of total wealth, competing with housing for the largest share in total wealth. While the first is annuitized by definition, and often delivers indexed benefits, housing wealth is rather illiquid. However, the house is often an attractive investment because it combines a flow of services with an investment good and it provides scope for portfolio diversification, given the low correlation between housing value and financial investments' return. Because of this illiquidity, it is sometimes excluded in empirical work on savings adequacy because households do not appear to draw down housing wealth after retirement (Venti and Wise 1990, 1991; Bernheim and Scholz, 1992).

Financial markets, however, have developed instruments to extract equity from home and to transform it into a more liquid form: mortgage equity withdrawals, reverse mortgages and flexible refinancing practices, offering a variety of cash flow profiles, enhancing households' ability to manage their financial position. Muellbauer (2007) focuses on the implications of easier access to credit for the housing wealth effect. In principle the relationship between house prices and aggregate consumption can be either positive or negative. Indeed higher prices increase homeowners' consumption but, on the other hand, lead renters and young potential first-time buyers to save more. Credit market's development lowers down-payment ratios and eases the access of homeowners to collateralized loans and, in turn, makes the aggregate effect of rise in price on consumption more likely to be positive. Muellbauer supports this theoretical argumentation with an empirical analysis that exploits cross-countries differences and the consequences of credit market liberalizations. He finds no evidence of housing wealth effect in the UK before 1980 but, after the liberalization that started in the Eighties, the positive link between consumption and housing wealth strengthened as credit supply conditions improved. Similar results are shown for countries with sophisticated financial systems like the US and South Africa. Different findings are obtained for Japan, characterized by inefficient credit markets and where no liberalization took place during the last decades. The negative housing wealth effect in Japan seems driven by higher saving by the young as house prices rise. Calcagno et al. (2008) study the effect on Italian households' saving behaviour of a change in real estate wealth using the Bank of Italy's Survey of Household Income and Wealth

(SHIW). They relate annual household saving to capital gains in housing, controlling for other characteristics such as age, and find the oldest households (less touched by the higher costs of future rents) to be the most affected by an increase in real net housing wealth.

In any case, new instruments are still scarcely used: many households still maintain a preference for living in their home, at least until a health shock force them to move, and hardly plan to use their housing wealth to finance consumption in retirement (Lusardi and Mitchell 2007).

Annuities. Economic theory advocates that, because of the "mortality premium", annuities dominate the return offered by financial assets; individuals should thus annuitize their wealth upon retirement to remove the risk of outliving their resources (Yaary, 1965). Davidoff et al (2003) show however that, when markets are incomplete, the arbitrage-like dominance argument does not hold any more, and full annuitization is not the best decision. While the theory can hardly answer questions about the "optimal fraction" of annuitized wealth, and while uninsurable risks may add to or subtract from it, depending on the nature of the risk, many simulations show that annuities are quite valuable to agents even when the optimal consumption trajectories differ substantially from the time paths of annuity payouts.

In practice, despite their high utility value, annuity markets are thin, as many problems limit individuals' propensity to annuitize: while the potential need to pay for uninsured medical expenses or for a nursing home provides a rationale for limiting/delaying the demand or for preferring lump sums (Turra & Mitchell 2004; Sinclair & Smetters 2004; Kifmann, 2008), risk pooling within couple/family decreases the value of annuitization for married couples (Brown & Poterba 2000, Dushi & Webb 2004).

Selection effects - estimated by the difference between the money's worth ratios[3] (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), MWR are not very far from it, suggesting that expensiveness is hardly the main reason for the limited demand.

Finally, psychological factors - i.e. a preference for lump sums *as such* and other forms of "irrational" or bounded rational behavior like the hyperbolic discounting - could be at work, while the complexity and riskiness of the product act as further disincentives. Given the relevance of *mortality risk* for the consumption path, there is room for government intervention, for instance in the definition of default options, in increasing transparency, in specifying that the standard type of annuity be inflation indexed, and possibly also in capping administrative costs.

1.1.3 Demographic issues

As long as consumption data are (collected and) used at the household level, demographic issues become important in assessing saving adequacy. In particular,

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

household composition has to be taken into account both because the number of household members varies across time and because of economies of scale in consumption. From a practical point of view, the application of an equivalence scale is a way of weighting each household member (depending on age and household size) to covert family expenditure into "adult equivalent" consumption[4].

Miniaci et al. (2003) compare household and per-adult equivalent age- consumption profiles in Italy, and show that even after this adjustment, non-durable consumption drops steadily after retirement, while it is almost flat at younger ages. Skinner (2007) suggests that having children helps in moderating pretentions 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 inadequate resources.

Endogeneity issues should be taken into account if we consider that 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 US households, accounting for the endogenous fertility decision. Their simulated model is able to match well the actual wealth and fertility heterogeneity and shows that variation in family size plays an important role in understanding wealth dispersion and that children have a substantial negative effect on wealth accumulation.

1.1.4 Proxy measures: replacement rates

As implementing an optimization model is not an easy task, less demanding approaches to individual choices or shortcuts have frequently been adopted, like using income levels as a proxy for consumption levels. A few conceptual steps allow to go from a rigorous conceptual framework as the above to the simplified measure of replacement ratios. First, smoothing of consumption levels instead of smoothing of marginal utility of consumption is required; then consumption levels are substituted with income levels in the typical RR below:

$$RR_i = \frac{y_i^r}{y_i^a}$$

where the replacement rate of individual *i* is computed as the ratio of income when retired to her earnings when active. This measure can be made more refined by considering comprehensive after-tax measures of income and take several dimensions (one can look at current or prospective RR or compare individuals in different cohorts), but the main point is that RR are a rather unsatisfactory method to analyze individuals' ability to maintain their living standards, mainly because they entirely neglect retirement risks (Hurd and Rohwedder, 2008).

[4] For instance, poverty studies in Italy use the Carbonaro equivalence scale, that assigns a unitary weight to a 2-members household, a weight of .599 to a 1-member household, and then weights of 1.335, 1.632, 1.905, 2.150 and 2.401 to households of 3, 4, 5, 6 and 7 or more members, respectively (Inquiry Commission on Poverty, 1997).

Moreover, as we move away from theory the idea of adequacy itself becomes looser. For instance, it is difficult to identify the "optimal" RR (should it be 100% or is 80% reasonable on the grounds that needs in retirement are less than in working life and that their composition changes with age towards state provided health and care services?). Further, given the diversity of individual circumstances it is very unlikely that a "one size fits all" measure will work. As a result, the target living standard to be maintained after retirement is normally rather arbitrarily fixed.

