Experimental tests on consumption, savings and pensions

Enrique Fatás, Juan A. Lacomba, Francisco Lagos and Ana I. Moro-Egido[1]

March 22, 2007

Abstract

As part of the current debate on the reform of pension systems, this article examines the potential effects on consumption behaviour of implementing a lump-sum payment in a public pension system. This work explores an experimental investigation into retirement consumption behaviour with two central features: first, there exists a decreasing probability of surviving; second, there are two sequences of income, one when individual works and another when she is retired. The results show how subjects seem to plan their consumption and saving choices conditionated by both the long horizon with no incomes and the lump-sum payment. This yields, in the majority of periods, a surprising over-saving behaviour.

JEL category: C91, H55, J26.

Keywords: Experimental test, consumption, savings, lump-sum payment.

Authors

Enrique Fatás	Juan A. Lacomba	Francisco Lagos	Ana I. Moro-Egido
LINEEX Facultad de Economía Campus Tarongers Universidad de Valencia 46022 Valencia Spain phone +34-96-3828643 fatas@uv.es	Departament of Economics Faculty of Economics University of Granada Campus La Cartuja s/n 18071 Granada Spain phone +34-958-249605 fax +34-958-249995 jlacomba@ugr.es	Departament of Economics Faculty of Economics University of Granada Campus La Cartuja s/n 18071 Granada Spain phone +34-958-249605 fax +34-958-249995 fmlagos@ugr.es	Departament of Economics Faculty of Economics University of Granada Campus La Cartuja s/n 18071 Granada Spain phone +34-958-249162 fax +34-958-249995 aimoro@ugr.es

[1] We thank people from CREED (Amsterdam) for helpful comments during the elaboration of this experimental design. Financial support from the Spanish Ministry of Education and Science (grant code SEJ2006-11067/ECON) and from Fundación Centro de Estudios Andaluces is gratefully acknowledged.

I. Introduction

The reform of Social Security systems is now one of the main issues on the economic policy agenda of most industrialized countries. It is widely considered that, unless serious changes take place, the aging of the population implying a rise in the number of retirees relative to that of workers will threaten the viability of Pay-As-You-Go public pension systems in the long-run.

Besides, this threat is being reinforced by the progressive reduction in the retirement age of the working population. Pension systems in virtually all OECD countries in the mid-1990s made it financially unattractive to work after the age of 55.[1] Indeed, the general consensus in the theoretical literature related to Social Security and retirement decisions is that pension systems create enormous incentives to leave the labour force early. [2] This large decline in labour force participation is attributed to the specific fact that to keep on working implies a reduction in the present value of total pension benefits. That is, it is considered that the drop in pension wealth acts as an *implicit tax* on income from continued work and as such is a clear incentive to retire early.

Reforms aiming to increase the effective retirement age to improve the financial problems of public pensions systems have mainly focussed on the reduction of this implicit tax on prolonging the working period.

It is considered that when the increase in pension benefits is exactly offset by the higher cost in terms of contributions and foregone pensions, the pension system is not distorting the retirement decision. That is, the pension systems that are marginally *actuarially fair* do not distort the individual retirement decisions. For this reason, the main economic policy measures move in the direction of strengthening the link between life-time contributions and pension benefits.[3]

However, Cremer, Lozachmeur and Pestieau (2006) argue that "while there is no doubt that retirement systems induce an excessive bias towards early in many countries, a complete elimination of this bias (i.e., a switch to an actuarially fair system) is not the right answer. This is so and for two reasons. First, some distortions are second-best optimal. Second, depending on the political process, it may either not be feasible or alternatively it may tend to undermine the political support for the pension system itself."[4]

Moreover, Fatas, Lacomba and Lagos (forthcoming) find with an experimental test that actuarially fair pension systems may not be neutral in terms of retirement decisions as identical expected payoffs generate different behaviors.

Therefore, a key question is whether or not there exist alternative reforms to increase the effective retirement age. Orszag (2001), related to U.S. Social Security, considered that transforming Social Security's delayed retirement credit (given to people working between the ages of 62 and 65 in the U.S.) into a lump-sum payment rather than an increased monthly payment would likely encourage people to defer retirement.

This question is adressed in Fatas, Lacomba and Lagos (forthcoming). They find that the more concentrated the payments (shifting from annuity into lump-sum), the more postponed the retirement decisions. This results suggests, in the line of Orszag (2001), that reforms aimed to delay effective retirement ages should transform the increases in pensions due to the additional years of work (after the standard retirement age) into a lump-sum payment rather than an increased periodic payment.

Furthermore, it is likely that this transformation including a lump-sum payment would be easier to implement. Fetherstonhaugh and Ross (1999), using a questionnaire, found that more than 75 percent of the respondents to the survey preferred a one-time bonus to an increased annuity. On the other hand, in the U.S. private industry, whose retirement benefits may be distributed in several alternative ways, using some type of lump-sum benefit as a payment option has become popular as an alternative to annuity payments.[5]

However, the incorporation of a lump-sum payment as a measure to delay retirement decisions requires further analysis before receiving full consideration by policymakers. Orszag (2001) states several important design issues that must be addressed before implementing a lump-sum payment system. In this paper we provide an experimental study on one of these issues: the impact on the poverty rates of the elderly of such a change.

Orszag (2001) states that paying lump-sum payments might result in increases in poverty rates among those who already delay their retirement decisions after the normal retirement age if the lump sums were mostly consumed rather than saved. But the amount of the lump-sum that would be quickly consumed is not very clear. Unlike neoclassical theoretical predictions about smooth consumption over time, some experimental works have shown that there is a close relationship between consumption and current income (Carbone and Hey, 2004). This suggests that some individuals might quickly consume a large amount of their lump-sum. However, Thaler (1992) finds that individuals are more likely to save a larger amount as the size of the lump-sum increases; and Hamermesh and Menchik (1987) state that there is a high average level of savings, far above what could be explained solely by planned saving for retirement. They explain this by introducing the bequest motive.

On the other hand, as Fatas, Lacomba and Lagos (forthcoming) find, the lump-sum payment may induce workers to postpone retirement after the normal retirement age and, as Orszag (2001) suggests, this delay could potentially reduce poverty rates.

The aim of this work is to provide additional empirical evidence to this debate. To our knowledge, this is the first experimental approach to examine a dynamic saving-consumption problem in a retirement framework. We consider an experimental investigation based on two central features: first, there exists a decreasing probability of surviving which implies an uncertain future income; and, secondly, there are two sequences of income, one when individual works and another when she is retired.

This article claims not only to analyze how closely the predictions of the optimality theory fit the actual behavior of subjects in a lab, but also to test the potential effects on consumption behaviour of implementing a lump-sum payment in a public pension system.

II. Experimental Background

In the experimental literature into consumption behaviour under uncertainty there exist few contributions but relevant ones. For instance, Hey and Dardadoni (1988) describe a large-scale experimental investigation to test the implications of expected utility maximization on optimal consumption behaviour. They find that the actual behaviour in the lab differs significantly from the optimal behaviour, and that the comparative static implications of actual behaviour to agree with those of optimality theory. Carbone and Hey (2004) investigate the over-sensitivity of consumption to current income. They adopt a simple model in which income in any period can take just one of two values:

employment and unemployment. They find that subjects over-react and do not seem to be able to smooth their consumption stream sufficiently.

