Individual preferences and the distribution of wealth

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WORKING PAPER N° 2005 - 32

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JEL Codes : C33, C35, D12, D91

Keywords : Risk aversion, time preference, altruism, wealth, inequalities.

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Abstract

For a sub-sample of French households of an Insee wealth survey, we obtain new and relative measures of 5 individual preference parameters : the risk "attitude" (aversion, prudence…), the rate of *time* depreciation over the life-cycle, the degree of short-term impatience, and the degrees of family and non family altruism. Short-term impatience and non family altruism are found no to affect wealth but, contrarily to recent results of behavioural analysis, the three other parameters have significant effects on wealth (financial, gross or net), which are consistent with theoretical predictions : wealth accumulation increases with the degree of prudence (precautionary saving), falls with time preference (life-cycle saving) and rises with the degree of family altruism (wealth intended for bequests). The way preferences are measured allows to get rid of potential causality problems and the joint explanatory power of the three parameters appears sizeable, although less important than the one of classic explanatory variables (age, income, social class and inheritance).

September 2005

This paper is part of a joint work with Daniel Verger of INSEE

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To what extent does household wealth depend on circumstances and on choices? In other words, to what extent are households "responsible" for their own level of saving? While this question may seem overly general, and at least partly normative, it is behind a large body of recent empirical literature, especially in North America.[1]

Work in this area typically starts by asking a more precise, slightly different question : can heterogeneity of individual preferences account for two major stylised facts concerning the wealth distribution in the USA and France (as indeed in most developed countries), facts which are unexplained by the life-cycle theory :

- the very wide range of the wealth distribution, given age (and family structure) and the level of resources (permanent income, or permanent wage and retirement income);

- the inadequacy of saving at retirement age of a substantial proportion of households, especially compared to resources available over the life-cycle (which should imply a sharp reduction in consumption at the end of life).[2]

These two findings are now well established and seem unlikely to only result from measurement error (which is nonetheless important in the measurement of wealth). The first reflects the finding that age and permanent income together only explain a small part of the distribution of wealth: just over a third, according to the Theil index. The remaining dispersion is indeed important for any age and decile of permanent income (or lifetime earnings) : at the eve of retirement, we thus find a non-negligible proportion of savers in the first income deciles, and an important percentage of non-savers in the top income deciles. The second stylised fact develops this last point for the bottom of the wealth distribution : at the end of working life, wealth is under two years of permanent income for over twenty per cent of households, and this holds almost independently of the level of permanent income.[3]

If these empirical observations are indeed correct, the interpretation given in the mentioned microeconomic literature is more problematic. These authors allow only a minor role for capital and credit market imperfections (entry barriers, transaction or holding costs, increasing returns to the size of investment, etc.), or again for distortions associated with social security, which may discourage small amounts of saving (Hubbard *et al*. 1995). Similarly, they disregard the implications of buffer-stock models, which explain low levels of wealth – for prudent consumers – by "impatience" (i.e. high time preference), together with liquidity or borrowing constraints (Deaton, 1992), or with private or public insurance imperfections (Caroll, 2001). And the fact of concentrating on wealth disparities at a given age

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[1] For example, Lusardi (2003) and Venti and Wise (2001) with American HRS panel data, or Ameriks, Caplin and Leahy (2003) using TIAA-CREF data (covering participants in a private pension program in the USA). Appendix 1 describes the ideological content of this approach.

[2] These are not the only "puzzles" regarding wealth. Household portfolios are only little diversified (but differ sharply between households) ; the demand for shares is indeed limited, despite the difference in returns between stocks and shares (the "equity premium puzzle").

[3] See Masson (1988) and Masson and Arrondel (1989) for France and Canada. Another statistic relating to the same phenomenon of insufficient saving is that *median* wealth is low at all ages and for all permanent income deciles, while *average* wealth is after age 40, or so, fairly high, even in intermediary income deciles.

and permanent income leads them to abstract from inheritances and differences in abilities (which are supposedly reflected in inequalities in permanent income).

How can one then explain such differences in wealth at a given age and income ? The previous authors have proposed a key role for preference heterogeneity, but not necessarily that of a fully rational agent in American data, time preference and risk-aversion have been found to explain only little of the distribution of wealth[4]. Following a "behavioural" approach, they emphasise the potential role of *limited* rationality in explaining the low level of savings of a number of households at retirement age : an insufficient propensity to plan for the future (too little time being devoted to retirement planning); lack of self-control (which prevents individuals from following a simple saving plan); or time inconsistency, as shown by feelings of regret at not having saved more (expressed by three-quarters of households in HRS data).