Ultimately, both dimensions of adequacy – as "optimizing behaviour" and as "maintenance of an income level" – are relevant. Policymakers are worried if a non-optimal saving behaviour is leading to too little saving for retirement, not if it entails too large resources during retirement and too little during working life. Therefore, the idea of adequacy as optimization provides a rigorous and theoretically-based benchmark to evaluate individual behaviour (assuming we have all the relevant information to assess it) but it is implicitly assumed that only some types/directions of non-optimization constitute a problem.

1.2 Adequacy from the point of view of the pension system

As argued in the previous paragraph, a proper understanding of household savings cannot ignore the issue of pension systems' adequacy. This requires a more macro perspective, with the focus on the government's role in delivering or promoting adequate saving for retirement.

Within the EU agenda, the idea of "adequacy of a pension systems" embeds three objectives: i) preventing social exclusion; ii) enabling people to maintain living standards; iii) promoting solidarity[5]. In a similar vein, a World Bank report on pension reforms (Holzmann and Hinz 2005) define as "adequate" a pension system "*that provides benefits to the full breadth of the population that are sufficient to prevent old-age poverty on a country-specific absolute level, in addition to providing reliable means to smooth lifetime consumption for the vast majority of the population*"[6].

Expanding on this framework, a pension *design* can be said *adequate* when, under the constraint of financial sustainability[7]:

a) it reduces the idiosyncratic uncertainty, i.e. it provides efficient ways to broaden the scope for risk pooling and sharing, not only through direct public provision of pensions (and other benefits for the elderly) but also through a good regulation/supervision of the market provisions. It is to be noted that risk diversification and sharing provides the main rationale for a mixed system

[5]See EC, Synthesis report on adequate and sustainable pensions (SEC(2006)304, 27/02/2006). In December 2005, the European Council adopted a (new) framework on social protection and social exclusion, establishing a series of common objectives, following those agreed in Laeken in 2001 (EC, 2005).

[6]Often this classification is referred to as the first and second tiers of the pension systems, with the first aiming at maintaining above the poverty level the absolute standard of living, and the second at providing an adequate income relative to previous earnings.

[7]Financial sustainability is interpreted here as the capability of the pension system to finance expenditure with contributions in the steady state. Adequacy 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.

(Shiller 1998, Lindbeck and Persson 2003), partly public, PAYGO and redistributive and partly private, funded (either occupational or individual based) and actuarial;

b) it encourages individual awareness of retirement needs and their capacity to take informed and farsighted decisions. This includes providing financial literacy and/or designing schemes appropriately (Madrian Shea, 2001; Holzmann et al., 2005, Lusardi 2007);

c) it reduces inequality and, more specifically, poverty among the elderly.

Note that points a) and b) can be thought of as "providing means for individual consumption smoothing" as stated in the definitions above, while point c) has more to do with the redistributive features of pension schemes.

From this macro perspective, adequacy has rather to do with the *ex ante* diversification of risks that is implied by the pension design than with pension levels *per se*. Ideally, what matters is the ability to provide a framework that is as close as possible to a complete and perfect market setting.

In an overlapping generations economy, a source of markets incompleteness comes from the impossibility of individuals to engage in intergenerational risk sharing, with not yet born generations. In the absence of such markets, governments can substitute for them by providing appropriately designed pension systems: a PAYG mechanism is exactly a vehicle to set up such an intergenerational contract (Shiller, 1998; Ball and Mankiw, 2007). Risk diversification however, requires more than just this. It demands a good combination of public and private choices as well as a good regulation/supervision of market provisions, thus providing a rationale for the set up of a mixed system (Lindbeck and Persson, 2003). Moreover, also the choice between DB or DC systems should be carefully considered in the pension system design, as it bears 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. Even though the scope for intragenerational risk pooling might be reduced by issues such as moral hazard and prior income inequality, there are many practical limitations to the ability of the elderly to diversify their incomes by themselves, hence emphasizing the government's role in providing this kind of risk sharing (Shiller, 1998).

Further, we have claimed above that even though the theory assumes that individuals are perfectly able to plan their saving, they may not be able to do so, or not entirely. Hence, government intervention should also aim at providing individuals instruments to make if not the "best" at least a sensible choice. This can be done by fostering individual responsibility (i.e. encouraging the individuals' awareness of retirement needs and improving their capacity to take informed and farsighted decisions via financial literacy programmes), or by choosing in a satisfactorily way on workers' behalf (i.e. appropriate design of pension schemes' default options) (Madrian and Shea, 2001; Holzmann et al., 2005; Lusardi 2007; OECD, 2008).

A*ssessing* the adequacy of a pension system *in practice* is, however, very difficult. On the one hand, one has to recognize the absence of suitable indicators, capable of offering a benchmark degree of efficient risk diversification, against which compare actual data. On the other, these indicators would be difficult to implement, in any case,

because pension systems are never in a steady state, and the transition costs imposed by reforms would have to be taken into account. Typically reforms imply high costs and a long term process, as for most countries, for example, the problem is not to decide whether to create *ex novo* a funded public scheme, but whether to favour the birth, or the growth, of funded schemes side by side with an already existing, and developed, PAYG one.

This applies in particular to European countries, whose welfare systems are almost invariably undergoing transitions (Castellino and Fornero, 2006). *First*, since most of the recent reforms are negatively impacting (or will in the future) on the replacement rates offered by the first pillar, they have been accompanied by measures aiming at encouraging the growth of the second and third pillars. Indeed, most recent pension reforms are designed with the implicit idea that household saving is too scarce, at least for a part of the population (Borsch-Supan and Brugiavini, 2001). As the growth of funding is seen as a countermeasure for the reduction of the PAYG coverage, the transition problem can be very severe: if young workers are told that they will receive lower pensions for the same payroll tax rate, and encouraged to contribute to a funded pillar as an offsetting measure, they are asked to save more for the same replacement ratio.

Retrenchment of past promises would seem shrinking the adequacy of the pension systems; however, by restoring financial sustainability, it could indeed reinforce it, because all future generations would benefit from a system that does not create additional public debt.