On the other hand, Ballinger et al (2003) study social learning about the life cycle saving task. They use experimental methods to study a household intertemporal choice problem. Subjects participate in three-member “families”. Second and third “generation” subjects observe and/or communicate with their “antecedent” first or second generation subject. They find that later generations perform significantly better than earlier generations. Brown, Camerer and Chua (2006) establish potential ways in which consumers can attain near-optimal consumption behaviour. In line with Ballinger et al (2003), individual and social learning mechanisms are proposed to be one possible link. They find that while consumers persistently spend too much in early periods, they learn rapidly from their own experience and from experience of others to consume amounts close to optimal levels.

Our work presents some interesting differences with regard to all above mentioned papers. In order to capture a retirement and pension system benchmark, we focus on how subjects make saving and consumption choices with two novel features. First, subjects face a decreasing probability of surviving across periods. Second, participants receive three different levels of *income* according to a *retirement period* (R hereafter): i) a constant level of income during each period before R (as worker); ii) a higher lump-sum of income in R (the first period as retired); and iii) nothing from R on.

This last sequence with no income is a novel feature in this literature. In all above mentioned papers subjects received a positive amount of income in each and every period. Thus, this is the first experimental analysis of consumption and savings decisions of subjects faced to periods with no income.

III. The model

Consider an individual who has to decide on his optimum consumption at different age in presence of uncertainty about the length of life. Suppose that this is the only uncertainty that the individual faces. Let $T>0$ be the planning horizon, that is, maximum lifetime. Lifetime uncertainty is presented by a survival distribution function, $F(t)$ non increasing in age, $0 \leq t \leq T$, that satisfies

F(0)=1.[6] All individuals are assumed to have the same survival distribution function, *F(t)*.

Denote consumption at age *t* by *c(t)*, where *c(t)≥0*. Utility from consumption at different ages is separable and independent of age. There is no subjective discount rate.[7] We use a specific utility function, *u(c)* that displays risk-aversion, and to ensure an interior solution, satisfies the Inada conditions.[8] When working, the individual provides one unit of labor. Contingent on survival, the individual works between ages 0 and *R*, *0<R<T*, that is, there exists a mandatory retirement age that occurs at *R*. The individual's objective function is

$$V = \sum_{t=1}^{T} \mathrm{F(t)}\ \mathrm{u}(c(t))$$

to maximize the non discounted expected utility *V*

Let wages at age t, be *w(t)≥0*. Savings earn a zero rate of interest.[9] With no initial assets, the individual's assets at age t, *S(t)*, are equal to the cumulative savings. Feasible consumption plans must have non-negative

$$S(t) = \sum_{j=1}^{\min(t,R)} \mathrm{w(j)} - \sum_{j=1}^{t} c(j)$$

assets at all ages

We assume that *w(t)=w* for all *0<t<R*, therefore the restriction becomes

$$S(t) = \min\left[(R-1)w, tw\right] - \sum_{j=1}^{t} c(j)$$

The choice of the optimum consumption path will depend on the insurance options available. We analyze two different scenarios, first the case in which individuals will receive a constant pension, from the age of retirement on, and secondly individual receives a unique lump-sum payment the period of retirement.

Concerning the case in which individuals will receive a constant pension, we assume that the total expected value of contributions is equal to total expected value of pensions

$$\sum_{t=1}^{R-1} F(t)\,\tau\,w = \sum_{t=R}^{T} F(t)\,P$$

therefore, the constant pension each period for each individual

$$P = \tau\,w \frac{\sum_{t=1}^{R-1} F(t)}{\sum_{t=R}^{T} F(t)} = \tau\,w\,G(R)$$

Therefore the restriction over total savings becomes

$$S(t) = \min\left[(t-R)p, t(1-\tau)w\right] - \sum_{j=1}^{t} c(j) \qquad \forall t \in [1, R]$$

Assuming that at the retirement, the agent receives a unique payment, the total value of expected contributions has to be equal than the lump-sum payments, that is,

$$\sum_{t=1}^{R-1} F(t)\,\tau\,w = F(R)\,LS$$

then the lump-sum payment is

$$LS = \tau\,w \frac{\sum_{t=1}^{R-1} F(t)}{F(R)} = \tau\,w\,H(R)$$

Restriction on savings is now

$$S(t) = \min\left[LS, t(1-\tau)w\right] - \sum_{j=1}^{t} c(j) \qquad \forall t \in [1, R]$$

Comparing the two scenarios, we can observe that they reflect an increasing on income, permanent and temporal respectively. Therefore going from the regime with no pensions to the others will imply an increase on consumption, that will be smaller in the case of a lump-sum payment, since increment of income is also smaller.

IV. Experimental design

Our experimental design tries to capture some actual features of a public pension system with a unique and actuarially fair lump-sum payment. The experiment consists of three sequences of at most 30 rounds and one decision per round. See Table 1 into Appendix.

-------------------- Insert Table 1 here -------------------

Each round is characterized by a probability of surviving. As the round number increases, the probability of surviving decreases. In each round reached, the subject either survives or not. A subject reaches a round if, and only if, she has survived all earlier rounds.

During the first *R* rounds, similar to wage earnings, the subject receives 85 experimental units in each reached round (*Income*). In the next round*,* the subject receives the present value of the total pension benefits as a unique lump-sum payment. In the rest of the rounds the subject receives nothing. Experimental units can be saved to provide wealth but savings earn no interest.

In each round subject has to take a decision concerning how much of their *Cash Available,* which is the addition of what is left over from previous rounds, and the new amount coming from *Income*, she wishes to convert into points in that round. Let us denote *C* the amount consumed by the subject. The subject is informed of the conversion scale (from experimental units to points). Thus, she is told that *C* experimental units generate *10*Square Root (C)* points. She is also told that borrowing is not allowed, that is, the subject cannot spend more than their Available Cash. A table similar to Table 1 showing how different consumption choices are converted into points is given separately to the subject.

As mentioned above, the subject plays three sequences. She is told that at the end of the experiment she will be paid in cash the total amount of points converted from experimental units of one of the three sequences with an exchange rate of 100 points = €2 (around USD 2.5, at that time) and that any unconverted experimental unit remaining at the end of any sequence is worthless. She is also told that the sequence to be paid is randomly chosen.

As a strategy to analyze the effect of the length of the retirement period on the savings and spending decisions, we design two treatments. In *Treatment 1 (LS10)* the round *R* is the round 10 and therefore subjects have at most 19 rounds with no income and in *Treatment 2 (LS15)* the round *R* is the round 15 and the rounds with no income are at most 14.

<u>Actuarially fair retirement benefits</u>

Reforms aiming to achieve actuarially fair social security systems must adjust pension benefits to achieve that the increase in pension benefits be exactly offset by the higher cost in terms of contributions and foregone pensions.

In the same way, in this experimental design we have adjusted payoffs to keep the same result. That is, we have to consider a gross wage of 100 experimental units and a tax rate of 15%. Thus, an actuarially fair pension system implies that the lump-sum payment in *LS10* is equal to 191.25 experimental units (with *R=10*) and in *LS15* is equal to 345 experimental units (with *R=15*).

Risk aversion

Whenever decisions involving tradeoffs between costs and benefits occurring at different points in time are uncertain, we find it essential to consider individual attitudes towards risk. The expected utility theory predicts that, regardless the treatment, the more risk averse the subject is, the larger her first rounds' consumption will be. In order to analyze whether or not this attitude plays a role in consumption and savings decisions, we introduce into our design an additional risk aversion test.

Following Holt and Laury (2002), a menu of ten paired lottery choices allows us to measure the degree of risk aversion. The payoffs for option A are less variable than the potential payoffs for option B. As the decision number increases, the probability of the high payoff increases. Thus only risk-loving subjects would take option B in the first decision and only risk-averse subjects would choose option B in the second last decision. A risk-neutral subject should cross over to option B when the expected value of each option is about the same. That is, a risk-neutral subject would choose option A in the first four decisions before switching to option B (see the Appendix for details).

V. Experimental procedures

A total of 39 undergraduate students in Business and Economics from the University of Valencia took part in the experiment in December 2006. All sessions were run at the Laboratory for Research in Experimental Economics (LINEEX) and the standard electronic recruitment procedures were used to collect the subject pool. The experiment consisted of two treatments: *LS10* and *LS15*. 20 subjects participated at *LS10* and 19 subjects at *LS15*.

All participants knew that they would be privately paid according to the outcome generated by both their choice and the random process of passing rounds. At the end of each treatment, all subjects were asked to participate in an additional risk aversion test. This test was paid independently and subjects could refuse to participate in the test.

In the risk aversion test, subjects made ten sequential choices between two alternative options, A and B. All participants knew that they would be paid according to the outcome generated by one of their ten choices.

Instructions were read aloud before the beginning of each stage and participants only had information about the individual payoffs obtained at the different treatments and tests. At the end of the experiment subjects were privately paid with an exchange rate of 125 experimental units = €1. The experiment took less than 90 minutes and average earnings were around 15 euros, the maximum earnings going above €40. Experimental instructions are provided in the Appendix. To make sure subjects understood the several instructions, they needed to complete a quiz after the instructions were read aloud to the group and before the experiments began. The explanations were repeated until nobody made a mistake (this was true from the beginning, probably due to the simplicity of the design).

VI. Results

The analysis of results is divided into four subsections. The first subsection compares consumption and saving choices in each sequence for both treatments, relative to the optimal levels. The second subsection examines in detail the saving-consumption choices before, during and after the lump-sum payment. The last two subsections include some regression analysis of the significance of the impact of the different variables at work.

Comparing actual behaviour to optimal behaviour

Table 2 below presents the summary statistics of the individual's decisions in terms of average consumption, average saving and average cash available decisions in the case of LS10 (with 20 individuals) and LS15 (with 29 individuals) for any sequence and for the total. To compare we present the optimal decisions of consumption, saving and available cash. We also include the variable "Difconabs" meaning the differences on average between actual consumption and optimal consumption in absolute terms. The variable "Average life” denotes the average number of periods that the individual is alive. Finally we present the number of observations for each sequence and for the total.

-------------------- Insert Table 2 here -------------------

Results report that subjects performed consumption and saving decisions poorly with respect to the optimal levels in both treatments. In Table 3, statistical tests show that the actual behaviour (consumption-saving) differs from the optimal behaviour in each sequence.

-------------------- Insert Table 3 here -------------------

When we analyze the consumption choices across sequences we find that the differences between pairs of sequences 1, 2 and 3 in both LS10 and LS15 are always significant, with the only exception of sequences 1 and 2 in LS10 and LS15. The same is true when we look at savings choices. In this case, the only exception occurs between sequences 1 and 2 in LS15. Although the actual consumption and saving choices do not show a convergence towards the optimal levels when the participants play more sequences, the standard deviation (in Table 2) fall as more and more subjects make decisions. Besides, this reduction in the standard deviation across sequences there seems to be a systematic trend in all variables (except obviously for “Alive expectancy” and “#Observations” variables). Moreover, the “Difconabs” variable exhibits not only a lower standard deviation across sequences (from 37.66 in sequence 1 to 25.89 in sequence 3), but also a lower difference in absolute terms between actual and optimal consumption behaviour (from 30.17 in sequence 1 to 25.63 in sequence 3). That is, subjects seem to adjust better when the number of decisions increases. This result supports the potential importance of learning to solve dynamic optimization problem found by Ballinger et al (2003) and Camerer and Chua (2005).

To facilitate the comparison of the average actual consumption with the optimal consumption each period over all individuals we plot them in Figure 1 and 2 for LS10 and LS15 respectively . We observe that both treatments exhibit a similar consumption pattern.

-------------------- Insert Figures 1 and 2 here -------------------

Unlike other works in this experimental literature that found that the behaviour of the majority of the subjects was such that they consumed too much in the early stages of the experiment, our participants under-consume in the earliest periods.[10] This under-consumption behaviour is extended during even more periods in LS15. However, in both treatments, after a first block of periods, subjects over-consume until they reach the lump-sum period. After the lump-sum period, participants seem to smooth their consumption decisions. In fact, while in LS10 the consumption choices seem to fit optimal consumption path from period 12 on (with the exception of sequence 1), in LS15 subjects again exhibit a cyclical behaviour (compared to the optimal one): under-consume from period 17 until period 26-27; over-consume from period 26-27 until the end.

Now we analyze the deviations on average from the optimal saving choices, see Figures 3 and 4 for LS10 and LS15 respectively. The Figure 3 is very illustrative. It can be observed that subjects perform saving choices poorly with regard to the optimal level in each sequence; however it is very enlightened to observe how subjects over-save in all periods and for all sequences.

-------------------- Insert Figures 3 and 4 here -------------------

In Figure 4 it can be appreciated that although subjects over-save the majority of periods, however in the central periods, participants over-reacted around to the lump-sum period, saving below the optimal level. There exist two possible explanations. First, subjects have an accumulated saving high enough. Second, the lump-sum payment is high enough and the number of remaining periods is not so large.

Comparing these two treatments one might deduce that the larger the horizon with no income together with a lower lump-sum payment, the higher the saving reaction. It could be seen as precautionary savings.

In Hey and Dardadoni (1988) and Carbone and Hey (2004) there is a certain and known rate of return per period on all money saved. In Ballinger et al (2003) and Camerer and Chua (2005) the incentives to save money are embedded in the particular utility function that they use for the experiment. The incentives to smooth the consumption across periods are very salient.

However, it is worth to emphasizing that in our experimental design savings earn no interest and the utility function, although being concave, differs of that used by Ballinger et al (2003) and Camerer and Chua (2005). Saving money is not so prominent. We tried to study the savings behavior in a context as neutral as possible. Therefore as exposed before, the answer we find is surprising.

The effect of the lump-sum payment on savings decisions

In this subsection we analyze how the existence of the lump-sum payment affects savings decisions of subjects.

First, we study the effects of the lump-sum payment on subjects' behaviour during the working period, that is, during the rounds previous to the lump-sum receipt. Table 4 shows the ratio consumption/endowment during the first 16 rounds in the two different environments (LS10 and LS15).