Second, another important feature of pension reforms is the move from Defined Benefits (DB) to Defined Contributions (DC) type of formulae, which implies both a stronger dependence of benefit on contributions and a closer proximity (when not a strict correspondence, as in the NDC system) of the internal rate of return to the equilibrium rate represented by the growth of the wage bill (Italy, Sweden, Poland and Latvia have adopted actuarially fair types of formulae). This is in sharp contrast to the history of PAYG, where workers had been accustomed to higher pay-offs. The shift from DB to DC is also occurring in the private sector, induced by the increasing, and in some instances destabilizing, cost of DB plans to employers.

The expansion of DC formulae within both PAYG and pension funds clearly implies an increase in the uncertainty surrounding the replacement rate at any given age of retirement and a transfer of risks onto the workers. Again, these greater risks would seem to undermine the adequacy, but if the overall design should attain - although with transition costs, whose incidence should not be ignored - a better diversification of risks the opposite could be true.

Third, reforms are also, in general, implementing a greater flexibility of retirement, instead of the traditional "mandatory" retirement ages, differentiated rather arbitrarily by gender and categories. This introduces an important adjusting margin, as workers are not forced to leave at a certain age, neither induced to leave as they reach the minimum requirements by pension formulae which contain high implicit taxes on the continuation of the activity.

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

1.2.1 Poverty rates

The *poverty rate* among the retired – the ratio of the number of retired individuals whose income is below a minimum level (the "poor") to the total number of retired individuals ($p^r = n^r_p / n^r$) – is commonly adopted because the adequacy-poverty threshold is fixed in an absolute way. Moreover, since the government does not know if households are saving optimally given their preferences, incomes, assets, demographics, etc, then aiming at low income individuals might be a good *ex post* solution. Even though poverty and adequacy are different concepts, from a practical point of view inadequate saving behaviour is typically found among the less educated households at the bottom of the income distribution, who are also those more likely to fall below poverty lines.

Indeed, one could say that the capacity to perform *ex post* redistribution so that the income of the elderly is in any case above a minimum threshold (i.e. poverty line) is a crucial aspect of a good welfare system. However, it is also rather arbitrary and it bears very little correlation to the degree of risk sharing and diversification carried out by the pension systems; it also neglects the fact that poverty in retirement may have to do with pre-retirement poverty status rather than with the fact of retiring and does not allow to distinguish whether inadequacy is due to individual behaviour (this may happen when retirement is chosen at too young ages) or context constraints (e.g. market incompleteness).

1.2.2. (Aggregate) replacement rates

At an aggregate level, replacement rates are used to assess the ability of a pension system to allow the maintenance of pre-retirement living standards. Again, they are only marginally related to the notion of pension systems adequacy as risk diversification and may suffer from a lack of representativeness when computed for some – supposedly – typical figures in the context of an evolving pension system. In fact, new systems often incorporate different incentives to saving/retirement with respect to the old ones – especially when reforms strengthen actuarial fairness and neutrality – and individual adjustments to the new rules cannot be easily predicted.

To overcome the problem of a reference RR target, the NRRI computes RRs *targets*, i.e. the replacement rate needed to allow households to maintain in retirement their pre-retirement standard of living (Munnell et al., 2007). In addition, analogously to other studies, the Index also tries to look at the adequacy issue from a broader perspective by including in the definition of wealth housing, social security benefits and private pensions; it's a good attempt to provide an index, which suffers however from all the shortcomings of measures derived from *ad hoc* methodologies and not from tight theories.

From the point of view of an adequate pension system design, it is also important that retirees maintain a certain level of living standards also with respect to the working population in younger cohorts. To this end replacement rates after 10 years of retirement are computed *as the ratio of the value of an individual's pension 10 years after retirement, divided by the income of another worker retiring 10 years later the previous one* (ISG, 2006). These are meant to provide an assessment of the evolution of the relative position of the individual, typically reflecting pension indexation. Indeed,

indexing pension benefits to wages or prices can produce great differences in the relative position of the elderly with respect to the active population. Typically, pension reforms have de-indexed pensions from wages to prices, meaning that at best retirees can maintain the purchasing power of their pensions, but not progress along with the increase of workers' productivity.

2 Major progress in understanding

The vast majority of empirical works directly aimed at assessing adequacy of household retirement saving refer to the United States[8]; less is known therefore about European countries. Indirectly, though, works studying the so called "consumption drop" or "retirement consumption puzzle" provide some evidence about European countries (Germany, Italy, UK). This represents indeed the same problem looked at from a different perspective, as it entails assessing whether the household is choosing optimally its intertemporal consumption/saving plan. However, as it has been pointed out in the literature (Banks et al., 1998; Bernheim et al., 2001; and Miniaci et al., 2003), optimal saving does not necessarily means *smooth consumption*, so the drop itself can be "optimal" from the point of view of the individual. Retirement is typically an anticipated (or even chosen) event which doesn't come as an unforeseen shock, and there are reasons that justify a fall in consumption even safeguarding the smoothing of marginal utilities (e.g. the cessation of work related expenses). Moreover, 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 amount to other explanations of the drop within the standard LC/PI framework (Hurd and Rohwedder, 2006; Haider and Stephens, 2007; Smith, 2006). Finally, other works claim that measurement problems dispute the existence of the drop itself on the grounds that the proper object to look at is not "expenditure" as is currently done but true "consumption" (as measured for instance by food intake) as retirement provides ample scope to economize (Aguiar and Hurst, 2007).

Before analyzing the empirical evidence, a brief outline of the literature on the saving behavior around retirement age and on the "preparedness" to retirement is presented.

2.1 Saving behaviour near retirement age

Given the diversity in pension and health care provisions in the various European countries, (discretionary) saving for retirement has to be analyzed on a country-specific basis, rather than with a pan-European perspective, as it inevitably responds to national institutional characteristics, such as mandated saving and state-provided in-kind services.

A comparison of the saving age profiles of a few European countries is carried out in Börsch-Supan and Lusardi (2003). This shows some remarkable differences, as age-saving profiles are pronouncedly hump-shaped in the Netherlands and moderately hump-shaped in Germany, while they are almost flat in Italy and increasing at all ages

[8] An exception is Khoman and Weale (2006), who study the household saving in the UK using an aggregate approach.

in the UK. In none of this cases there seems to be dissaving in old-age. Some of the variation reflects the different pension systems setup: the more generous public social security system present in both Italy[9] and Germany reduces the need to save for retirement in 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. Another force driving some of the difference between the countries is the stringency of borrowing constraints (measured here with the average down payment for housing). This appears to drive up savings in young age in Germany and Italy, and also increases aggregate saving in general, with respect to Anglo-Saxon countries and the Netherlands.