-------------------- Insert Table 4 here -------------------

The first three columns give the ratio consumption/endowment per period in the three sequences of the LS10 treatment. The fourth column gives the average ratio of these three sequences. The fifth column shows the optimal ratios in the LS10 treatment. Note that since we focus here on the pre lump-sum subjects' behaviour, from round 12 on the first five columns have no data. The sixth, seventh and eighth columns give the ratios consumption/endowment in the three sequences of the LS15 treatment. The ninth column gives the average ratio of the three previous sequences and the last column shows the optimal ratios in the LS15 treatment.

The existence of a large lump-sum payment at the end of the working period might have induced subjects to over-consume in the rounds previous to the lump-sum and to use this payment as the main (or even unique) source of financing for the retirement period. However, results suggest that the weight of the future rounds with no income in subjects' behaviour prevented them from over-consuming during the pre lump-sum rounds.

As we can see in Table 4, in LS10 the optimal behaviour in the pre-lump-sum rounds is to consume on average an 82.60% of the endowment of these ten first rounds. However, results show that on average, subjects consumed around 70% of this endowment. The under-consumption is observed in the three sequences. Moreover, the average consumption during the 10 first rounds decreased with the sequences (75,88% in the first sequence, 68,79% in the second one and 66,1% in the last one).

The lower number of rounds with no income and/or the larger lump-sum payment in LS15 led subjects to higher consumption levels in the pre lump-sum rounds. The obtained results were very close to the optimal behaviour (the optimal consumption is around 88% of the endowment of the fifteen first rounds and, on average, subjects consumed 90%).

Note that this under consumption come mainly from the very first rounds, where subjects saved an important part of the endowment being the optimal behaviour not to do it (in LS10 the optimal behaviour is to consume the whole endowment in the first three rounds and in LS15 in the eight first rounds).

With respect to the consumption in the round associated with the lump-sum payment, we find that subjects over-reacted to this payment, in the sense that they consumed an amount of the lump-sum larger than the optimal amount. While in LS10 the optimal behaviour is to consume around 25% of the lump-sum and subjects consumed around 44%, in LS15 the optimal behaviour is to consume around 26% of the lump-sum and subjects consumed around 39%. This result is in the same direction that Thaler (1992). He found that individuals are more likely to save a larger amount as the size of the lump-sum increases. In our case, the lower amount of lump-sum saved in LS10 might come from the fact that subjects over saved in the pre lump-sum rounds.

On the other hand, one of the main problems associated with the implementation of a lump-sum payment in the pension system is that people might consume the lump-sum payment rather quickly. If so, Orszag (2001) states that paying lump-sum payments might result in increases in poverty rates among those who already delay their retirement decisions after the normal retirement age. Indeed, unlike neoclassical theoretical predictions about smooth consumption over time, some experimental works have shown that there is a close relationship between consumption and current income (Carbone and Hey, 2004) suggesting that some individuals might quickly consume a large amount of their lump-sum. However, our results are in the opposite direction. In spite of the over-reaction to the lump-sum payment, subjects did not consume the whole lump-sum payment quickly. This can be oberved with the help of the figures.

Figures 3 and 4 show the average accumulated savings of subjects per round in each sequence compared with the optimal accumulated savings.

As we can observe in Figure 4, the over consumption of the lump-sum in LS10 is not large enough and therefore the average accumulated savings of subjects in each round of the retirement period is always higher than the optimal one. In Figure 4 we observe the same results for LS15 except for the rounds between round 15 and 20. But in these cases the differences are not very large.

Since the accumulated savings in the retirement period is equivalent to the available cash, our results suggest that lump-sum payments should not result in increases in poverty rates among those who already delay their retirement decisions after the normal retirement age.

Regression analysis

Finally, we use regression analysis to explore the determinants of the differences on consumption from the individual's decisions and optimal decisions. The dependent variable is the log of absolute deviation from optimality, i.e., ln(Difcons). A negative coefficient means a variable lowers the deviation from optimality. Since the dependent variable is the logged deviation, the coefficient means that a variable causes a certain percentage of increase or decrease in deviation relative to when this variable is absent.

We consider different groups of explanatory variables. First, a set of indicators built from the risk aversion test made to individuals. The variable "risk" goes from 0 to 10, meaning that the higher the value of the variable, the more risk averse the individual is. Secondly, we decompose the former variable into two dummies, one called "riskaverse", that takes value 1 if individual is risk averse and 0 otherwise, and the other one, called "riskloving", that takes value 1 if individual is risk lover and 0 otherwise. We also include the variable "Raven Test" which is built from a "test de inteligencia", as the ratio of correct answers to the total number of questions.

Secondly, a set of demographic variables that includes sex, education level of mother and father, "Relig" as a measure of membership of a religious community, "Frecrelig" as la frecuencia de asistencia a oficios religiosos, and "Politics" which is a categorized value from left position to right position.

Finally, because of the decreased probability of survival as more periods are played, participants should be able to make worse decisions, then we include de variable “period” and we expect a positive coefficient. The “period squared” variable simply takes into account any possible non-linearity that the period variable may have and it may have either sign. Regressions were run separately for each treatment and pooled data, in which we include the dummy for the treatment “dumbreak”, and also a dummy for the sequence. We report the estimation results in Table 5. Note that the regressions are run previously with all individuals and then with only the individuals that remain alive.

-------------------- Insert Table 5 here -------------------

The coefficients of sequence dummy variables show that individuals learn when the break is larger (2nd treatment LS15) and they do not learn when the break is shorter (1st treatment LS10), while when we use the pooled data there is a weak evidence of learning. When using pooled data the second treatment reduces the deviation from optimal consumption, as the negative coefficient of “dumbreak” variable exhibits. The period variable is positive, meaning that …. The pattern of coefficients on Period and Period Squared shows that deviations increase at a decreasing rate as more periods are played. Females appear to deviate more in almost all cases.

When including the variables measuring the risk preference (“risk”), we observe that the more risk averse the individual is, the lower differences between her decisions and the optimal decisions. When decomposing the sample by treatment, the results do not change. If it does, it concerns to the significance level. When decomposing the variable into the dummies “riskaverse” and “riskloving” the results do not change. The “Raven test” variable presents a significant and positive sign.

The influence of parents’ education is not conclusive. In the case of pooled data and the treatment LS10, only mother’s education (“edumother”) makes the deviations increase, while in the case of treatment LS15, both, father’s and mother’s education affect the deviations in compensating way, although mother’s educations coefficient is larger than that of father’s education. The variable “Relig” presents a positive sign in treatment LS10 while a negative one in treatment LS15. The same result for “Frecrelig” variable. The variable

“Politics” always displays a positive and significant effect. Females appear to deviate more in almost all cases.

Behavioural models

Following Camerer and Chua (2005), a natural behavioural explanation for patterns of consumption is a “rule of thumb” in which subjects simply spend a fixed fraction of their current income or a fraction of cash-on-hand. To investigate these alternative explanations, we ran regressions in which the log of actual consumption was regressed against the optimal level of consumption and either current income or current cash-on-hand (i.e, current income plus savings). Table 6 summarizes the results[2].

-------------------- Insert Table 6 here -------------------

As in earlier analysis, the best model puts a larger weight on the optimal level of consumption than in current income or cash-on-hand. Besides, the coefficient of “Current Income” is larger than that of “Cash-on-hand”, which means that individuals decide their consumption level not considering savings. This can be an explanation of the over-saving behaviour found in previous sections. The incremental R-squared from adding the either “rule of thumb” variables (income and cash-on-hand) to the optimal consumption is small when considering cash-on-hand but large in the case of current income.