2.2 "(In)adequate" outcomes

Evidence on saving (in)adequacy can be grouped according to the methodology adopted, moving from rougher to more rigorous approaches. Most works take into account, to some extent, the two dimensions of saving adequacy considered above – sensible individual behaviour and efficient risk sharing of the pension systems – by including the institutional framework in which agents operate within the assessment of individual ability to plan optimally or to maintain living standards.

2.2.1 Synthetic indicators based on an implicit model

Butrica, Iams and Smith (2003) use the SSA Model of Income in Near Term (MINT) to project comprehensive measures of income up to age 67 and then compare poverty rates and income replacement rates (income at 67 to lifetime earnings) at retirement for various age-of-birth cohorts. Similarly, Smith (2002) projects replacement rates and poverty rates up to 2040 and Munnell and Soto (2005) compute RR, using an income measure that includes housing.They all find a decline in prospective RR. Butrica et al. (2003) and Munnell and Soto (2005) conclude that future retirees are less likely than current ones to have enough post-retirement income to maintain their pre-retirement living standards. However, also poverty rates for individuals at or above the normal retirement age will fall. Munnell and Soto (2005) indicate that households with (private) pensions fare better.

A number of papers examine the issue of individual adequacy having in mind optimal life-cycle behaviour but using reduced forms or just having a loose theoretical framework. Most of these works project households' lifetime assets and income paths and derive from them implications for saving adequacy. Kotlikoff, Spivak, Summers (1982) pioneered by comparing consumption in old-age that can be financed with resources in old-age, with lifetime consumption financed with lifetime resources. Gustman and Steinmeier (1999), Mitchell and Moore (1997), Love, Smith, McNair (2008) use a somewhat similar methodology: they project resources pre and post retirement and use them to compute replacement rates. Mitchell and Moore (1997) make reference to the level of wealth necessary to maintain the pre-retirement level of income (income smoothing), while Gustman and Steinmeier (1999) and Love et al.

[9] The absence of an hump-shaped age-saving profile in Italy – where the household saving literature concentrated on the substitutability between mandatory and discretionary saving for retirement – is reported also by Brugiavini and Padula (2001) and Jappelli and Modigliani (2003).

(2008) don't have a clear adequacy benchmark. Haveman et al. (2006) compute annuitized net wealth only over the remaining lifetime after retirement and compare it with adequacy targets (the "maintenance of living standard" targets are defined as an average of pre-retirement consumption level and as an income RR of 70%, while the "meeting of basic needs" target is defined as a poverty threshold). Khoman and Weale (2006) take a macroeconomic approach to the UK saving gap. Haveman et al. (2006) focus on consumption rather than on resources. They estimate potential consumption over the remaining lifetime after retirement and compare it with targets (the first defined as maintenance of living standard and the second as meeting of basic needs). Hurd and Rohwedder (2008) estimate consumption paths from the time of retirement onward and evaluate whether the value of wealth at retirement is greater than the "present value of spending in excess of annuities" (i.e. "necessary wealth"). If so, the consumption path is optimal in the sense that the level and shape of consumption are consistent with economic resources and spending in HRS/CAMS data.

As for results, Kotlikoff, Spivak, Summers (1982), Love et al. (2008) and Hurd and Rohwedder (2008) agree that 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 and Mitchell and Moore (1997) 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 (additional 16% saving rate to retire at 62, additional 7% to retire at 65).

2.2.2 Comparisons between actual and (simulated) optimal savings

Bernheim and Scholz (1992), Engen et al. (1999), Scholz et al. (2006) and Scholz & Seshadri (2008) generate optimal household consumption and wealth accumulation profiles by simulating a life-cycle model (model characteristics differ across works) and compare them to actual data. Munnell et al. (2006) present their results (the National Retirement Risk Index, NRRI) in terms of (annuitized) income RRs but the underlying methodology is not far from those described above[10].

Bernheim and Scholz (1992) conclude that only households without a college degree do not behave in a manner consistent with the optimal life-cycle planning. Engen et al. (1999) suggest that saving may be adequate for the majority of households but there is some mixed evidence of inadequate saving among households with low wealth-earnings ratios. Scholz, Seshadri and Khitatrakun (2006) find that 15.6% of older households in 1992 are below the optimal wealth target and that undersavers are in the lower part of the earnings distribution. Scholz and Seshadri (2008) updates the previous work by exploiting all waves of HRS and thus including all older Americans born before 1954. Preliminary results indicate that overall only 3.6% of the sample has accumulated less than the target as of 2004 (10% among Early Baby Boomers households).

Dissimilar results are found by Munnell et al. (2006), who find that 43 percent of households are at risk of not being able to maintain their standard of living in retirement. This is quite at odds with the finding by Scholz et al. (2006) and Scholz and

[10] They obtain "optimal RR targets" by simulating a life-cycle model and actual RRs by projecting pre- and post-retirement resources to retirement age. Households with replacement rates that fall more than 10 percent below the benchmark are considered "at risk".

Seshadri (2008) showing that the extent of undersaving is much more limited. Much of the difference, however, seems to be attributable to the different methodologies and different data used[11].

A couple of remarks can be drawn from the review of (in)adequate outcomes. The first has to do with the empirical evidence. According to most studies the issue of inadequate retirement saving does not appear to be as serious as one might expect, since only relatively small percentages of the US population seem to save poorly. Moreover, studies following different approaches to the problem typically identify less educated households and households at the bottom of the wealth or earnings distribution as the groups facing the most severe saving inadequacy problem. If this is indeed the case, then targeted actions to those population segments could be sufficient to tackle the issue.

Second, from the methodological point of view, both approaches where the optimization model is implicit and those where it is modelled explicitly show the great heterogeneity in saving adequacy (i.e. some over save, some under save…) and yield fairly similar results. The most complete findings certainly come from the far-reaching methodology experimented in Scholz et al. (2006), because it is the only one that combines the rigour of an optimization framework with the full distribution of household saving behaviour. However, its implementation is fairly complex and remarkably similar results have been obtained by other simpler techniques, such as the one used in Hurd and Rohwedder (2008). On the contrary, methods reviewed in the first category are too simplified to give sufficiently precise answers.