VII. Conclusions

One of the proposal in the current debate on the possible Social Security reforms to achieve a delay in the effective retirement age is to transform the increases in pensions due to the additional years of work (after the standard retirement age) into a lump-sum payment rather than an increased periodic payment. It was firstly suggested by Orszag (2001) related to U.S. Social Security. He considered that transforming Social Security's delayed retirement credit (given to people working between the ages of 62 and 65 in the U.S.) into a lump-sum payment rather than an increased monthly payment would likely encourage people to defer retirement.

[2] Fixed effects are included to adjust for the possibility that some subjects saved more than others. The estimates of those variables are omitted for simplicity of the table. Although not in the table, we have also performed the analysis by sequence for any of the treatments and for pooled data. Since the results do not change for simplicity we only present results by treatment.

However, one important issue related to this measure would be the impact on the poverty rates of the elderly of such a change. People might consume the lump-sum payment rather quickly. If so, paying lump-sum payments might result in increases in poverty rates among those who already delay their retirement decisions after the normal retirement age.

In this paper we focus on this specific issue. We present an experimental test to analyze whether the incorporation of a lump-sum payment as a measure to delay retirement decisions might lead to higher levels of poverty rates.

With reference to the effect of the lump-sum payment on savings decisions, we found that when individuals know that there are future rounds with no income, they smooth consumption over time more than previous experimental works where it is observed a close relationship between consumption and current income. Indeed, subjects over-save during their working period. The existence of a large lump-sum payment at the end of this period did not prevent this under consumption. It has to be noted that the over-savings was higher the larger the retirement period.

Regarding the lump-sum round, we found a small over-reaction with respect to the payment in consumption decisions. In this case, the over-reaction was greater the larger the retirement period.

Finally, with respect to the post lump-sum rounds, we found that on average the available cash of subjects was in most of these rounds larger than the optimal one. This result was stronger in the treatment with the larger retirement period where the available cash was always larger than the optimal one.

This result suggests that it is very unlikely that the introduction of a lump-sum payment in pension systems causes an increase in elderly poverty rates. Indeed, if this lump-sum payment would induce workers to delay retirement after the normal retirement age then poverty rates could be potentially reduced.

VIII. References

1. Ballinger T. P., Palumbo G. M. and T.N. Wilcox. Precautionary Saving and Social Learning across Generations: an experiment. *Economic Journal*, 113, 2004, 920-947.

2. Blondal, S. and S. Scarpetta. “The retirement decision in OECD countries.” OECD Economic Department Working Papers, Nº202, OECD Publishing, 1998.
3. Blostin, A.P. “Distribution of retirement income benefits.” *Monthly Labor Review*, 126 (4), 2003, 3-9.
4. Breyer, F. and M. Kifmann. “Incentives to retire later: a solution to the Social Security crisis?” *Journal of Pension Economics and Finance*, 1, 2002, 111-130.
5. Brown, A., Camerer, C. and Z. Chua. “Learning and visceral temptation in dynamic savings experiments” . Working Paper, 2006.
6. Carbone, E. and J. Hey. "The effect of unemployment on consumption: an experimental analysis." *Economic Journal*, Royal Economic Society, 114 (497), 2004, 660-683.
7. Casamatta, G., H. Cremer and P. Pestieau. “Voting on Pensions with Endogenous Retirement Age.” *International Tax and Public Finance*, 12, 2005, 7-28.
8. Camerer, C. and Z. Chua. Experiments on Intertemporal Consumption with Habit Formation and Social Learning. Working Paper, 2005.
9. Conde-Ruiz J.I. and V. Galasso. “Early Retirement.” *Review of Economics Dynamics*, 6, 2003, 12-36.

   _____ “The Macroeconomics of Early Retirement.” *Journal of Public Economics*, 88, 2004, 1849-1869.
10. Conde-Ruiz J.I., V. Galasso and P. Profeta, 2003. “Economic Development, Aging and Retirement Decisions.” Mimeo, 2003.

    _____ “The Evolution of Retirement.” CEPR Discussion Papers, n. 4683, 2005.
11. Coller, M. and M.B. Williams. “Eliciting Individual Discount Rates.” *Experimental Economics*, 2, 1999, 107-127.
12. Crawford, V.P. and D.M. Lilien. “Social Security and the Retirement Decision.” *Quarterly Journal of Economics,* 96, 1981, 505-529.
13. Cremer, H., J. Lozachmeur and P. Pestieau. “Social Security and Retirement Decision: A Positive and Normative Approach.” *CEPR Discussion Paper* no. 5542, 2006, London, Centre for Economic Policy Research.

14. Cremer, H. and P. Pestieau. "Reforming Our Pension System: Is It a Demographic, Financial or Political Problem?" *European Economic Review,* 44, 2000, 974-983.

_____ "The Double Dividend of Postponing Retirement." *International-Tax-and-Public-Finance,* 10 (4), 2003, 419-34.

15. Crettez, B. and P. Le Maitre. "Optimal Age of Retirement and Population Growth." *Journal of Population Economics*, 15, 2002, 737-755.
16. Cubitt, R.P. and R. Sudgen. "Dynamic Decision-Making Under Uncertainty: An Experimental Investigation of Choices Between Accumulator Gambles." *The Journal of Risk and Uncertainty*, 22:2, 2001, 103-128.
17. Fatas, E., J.A. Lacomba and F. Lagos. "An experimental test on retirement decisions." *Economic Inquiry*, forthcoming.
18. Fehr, H., W.I. Sterkeby and O. Thorgersen. "Social security reforms and early retirement." *Journal of Population Economics,* 16, 2003, 345-361.
19. Feldstein, M.S. "Social security and private savings: international evidence in an extended life-cycle model," in *The Economics of Public Services*, Proceedings of a Conference held by the International Economics Association, edited by M.S. Feldstein and R.P. Inman, 1977.
20. Fetherstonhaugh, D. and Lee Ross. "Framing Effects and Income Flow Preferences in Decisions About Social Security," in *Behavioral Dimension of Retirement Economics*, edited by Aaron. Washington D.C, 1999.
21. Frederik, S., G. Loewenstein and T. O'Donoghue. "Time Discounting and Time Preferences: A Critical Review." *Journal of Economic Literature*. 40(2), 2002, 351-401.
22. Gruber, J. and D. Wise, eds. "Social Security Programs and Retirement around the world," in *University of Chicago Press*, 1997.
23. Hamermesh, D. and P.L. Menchik. "Planned and Unplanned Bequests." *Economic Inquiry*, 25(1), 1987, 55-66.
24. Harrison, G.W., L. Morten and M.B. Williams. "Estimating Individual Discount Rates for Denmark: A Field Experiment." *American Economic Review*, 92(5), 2002, 1606-1617.
25. Herbertsson, T.T. and M. Orszag. "The Cost of Early Retirement in the OECD." *IoES Working Paper*, No. W01:02, 2001.
26. Hey, J. And V. Dardadoni. "Optimal Consumption under Uncertainty: An Experimental Investigation." *Economic Journal*, 98 (390), 1987, 105-16