2.3 An alternative approach: retirement planning, information about pensions, and financial literacy

2.3.1 Do individuals plan for retirement?

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 U.S. Health and Retirement Study (HRS), which surveys respondents 51 years or older. She found that as many as one-third of respondents have not thought about retirement at all. While some of this behavior may be perfectly

[11] The work by Scholz et al. (2006) is based on the Health and Retirement Study (HRS), which covers Americans aged 51 to 61 in 1992, while the NRRI is based on the 2004 Survey of Consumer Finances. A comparable sample is constructed by calculating the NRRI on the population aged 51-61 in 1992 surveyed in the SCF. In this case, the NRRI takes on the value of 19 percent, meaning that 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 US households had less wealth than their optimal targets.
Methodological differences include:

- The life-cycle model used to compute target RR in the NRRI is more simplified than the one used by Scholz et al. (2006) to simulate optimal wealth targets.
- Targets in the NRRI are computed for some typical figures while Scholz et al. (2006) compute targets fro every household in the sample
- Households in the NRRI are assumed to purchase annuities and reverse mortgages while they are simply assumed to decumulate total wealth in Scholz et al. (2006)

rational, it is nevertheless surprising that the majority of older respondents have not given any thought to retirement, even when they are only five to ten years away from it. Lack of planning is concentrated among specific groups of the population, such as those with low education, 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. Notwithstanding the many changes in the economic environment, including the increased supply of financial products to facilitate planning, lack of planning is still prominent among the current population of older respondents. Using data from the 2004 HRS and concentrating on respondents who are 51 to 56 years old, Lusardi and Mitchell (2007a) find that close to 30% of respondents also have not given any thought to retirement. Moreover, Lusardi and Mitchell (2006) devised a special module on planning that was added to the 2004 HRS. This module has the advantage of measuring different types of planners, from those who merely tried to calculate their saving needs to those who were able to develop and carry through on their plans. Findings are not much different when using this alternative, and perhaps more appropriate, measure of planning: As many as 31% of older respondents in the HRS module do not plan for retirement. However, the percentage of planners decreases significantly when restricting to those who were able to develop a saving plan and stick to it: only 18% of respondents were able to do so. This finding underscores the fact that not only have many families never attempted to devise a saving plan, but even among those who do plan, many did not follow through.

These findings regarding lack of planning have been confirmed in other surveys. For example, using data from a representative sample of U.S. workers from the Retirement Confidence Survey (RCS), Yakoboski and Dickemper (1997) report that only 36% of workers have tried to determine how much they need to save to fund a comfortable retirement. However, many of the workers who have done the calculation could not give a figure when asked. Thus, according to this survey, as many as three-quarters of workers have little idea how much money they need to accumulate for retirement. While planning is strongly correlated with education, a sizable fraction of non-planners is present even among respondents with high educational attainment (Ameriks, Caplin, and Leahy, 2003).

Lack of planning has been documented not only in the United States. 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, even though many people had concerns about their retirement income and the recognition of the need to save did not always match intentions. This was particularly true of younger respondents, those with low incomes and those with self-perceived lower life expectancies. For instance, only half of respondents contacted a source of information and advice on planning for retirement, and of those who received a State Pension Forecast, very few people had undertaken 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 was 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).

2.3.2 How much do individuals know about their pensions?

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. For households around the median of the wealth distribution, those two components account for about half of total wealth, and even for households at the top of the wealth distribution, the percentage of wealth accounted for by Social Security and pensions is sizable (Gustman and Steinmeier, 1999). This is the case not only for the United States, but also for European countries, such as the Netherlands (Alessie, Kapteyn and Lusardi (1995)).

Earlier studies indicated that workers were woefully uninformed about their pensions and the characteristics of their pension plans (Mitchell, 1988, and 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 savings responsibility to workers (Gustman and Steinmeier, 2004). The calculations underlying pensions and Social Security wealth are certainly very complex and—as for private savings—individuals do not seem to engage in these calculations. However, Gustman and Steinmeier (2004) simply compare the types of pensions that workers report they have (whether DB, DC, or a combination of both) with the reports of employers. Results are striking: Only half of older workers are able to correctly identify the plan they have. Because errors can abound not only from the reports of workers but also from the reports of firms, Gustman, Steinmeier and Tabatabai (2007) use different sources of data, including data from Watson Wyatt, where it is possible to correctly identify the pension type from firms' data. They also study different time periods, from the 1980s (when DB plans were prevalent) to the recent period (when DC plans gained popularity). They show that it is workers who are most often erroneous and confused about the type of pensions they have.

Findings about the UK seems less worrisome, albeit not entirely comforting. Results from ELSA data show that 40% of individuals aged 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 of having received enough information (Banks and Oldfield, 2006).

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. Moreover, only a little more than a quarter of older respondents in the HRS have ever asked Social Security to calculate their retirement benefits (Lusardi, 2004). As noted in the Employee Benefit Research Institute report after conducting the 2007 RCS, even though it has been 24 years since legislation was passed that increased in increments the normal retirement age for Social Security, and despite 8 years of annual mailings of individual benefit statements from

the Social Security Administration, only 18% of workers knew the correct age at which they would be entitled to full Social Security benefits.

Lack of knowledge and confusion are also found in regards to other, equally important financial decisions. Bucks and Pence (2007) document that households with adjustable rate mortgages, which are potentially more complex contracts to understand than fixed-rate mortgages, are either incorrect or simply do not know about the terms of their contracts. These are disconcerting results, since mortgages are important and often onerous contracts. Again, those displaying low knowledge about mortgages are disproportionately those with low education, low income, and minorities—those who may benefit the most by knowing the terms of their contracts. These findings are also consistent with the evidence on "mistakes" provided by Campbell (2006). He shows that many households failed to refinance their mortgages during a period of declining interest rates. Lack of knowledge may have contributed to that behavior since lack of refinancing was particularly pronounced among those with low education and low income. Moore (2003) also documents that households that engage in onerous mortgages are less likely to be knowledgeable and financially skilled.

2.3.3 How much do individuals know about economics and finance?

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 sub-groups have consistently documented very low levels of economic and financial literacy. The National Council of Economic Education (NCEE) periodically surveys high school students and working-age adults to measure financial and economic knowledge. Adults scored rather poorly on these questions with an average score of C, while the high school population fared even worse, with most earning an F. These findings are confirmed by the Jump$tart Coalition for Personal Financial Literacy survey, which also documents very low levels of basic literacy among U.S. high school students (Mandell, 2004). Hilgert, Hogarth and Beverly (2003) examine data from the 2001 Survey of Consumers, where some 1,000 respondents (ages 18–98) were given a 28-question true/false financial literacy quiz, covering knowledge about credit, saving patterns, mortgages, and general financial management. Again, most respondents earned a failing score on these questions, documenting widespread illiteracy among the whole population. Similar findings are reported in smaller samples or among specific groups of the population (Agnew and Szykman, 2005, and Moore, 2003).

Lusardi and Mitchell (2006) devised a special module on financial literacy for the 2004 HRS.[12] Adding these types of questions to a large U.S. survey is important not only because it allows researchers to evaluate levels of financial knowledge but also and, most importantly, because it makes it possible to link financial literacy to a very rich set of information about household saving behavior. The module measures basic financial knowledge related to the workings of interest rates, the effects of inflation, and

[12] For a detailed discussion of the importance of financial literacy, see Lusardi (2007b).

the concept of risk diversification.[13] 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 answer correctly these two questions and a question about risk diversification. Financial illiteracy is particularly acute among the elderly, African-American and Hispanics, women, and those with low education (a common finding in the surveys of financial literacy).[14]

Lusardi and Mitchell (2007a) have also examined numeracy and financial literacy among the Early Baby Boomers (age 51-56), who should be close to the peak of their wealth accumulation and who should have already dealt with many financial decisions (mortgages, car loans, credit cards, pension contributions, etc.). While more than 80% of respondents were able to do a simple percentage calculation, only about half could divide $2 million by 5. Moreover, only 18% were able to perform an interest compounding calculation. These are uncomforting findings, especially considering that these respondents had already dealt with many financial decisions during their lifetimes.

Similar modules on financial literacy have been added to some European surveys, such as the Italian Survey of Households Income and Wealth (SHIW) and the Dutch DNB Household Survey (DHS). On average, only 47% percent of Italian families answer correctly to some basic financial literacy questions and only 27% are able to cope with the interest compounding question (Fornero, Lusardi, Monticone, 2008). On the contrary, Dutch households do much better, as at least 70% answer correctly to any basic question and on average answer correctly about 4 quizzes out of 5 (van Rooij, Lusardi, Alessie, 2007).

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 behavior. In fact, as illustrated in Lusardi (2008) 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). 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-costs instruments and are more likely to have problems with debt (Lusardi and Tufano, 2008). Hilgerth, Hogarth, and Beverly (2003) also document a positive link between financial knowledge and financial behavior. Van Rooij, Lusardi and Alessie (2007) and Kimball and Shumway (2006) find that financially sophisticated households are more likely to participate in the stock market. Agarwal, Driscoll, Gabaix and Laibson (2007) show that financial mistakes are most prevalent among the young and elderly, who are also those displaying the lowest amount of financial knowledge.

[13] For a discussion of the measurement of financial literacy and the extent of measurement error in financial literacy data, see van Rooij, Lusardi and Alessie (2007).
[14] See Lusardi and Mitchell (2007b) for a review.

2.3.4 Ways to help people save

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.[15] Below, we report some examples:

- **Planners**. Devising optimal saving plans requires complex and lenghty computations. Hence, several tools have been developed to make this task less cumbersome. Some of these softwares combine advice on lifecycle planning and portfolio choice (e.g. Mornigstar[16] and Financial Engines[17]). Some are very simplified (e.g. Ballpark E$timate.[18] Morningstar computes 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 planner is ESPlanner[19] – 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, Keller and Keller (2008) devised a 7-step planning aid that describes to new hires in a large non-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 program resulted in a sharp increase in supplementary retirement accounts. After the implementation of the program, the election rate more than doubled.

  - Automatic enrollment into pensions. One way to stimulate participation and contribution to pensions is to automatically enroll workers into employer-provided pension plans. Thus, rather than let workers choose whether or not to *opt in*, employers enroll workers and let them choose whether or not to *opt out* of a pension plan. This simple but ingenious method has been proven 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.

[15] Allen and Carroll (2001) show that, even assuming that individuals are solving the optimal consumption problem by approximation, pure trial-and-error learning requires an enormous amount of experience, far more experience than any one consumer would have over the course of a single lifetime.
[16] http://www.morningstar.com/Cover/PersonalFinance.html
[17] https://www.financialengines.com/
[18] http://www.choosetosave.org/ballpark/
[19] http://www.esplanner.com/

- **Save More Tomorrow**. Similar to the automatic enrolment program described earlier, in this program workers commit themselves to automatic increases of their pension fund contributions every time they obtain a pay rise (Thaler and Benartzi, 2004). As in the 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 Gaps in the theoretical framework

Recent research has marked quite substantial progress in our understanding of what drives households' saving behaviour. Advances in the theoretical framework have been made possible by progress 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; simulating life-cycle patterns for each household rather than looking at mean/ median households.

However, from the little we know about individual adequacy in terms of outcomes, we learnt that there is a concrete possibility that at least a part of the population behaves "inadequately", i.e. not according to the predictions of the LCM. This demands a deeper understanding of the reasons of this behaviour. Behavioural economists emphasized overconfidence, lack of self-control, mental accounting, dynamically inconsistent time preferences and so on as "anomalies" of individual behaviour that invalidate the standard life-cycle framework and that are particularly relevant for the issue of retirement saving adequacy (Thaler, 1994; Laibson, 1998). Therefore, a greater effort could be made in explaining drivers and constraints on how individual saving choices are made.

Furthermore, another large gap relates to the efficient risk diversification and to its link with individual optimization.

3.2 Gaps in the empirical evidence

A dichotomy seems to characterise our empirical knowledge: quite a lot is known about the adequacy of retirement saving as far as the United States are concerned; conversely, very little is known for Europe. As most of empirical evidence relates to the US, we have a relatively clear picture of what the problems are in that country (i.e. we know that most households save "adequately" and that those who fail to do so belong to the least educated households at the bottom of the lifetime income distribution). Almost no evidence is there for European countries, therefore we ignore whether there is inadequacy at all and who are the groups faring worst in this sense. (Moreover, it would very difficult to generalize among European countries given the very different public – mandatory – provisions and the institutional setting for voluntary pension saving).

Another gap is given by the difficulty to obtain a unified and consistent message from the different strands of literature concerning saving adequacy on one side and financial education and planning on the other. Most works on the ability to finance retirement adequately seem to agree that serious concerns are limited to a segment of the US population, namely the poorest and least educated. According to Scholz et al. (2006) about only 16% of older Americans were undersaving in 1992.