27. Holt, C. and S.K. Laury. "Risk Aversion and Incentive Effects." *American Economic Review*, 92(5), 2002, 1644-1655.
28. Kotlikoff, L.J. "Social Security and Equilibrium Capital Intensity." *Quarterly Journal of Economics*, 93, 1979a, 233-53.
_____ "Testing the theory of social security and life cycle accumulation." *American Economic Review*, 69, 1979b, 396-410.
29. Lacomba, J.A. and Francisco Lagos. "Population Aging and Legal Retirement Age." *Journal of Population Economics*, 19 (3), 2006, 507-519.
_____ "Political Election on Legal Retirement Age." *Social Choice and Welfare*, forthcoming.
30. Laibson, D.I. "Golden Eggs and Hyperbolic Discounting." *Quarterly Journal of Economics* 112, 1997, 443-447.
31. Moore, J.H. and L.A. Muller. "An analysis of lump-sum pension distribution recipients." *Monthly Labor Review*, 125 (5), 2002, 29-46.
32. O'Donoghue, T. and M: Rabin. "Doing it Now or Doing it Later." *American Economic Review*, 89, 1999, 103-124.
33. Organization For Economic Cooperation and OECD (2000). *Maintaining Prosperity in an Ageing Society*. Organisation for Economic Co-operation and Development.
34. Orzag, P. "Should a lump-sum payment replace social security's delayed retirement credit?" An issue in brief. *Center for Retirement Research at Boston College*, 2001, Number 6.
35. Samwick, Andrew A. "Discount Rate Heterogeneity and Social Security Reform." *NBER Working Paper* No. W6219, 1997.
36. Sheshinski, E. "A Model of Social Security and Retirement Decisions." *Journal of Public Economics*, 10, 1978, 337-360.
37. Social Security Administration. "The Impact of Repealing the Retirement Earning Test on Rates of Poverty". Office of Policy, 2000, February 23.
38. Steuerle, E. and J. Bakija. "Retooling Social Security for the 21st Century: Right and Wrong Approaches to Reform." Washington, DC: *Urban Institute Press*, 1994.
39. Thaler, Richard. "Intertemporal Choice." In Richard Thaler, ed., *The Winner's Curse: Paradoxes and Anomalies of Economic Life.* Princeton, NJ: Princeton University Press, 1992.

IX. Appendix

Table 1:Experimental Design

Rounds	Pobability of surviving	LS10 Endowment	LS15 Endowment	Cash Available	**Consumption**	Savings	**Obtained Points**
1	1	85	85	85	---	---	---
2	29/30	85	85				
3	28/29	85	85				
4	27/28	85	85				
5	26/27	85	85				
6	25/26	85	85				
7	24/25	85	85				
8	23/24	85	85				
9	22/23	85	85				
10	21/22	85	85				
11	20/21	191,25	85				
12	19/20		85				
13	18/19		85				
14	17/18		85				
15	16/17		85				
16	15/16		345				
17	14/15						
18	13/14						
19	12/13						
20	11/12						
21	10/11						
22	9/10						
23	8/9						
24	7/8						
25	6/7						
26	5/6						
27	4/5						
28	3/4						
29	2/3						
30	1/2						
							0,00

Table 2: Descriptive Statistics

	LS10					LS15				
	Total	Seq = 1	Seq = 2	Seq = 3	Optimal	Total	Seq = 1	Seq = 2	Seq = 3	Optimal
Consumption	43,82	49,32	40,27	43,74	34,71	66,22	65,89	68,11	65,11	54
	(44,20)	(50,51)	(44,61)	(36,62)		(44,65)	(50,35)	(44,18)	(40,47)	
Savings	152,8	148,0	149,6	161,4	67,75	101,4	111,8	89,4	102,5	78,84
	(187,35)	(198,69)	(187,81)	(176,36)		(135,31)	(144,99)	(128,05)	(132,75)	
Cash available	196,6	197,3	189,9	205,2	102,5	167,6	177,7	157,5	167,6	132,8
	(191,28)	(197,28)	(196,21)	(179,00)		(135,89)	(144,09)	(127,74)	(135,25)	
Difconabs	27,54	30,17	27,24	25,63		25,53	27,65	27,55	22,54	
	(32,19)	(37,66)	(32,48)	(25,89)		(36,40)	(43,27)	(32,69)	(33,23)	
Average life	21,96	19,76	24,37	20,64		21,31	20,91	19,13	23,18	
	(7,12)	(8,04)	(5,95)	(6,75)		(7,08)	(7,96)	(7,50)	(5,43)	
# Obs.	1002	275	418	309	30	945	281	278	386	30

Standard Deviation between brackets.

Table 3: Statistical Tests

	R=10					R=15				
Consumption	Total	Seq = 1	Seq = 2	Seq = 3	Optimal	Total	Seq = 1	Seq = 2	Seq = 3	Optimal
Total	0,00	1,64	1,37	0,03	6,52	0,00	0,10	0,63	0,44	8,41
Seq=1		0,00	2,42	1,51	4,80		0,00	0,55	0,21	3,96
Seq=2			0,00	1,15	2,55			0,00	0,89	5,33
Seq=3				0,00	4,33				0,00	5,39
Optimal					0,00					0,00

	R=10					R=15				
Saving	Total	Seq = 1	Seq = 2	Seq = 3	Optimal	Total	Seq = 1	Seq = 2	Seq = 3	Optimal
Total	0,00	0,36	0,29	0,74	2,49	0,00	1,07	1,36	0,14	0,91
Seq=1		0,00	0,11	0,86	6,70		0,00	1,94	0,85	3,81
Seq=2			0,00	0,87	8,91			0,00	1,28	1,37
Seq=3				0,00	9,34				0,00	3,50
Optimal					0,00					0,00

Table 4: Ratio Consumption to Endowment

	R=10					R=15				
Period	Seq=1	Seq=2	Seq=3	Total	Opt.	Seq=1	Seq=2	Seq=3	Total	Opt.
1	52,06	48,29	54,53	51,63	100,00	71,76	69,29	74,24	71,76	100,00
2	78,02	61,24	53,68	64,26	100,00	79,35	82,97	78,43	80,30	100,00
3	63,73	62,29	58,50	61,52	100,00	77,71	81,96	91,76	83,81	100,00
4	68,63	63,53	69,07	66,97	94,45	110,03	102,08	92,48	101,36	100,00
5	84,78	66,87	83,67	78,00	87,58	85,96	86,78	93,46	88,88	100,00
6	120,00	72,51	74,71	87,46	80,98	85,22	101,38	87,25	91,33	100,00
7	69,33	83,59	67,37	74,36	74,63	80,31	92,32	85,49	86,26	100,00
8	80,09	66,99	59,06	68,13	68,54	73,16	95,61	94,46	89,41	100,00
9	87,25	84,43	75,92	82,30	62,71	85,99	77,65	95,85	87,20	97,56
10	64,28	82,56	70,50	73,83	57,14	135,83	129,32	92,39	115,75	88,89
11	41,41	50,96	37,24	44,05	24,71	81,18	71,55	94,12	84,10	80,63
12	-	-	-	-		120,13	103,53	97,30	104,74	72,77
13	-	-	-	-		87,32	79,61	94,85	88,82	65,31
14	-	-	-	-		80,00	99,22	86,03	87,92	58,25
15	-	-	-	-		115,29	84,41	96,22	98,71	51,60
16	-	-	-	-		37,81	33,51	42,13	38,65	26,41
Average Ratio[3]	75,88	68,79	66,10	70,85	82,60	89,28	90,05	90,05	89,82	87,67

[3] This is the average ratio of the pre lump-sum rounds, that is, the 10 first rounds in LS10 and the 15 first rounds in LS15.