However, evidence on economic and financial education shows that ignorance is widespread and that even graduates often fail on basic questions. Lusardi and Mitchell (2006) find that among US population aged 50 or older only 50% were able to correctly answer two simple questions about interest rates and inflation.

Hence, it appears that many households manage to plan fairly adequately without knowing much about their own finances. This can be explained by a massive resort to financial advise external to the family, but the evidence on planning, again, shows a that as much as 30% of the US 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.

Therefore, further evidence is needed to reconcile these findings and gain a better insight of households' saving behaviour.

4 Current state of play of European research infrastructures and networks

Among the leading independent infrastructures that have carried out quality research on household saving in the last years there are:

- **CASE**: the Center for Social and Economic Research is an independent non-profit institute founded in Warsaw in 1991.
- **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.
- **IFS**: the Institute for Fiscal Studies, based in London, carries out quality research in various fields, including household consumption and saving.
- **MEA**: the Mannheim Research Institute for the Economics of Aging analyzes the micro- and macroeconomic aspects of demographic change. MEA is part of the Faculty of Law and Economics, Department of Economics of Mannheim University. Its funding consists of basic funds (financed in equal shares by the state of Baden-Württemberg and the German Insurance Association) and competitive third-party funds.
- **Netspar**: it is an independent network for research and education in the field of pensions, aging and retirement and is located at Tilburg University.
- **NIESR**: the National Institute of Economic and Social Research is an independent research institution founded in 1938 and located in London. It undertakes, among others, research on pensions and ageing.

- **OEE**: The European Savings Institute/Observatoire de l'Epargne Européenne was launched as a non-profit association in September 1999 with two main objectives: collect European savings-related information (including the establishment of a statistical and regulatory database covering the behaviour pattern of the various agents: households and corporates, banks, insurance companies, fund managers and other financial intermediaries), and encourage studies and research contributing to the public debate.

Other research infrastructures are public research centres or are part 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.
- **SCP**: the Netherlands Institute for Social Research is a government agency which conducts research into the social aspects of all areas of government policy. The main fields studied are health, welfare, social security, the labour market and education, with a particular focus on the interfaces between them.

Most research networks are created under the drive of an international organization (most often the EU) providing funding:

- **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[20]. (http://cordis.europa.eu/mariecurie-actions/rtn/home.html)
- **TMR** are Training and Mobility of Researchers programmes financed under the Research Framework Programmes of the European Union.
- **ENEPRI**: the European Network of Economic Policy Research Institutes brings together twenty-four economic policy research institutes from most of the EU-27 countries. The goals of the network are to foster the international diffusion of existing research, coordinate research plans, conduct joint research and increase public awareness of the European dimension of national economic policy issues. ENEPRI was created in 2000 at the initiative of the Centre for European Policy Studies (CEPS).
- **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

[20] As an example of an RTN we mention the "Microdata Methods and Practice", supported by the EU 6th Research Framework and Marie Curie Research Training Actions. Main partners: Centre for Microdata Methods and Practice (cemmap), Institute for Fiscal Studies, London; Centre for Applied Microeconometrics (CAM), University of Copenhagen; Centro de Estudos Monetarios y Financieros (CEMFI), Madrid; Centre National de la Recherche Scientifique (CNRS-EUREQua), Université Paris 1; Tinbergen Institute, Eramus University Rotterdam, University of Amsterdam and Vrije Universiteit Amsterdam; Institute for Labour Market Policy Evaluation (IFAU), Uppsala University

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 in 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 life-long 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 etc and consequences for research policy

Data

According to Campbell (2006), the ideal data set for household finance analysis should have at least the following characteristics:

- cover a representative sample of the entire population, especially by age and wealth
- for each household the data set would measure both total wealth and an exhaustive breakdown of wealth into relevant categories. These would be sufficiently disaggregated to distinguish among asset classes, and ideally would capture specific individual assets so that one could measure household diversification within asset classes
- the data would be reported with a high level of accuracy
- it should be a longitudinal dataset

We can add other characteristics to this "wish list", such as the inclusion on information regarding consumption, income, transfers (from family and friends as well as from the government), bequests, expectations, and on the extent of financial literacy.

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

- **ECHP / EU-SILC**. The European Community Household Panel (ECHP) is a panel survey running for 8 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 (BE, DK, EE, EL, ES, FR, IE, IT, LU, AT, PT, FI and SE) and in NO and IS. This first release of the cross-sectional data mainly refers to income reference year 2003 with a fieldwork carried out in 2004. The EU-SILC reached its full scale extension with the 25 Member States plus NO, IS in 2005. It will be completed by TR, RO, BG and CH.
- **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. From 2007 the Luxembourg Wealth Study (LWS) has been created to collect household wealth micro-data (from a smaller set of countries compared to LIS).

- **SHARE**. The only dataset collected at the European level is the Survey of Health, Ageing and Retirement in Europe (SHARE). It is a longitudinal dataset collecting data on the population aged 50 + of 10 EU countries plus Switzerland and Israel.

A recent initiative is underway to respond to the need for truly comparable European micro-data on households' income and wealth. A project promoted by the European Central Bank (ECB) aims at creating a comprehensive survey on households' finances and consumption (HFC) for the Euro area. Should this be implemented, it would have some advantageous characteristics with respect to the already available datasets:

- cross-country comparability (this is to be achieved via harmonization of exiting surveys, such as SHIW or 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 aged 50+);
- covers wealth, income, consumption and employment (ECHP does not cover consumption);

At the currant stage of the project, the HFC survey would also have some potential drawbacks, such as the non-synchronization between different countries and the lack of information on financial literature (mainly in order to minimize monetary costs and the burden to respondents).

Methodological innovations

A major required methodological innovation has to do with the link between different – but related – disciplines. As we have seen, the driving forces of household saving are far from being fully explained and there many unresolved issues, including the link between the so-called optimizing and behavioural approaches, the latter drawing many insights from the psychological literature. This is just an example, but it draws the attention on how important a stronger relationship between economics, sociology, psychology and other social sciences could be in achieving a better understanding of households' behaviour.

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

6.1 Financial Education Programs

Aware that workers display limited financial literacy and know little about their pensions, employers, policy makers and not-for-profit institutions have undertaken financial education programs. The evidence on the effectiveness of these programs is, so

far, rather mixed.[21] There is evidence of some positive effect of financial education on savings and pensions, but the type of education seems to matter. For example, Bernheim and Garrett (2003) find that programs that rely on print media (newsletters, plan descriptions, etc.) have generally no effect on pension participation or contributions, even though the quality of financial information does matter (Clark and Schieber, 1998). Only a few studies find that those who attend a retirement seminar are much more likely to save and contribute to pensions.[22] Clearly, those who attend seminars are not necessarily a random group of workers. Because attendance is voluntary, it is likely that those who attend have a proclivity to save, and it is hard to disentangle whether it is seminars, per se, or simply the characteristics of seminar attendees that explain the higher savings of attendees that are shown in the empirical estimates. However, Bernheim and Garrett (2003) argue that seminars are often remedial, i.e., offered in firms where workers do little or no saving. In their work, they find that the effect of seminars is concentrated in the first two quartiles of wealth and decreases or disappears at higher values of wealth holdings, a finding difficult to rationalize simply by appealing to tastes for saving. Lusardi (2004) uses data from the Health and Retirement Study and confirms the findings of Bernheim and Garrett (2003). Consistent with the fact that seminars are remedial, she finds that the effect of seminars is particularly strong for those at the bottom of the wealth distribution and for those with low education. Estimated effects are sizable for the least wealthy, for whom attending seminars appears to increase financial wealth (a measure of retirement savings that excludes housing and business equity) by approximately 18 percent. Note also that seminars affect not only private wealth but also measures of wealth that include pensions and Social Security wealth, perhaps because seminars provide information about pensions and encourage workers to participate and contribute. While these studies were able to single out the effects of financial education, one should also note that a only small fraction of workers ever attend retirement seminars or work at firms that offer such seminars. Thus, many workers are left untouched by such initiatives.

Other papers find rather modest effects of education programs. Duflo and Saez (2003; 2004) focus on non-faculty employees at a large university who where given financial incentives to participate in an employee benefits fair. The authors compared pension participation and contributions in that group with that of employees not induced to participate. Overall, they found that the program had fairly small effects: attending the fair did induce more employees to participate in the pension, but the increase in contributions was negligible. And good intentions do not always translate into desired behavior. For instance, Clark and d'Ambrosio (2008) report that exposing workers to retirement seminars does influence workers stated desire to save more. However, intentions did not always translate into actions. When interviewed several months later, many of those workers who had intended to make changes had not yet implemented them, a finding reported in other papers, including Choi, Laibson, Madrian and Metrick (2004) and Madrian and Shea (2001). Notably, the study by Clark and d'Ambrosio (2008) study highlights rather pronounced gender differences in saving behavior. Before attending the seminars, women displayed less confidence in their ability to attain their retirement goals than men. But women were substantially more likely than men to

[21] See Lusardi (2004) and Lusardi and Mitchell (2007b) for a review of the effectiveness of financial education programs.

[22] See Bernheim and Garrett (2003) and Lusardi (2004).

increase their expected retirement age and to alter their retirement goals. Thus, evaluating the effects of seminars on the whole population of participants may understate its impact on specific groups.

It is not surprising that a hand-full of retirement seminar does little to change behavior; widespread financial illiteracy cannot be "cured" by a one-time benefit fair or a single seminar on financial economics. This is not because financial education is ineffective, but because these programs are too small with respect to the size of the problem they are trying to address. Evidence from financial education sessions offered in programs aimed to promote Individual Development Accounts (IDAs), which are subsidized savings accounts targeted at the poor, show that multiple education sessions are effective in stimulating saving (Schreiner and Sherraden, 2007).

The finding that people have difficulty following through on planned actions suggests that education alone many not be sufficient. Rather, it is important to give consumers the tools to change their behaviors, rather than simply delivering financial education. As this paper clearly illustrates, people differ widely in their degree of financial literacy and saving patterns are very diverse (Browning and Lusardi, 1996). Accordingly, a "one-size-fits-all" education program will do little to stimulate saving and could even be a disincentive to participate in a financial literacy effort. For instance, in the Washington Financial Literacy survey, most respondents stated that they would prefer personalized ways to learn how to manage money, rather than attending information sessions (Moore, 2003).

6.2 The OECD's Recommendation on Principles and Good Practices for Financial Education and Awareness

As reported by Stewart and Smith (2008), in 2005 the OECD Council approved its *Recommendation on Principles and Good Practices for Financial Education and Awareness* (OECD 2005b). The principles and good practices were designed to provide guidance on improving financial education and awareness in OECD and non-OECD countries. They were drawn from the financial literacy and behavior finance studies, as well as surveys of financial education programs and experience in OECD member countries. The principles and good practices listed in the paper by Stewart and Smith are reported below:

> *-- Financial education programs should focus on high priority issues, which, depending on national circumstances, may include important aspects of financial life planning, such as basic savings, private debt management, or insurance, as well as prerequisites for financial awareness, such as elementary financial mathematics and economics. The awareness of future retirees about the need to assess the financial adequacy of their current public or private pension schemes and to take appropriate action when needed should be encouraged.*
>
> *-- National campaigns should be encouraged to raise awareness of the population about the need to improve their understanding of financial risks and ways to protect against financial risks through adequate savings, insurance, and financial education. Specific websites should be promoted to provide relevant, user-friendly financial information to the public. Warning systems by consumer, professional, or other organizations on high-risk issues that may be detrimental*

to the interests of the financial consumers (including cases of fraud) should be promoted. Financial education should be provided in a fair and unbiased manner. Programs should be coordinated and developed with efficiency.

-- Financial education should start at school. People should be educated about financial matters as early as possible in their lives.[23] *Financial education should be regarded as a lifelong, ongoing, and continuous process.*

-- Financial institutions' accountability and responsibility should be encouraged not only in providing information and advice on financial issues, but also in promoting financial awareness in their clients, especially for long-term commitments and commitments that represent a substantial proportion of current and future income. Financial institutions should be encouraged to provide information at several different levels in order to best meet the needs of consumers. Financial institutions should be encouraged to train their staff on financial education and develop codes of conduct for the provision of general advice about investment and borrowing. Financial institutions should be encouraged to clearly distinguish between financial education, financial information, and commercial financial advice.

-- International cooperation on financial education should be promoted, including the use of the OECD as an international forum to exchange information on recent national experiences in financial education (see Stewart and Smith (2008) page XX).

[23] See the chapter by Mandell in this volume. Because evidence on the effectiveness of financial education offered in high school is limited, it might be important to start financial education as early as possible and to look for ways to increase its effectiveness.

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