Table 5: Regression Analysis

LN(DIFCONS)	POOLED DATA		BREAK=10		BREAK=15		POOLED DATA		BREAK=10	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Alive	-1.098***	-1.072***	-0.673***	-0.680***	-2.020***	-2.020***				
	[0.119]	[0.118]	[0.103]	[0.102]	[0.263]	[0.263]				
Dumbreak	-0.119	-0.114					-0.520***	-0.415***		
	[0.081]	[0.083]					[0.142]	[0.141]		
Seq 1	0.165	0.170	0.050	0.049	0.261	0.261	0.168	0.268	-0.021	-0.017
	[0.117]	[0.117]	[0.100]	[0.100]	[0.230]	[0.230]	[0.217]	[0.217]	[0.205]	[0.205]
Seq 2	0.257**	0.257**	0.247**	0.248**	-0.096	-0.096	-0.305	-0.192	0.406**	0.440**
	[0.115]	[0.115]	[0.101]	[0.101]	[0.232]	[0.232]	[0.199]	[0.200]	[0.179]	[0.175]
Period	0.517***	0.517***	0.353***	0.352***	0.804***	0.804***	0.491***	0.503***	0.348***	0.348***
	[0.023]	[0.023]	[0.020]	[0.020]	[0.044]	[0.044]	[0.041]	[0.042]	[0.037]	[0.037]
Period Squared	-0.018***	-0.018***	-0.015***	-0.015***	-0.024***	-0.024***	-0.016***	-0.017***	-0.014***	-0.014***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.002]	[0.002]	[0.001]	[0.001]
Riskaverse	-0.303**		-0.372***		0.000		-0.552**		-0.304	
	[0.142]		[0.143]		[0.000]		[0.276]		[0.299]	
Riskloving	-0.333*		-0.233		8.853***		-1.350***		-0.232	
	[0.176]		[0.176]		[1.879]		[0.319]		[0.351]	
Risk		-0.048		-0.099**		-0.765***		0.056		-0.091
		[0.040]		[0.043]		[0.162]		[0.078]		[0.089]
Raven Test	0.041*	0.042*	-0.030	-0.041	0.665***	0.208***	0.188***	0.164***	0.319*	0.292*
	[0.022]	[0.022]	[0.099]	[0.095]	[0.140]	[0.053]	[0.038]	[0.038]	[0.192]	[0.177]
Sex	0.304***	0.293***	0.027	-0.038	-2.211***	2.052***	0.822***	0.827***	0.071	0.047
	[0.109]	[0.109]	[0.094]	[0.092]	[0.685]	[0.411]	[0.197]	[0.199]	[0.171]	[0.173]
Edufather	-0.000	-0.008	-0.001	-0.013	0.784***	0.007	0.035*	0.019	-0.024	-0.034*
	[0.010]	[0.009]	[0.010]	[0.008]	[0.178]	[0.045]	[0.019]	[0.019]	[0.021]	[0.019]
Edumother	0.022**	0.025***	0.034***	0.035***	-2.037***	-0.179**	0.012	0.023	0.020	0.020
	[0.009]	[0.009]	[0.007]	[0.007]	[0.430]	[0.078]	[0.015]	[0.015]	[0.014]	[0.013]
Politics	0.083*	0.112***	0.057	0.074	1.953***	0.423***	0.117	0.188**	0.398***	0.408***
	[0.045]	[0.043]	[0.053]	[0.051]	[0.386]	[0.100]	[0.081]	[0.079]	[0.122]	[0.113]
Religion	0.003	-0.009	0.049***	0.036***	-1.673***	-0.329***	0.061**	0.023	0.092***	0.081***
	[0.016]	[0.015]	[0.014]	[0.013]	[0.295]	[0.062]	[0.030]	[0.028]	[0.025]	[0.022]
Frecrelig	0.158***	0.160***	0.153***	0.161***	-8.335***	-1.012***	0.336***	0.352***	0.379***	0.383***
	[0.054]	[0.054]	[0.042]	[0.041]	[1.622]	[0.287]	[0.100]	[0.100]	[0.092]	[0.089]
Constant	-0.131	-0.112	-0.009	0.459	85.223***	14.344***	1.141	-0.735	-2.569**	-2.169*
	[1.059]	[1.129]	[0.477]	[0.551]	[17.513]	[3.929]	[1.862]	[1.958]	[1.000]	[1.221]
Observations	2250	2250	1440	1440	810	810	1172	1172	754	754
R-squared	0.28	0.28	0.45	0.44	0.43	0.43	0.22	0.21	0.19	0.19

Standard errors in brackets * significant at 10%; ** significant at 5%; *** significant at 1%

Table 6: Behavioural Analysis						
	POOLED DATA		LS10		LS15	
	MODEL 1	MODEL 2	MODEL 1	MODEL 2	MODEL 1	MODEL 2
Opt. Consumption	-0.018	-0.371***	1.088*	1.141*	-0.191	-1.196***
	[0.121]	[0.132]	[0.573]	[0.605]	[0.169]	[0.153]
Current Income	0.384***		0.365***		0.368***	
	[0.024]		[0.040]		[0.034]	
Cash on Hand		0.006		-0.009		0.068***
		[0.008]		[0.010]		[0.017]
Observations	1172	1172	754	754	418	418
R-squared	0.41	0.28	0.31	0.23	0.53	0.42
R-squared (only opt.)	0.28	0.28	0.23	0.23	0.39	0.39

Figure 1

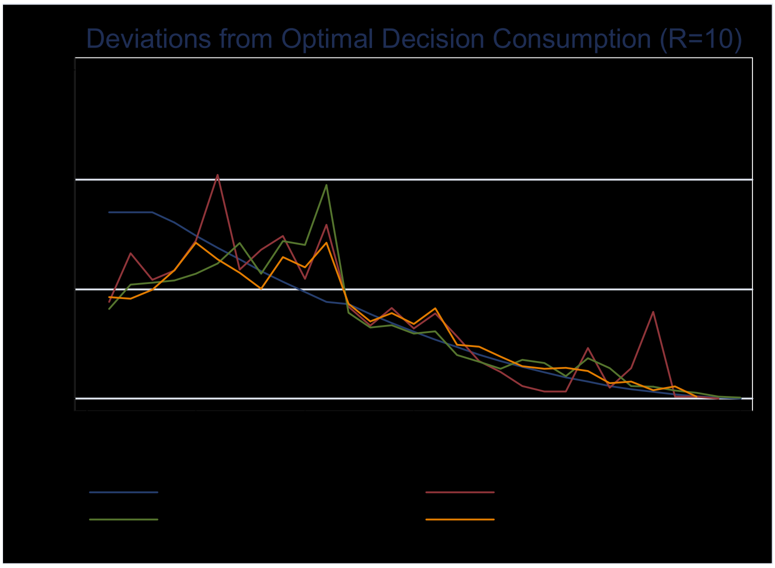


Figure 2

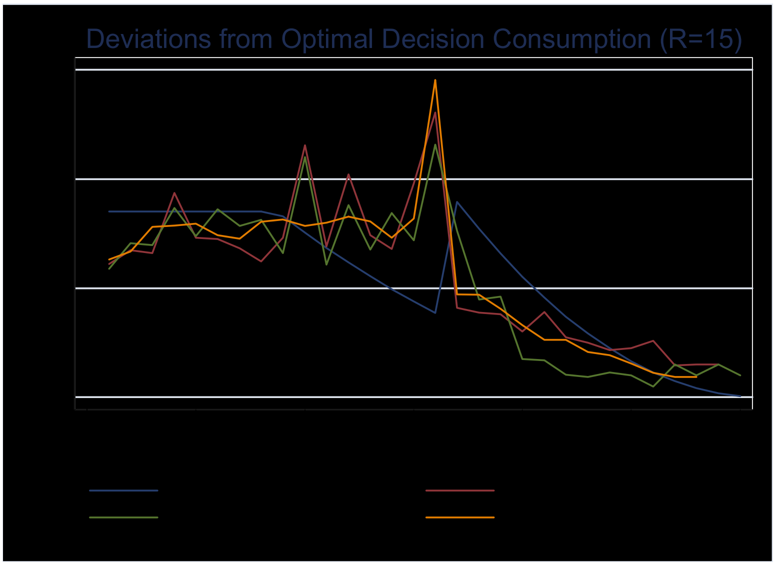

Deviations from Optimal Decision Consumption (R=15)

Figure 3

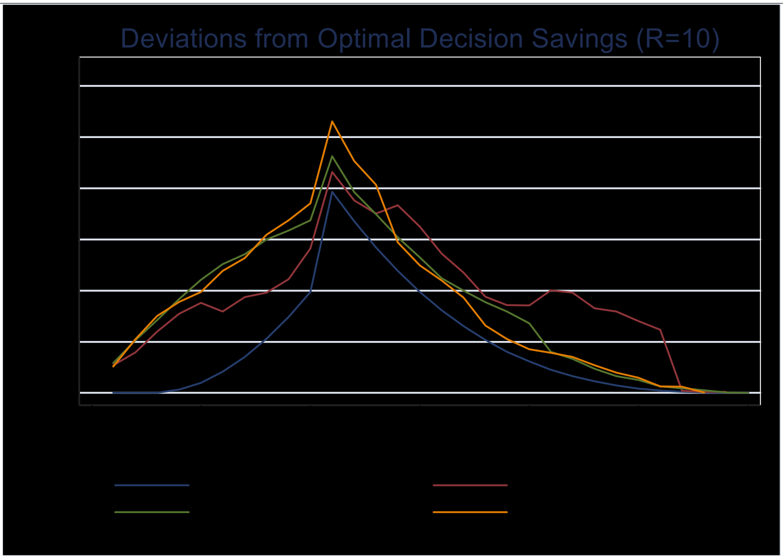
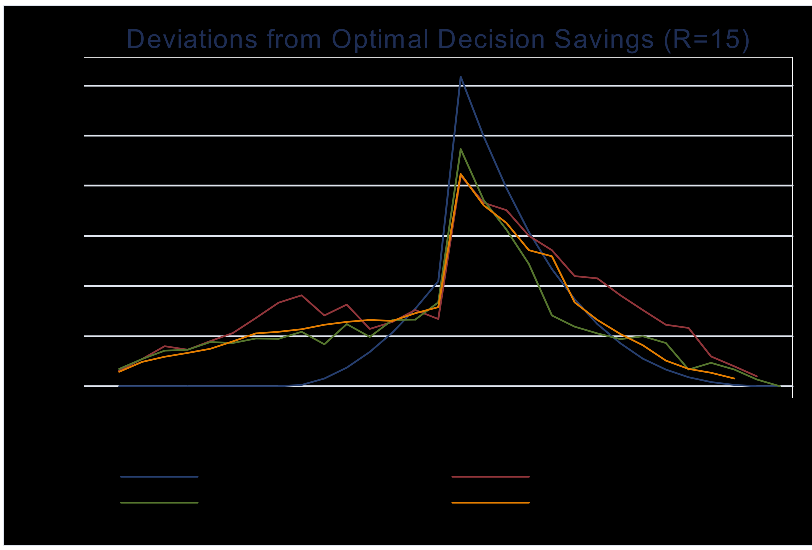


Figure 4



Risk aversion test

Risk Aversion Test

	Option A				Option B					
Decision	High Payoff		Low Payoff		High Payoff		Low Payoff		Option	
1	1/10	200	9/10	160	1/10	385	9/10	10	A	B
2	2/10	200	8/10	160	2/10	385	8/10	10	A	B
3	3/10	200	7/10	160	3/10	385	7/10	10	A	B
4	4/10	200	6/10	160	4/10	385	6/10	10	A	B
5	5/10	200	5/10	160	5/10	385	5/10	10	A	B
6	6/10	200	4/10	160	6/10	385	4/10	10	A	B
7	7/10	200	3/10	160	7/10	385	3/10	10	A	B
8	8/10	200	2/10	160	8/10	385	2/10	10	A	B
9	9/10	200	1/10	160	9/10	385	1/10	10	A	B
10	1	200	0	160	1	385	0	10	A	B

Footnotes

[1] See Gruber and Wise (1997) or Blondal and Scarpetta (1998).

[2] Many studies have analyzed the relationship between retirement and Social Security. Earlier literature mainly focussed on the effect of the introduction of a pension system on the individual retirement decision, see among others, Feldstein (1977), Sheshinski (1978), Kotlikoff (1979a; 1979b), Crawford and Lilien (1981) or Cremer and Pestieau (2000). There is however more recent literature dealing with the retirement decision in a political economy environment, see Crettez and Le Maitre (2002), Conde-Ruiz et al. (2003; 2005), Conde-Ruiz and Galasso (2003; 2004), Casamatta et al. (2005), or Lacomba and Lagos (2006; forthcoming).

[3] The link between lifetime contributions and benefits is being reinforced in a number of countries, Germany, Italy, Hungary, Mexico, Poland, Sweden, etc., by shifting from defined-benefit to defined-contribution systems. See Blondal and Scarpetta (1998).

[4] An alternative way of raising the effective retirement age might be to delay the legal retirement age. If so, Lacomba and Lagos (forthcoming) find that it would be appropriate to combine that measure with an increase in the redistributive character of the pension system. This higher intra-generational redistribution would delay the preferred legal retirement age of most of voters, which would result in a larger degree of approval in the postponement of the legal retirement age.

[5] See Moore and Muller (2002) or Blostin (2003) for a detailed analysis of this issue.

[6] In a theoretical background it also requires that $F(T)=0$.

[7] For the sake of simplicity we choose a zero discount rate.

[8] Conditions for risk aversion are u′(c)>0 and u″(c)<0. The Inada conditions imply that u′(0)=∞ and u′(∞)=0. The specific utility function for implementing the experiment is u(c) = 10 * Square Root (c).

[9] For the sake of simplicity we choose a zero discount rate.

[10]See Hey and Dardadoni (1988), Ballinger et al (2003), Carbone and Hey (2004) and Camerer and Chua (2005) for experimental evidence of this issue.