Do those who find themselves with insufficient saving at retirement age only have themselves to blame ? Lusardi (2004) indeed proposes savings and financial education training "seminars" to reduce the costs of financial planning and information. She suggests that such a programme would be cost-effective, producing a non-negligible (20 to 30 %) rise in savings by the low-educated.

Appendix 1 underlines the methodological and ideological issues raised by this recent literature. Our own contribution to that debate is based on a novel method of estimating individual preferences.

Using a series of different questions (regarding behaviour, opinion or intention, lottery or hypothetical choice) covering a number of different domains (consumption, leisure, health, financial investment, work, retirement, and family life), we construct synthetic *scores* for an *"experimental" sub-sample* of individuals in the Insee survey "Patrimoine 1997". These scores are argued to provide information regarding five different kinds of preferences :

- Two key parameters : , the general attitude (rather than aversion) regarding risk ; and , the discount rate. These are extensions to the equivalent parameters in the standard life cycle model (but see the [Theory] paper).

- Two parameters measuring intergenerational altruism, one familial, , measuring the weight given to children's well-being, and the other non-familial or social, ^{nf}, showing the weight given to future generations (protection of the environment, saving the planet, etc.).

- A composite indicator of *short-term* impatience, , which may reflect an aversion for waiting due to opportunity cost for a fully rational agent, or more likely the degree of time inconsistency, corresponding to a lack of imagination or will (hyperbolic discounting). This parameter reflects in part limited rationality, unlike the other four parameters.

[4] See in particular Ameriks *et al.* (2003). However, the [Theory] paper underlines the potential unreliability, especially concerning time preference, of these measures inspired by the work of Barsky *et al.* (1997).

Our previous papers support the introduction of these five measures, suggest new definitions of them, and, last, test empirically their empirical relevance[5]. We consider now the role that these five preference measures play in explaining the distribution of wealth (financial, gross and net) observed in data from the 1997 French survey of Wealth (Patrimoine 1997).[6]

As in previous work, we consider the effect of these measures conditional on other variables, notably age and financial resources. The wealth equation implied by the life-cycle hypothesis suggests a role for all of the control variables, including the preference parameters : wealth accumulation (financial or global) should increase with γ (precautionary saving), fall with δ (life-cycle saving) and rise with θ (wealth intended for bequests).

This paper brings a number of pieces of good news, which call into question some of the results of recent behavioural analysis :

(i) The effect of the three preference scores γ, δ and θ on wealth are significant and consistent with the predictions (this is not the case of non-familial altruism with respect to future generations). Moreover, the impatience parameter, β, does not affect wealth. These conclusions are thus different from those found in American data, where insufficient wealth is often explained by limited rationality.[7]

(ii) The causality between wealth and preferences is a key issue : wealthier households could be more far-sighted than others, for example. Our method is here very useful : the preference scores are constructed from a wide variety of questions covering multiple dimensions of life (other than wealth) ; as such, these scores represent *natural instruments*, whose exogeneity can be further checked.

(iii) The explanatory power of these preference parameters (γ, δ and θ) remains limited : but it comes just after the classic explanatory variables (age, income, social class, and inheritance), and before other variables social origin, education, household composition, unemployment and health, etc. Moreover, those who have not saved ("enough") at retirement age are found to have, on average, a higher discount rate and a lower weight given to children's well-being than those who have saved.

(iv) The analysis of the role of preferences can be continued by considering interactions. The correlation between γ and δ is negative (0.34) : being prudent (a higher value of γ) is to some extent the same as being conscious of the future (a low value of δ). These interactions are significant predictors of wealth : between the individual the most prudent and far-sighted, and his/her opposite the ratio of predicted gross wealth is 1: 10,

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[5] See, in the [Risk] and [Time] papers, the discussion of the Cronbach Alpha measures (internal consistency of scores), Principal Component analysis, the regressions of each score, etc.

[6] The effect of these preference indicators on the composition of wealth and the demand for different assets is presented in Arrondel *et al.* (2004), which defines *saver types*, interacting risk and time preference scores.

[7] We think that the poor measures of the parameters γ and δ in American studies explain the absence of effects of these preferences. On the other hand, the "propensity to plan ahead", which is significant, is in fact an indirect (but more reliable) measure of time preference, as Ameriks *et al.* (2003) themselves acknowledge.

ceteris paribus. While this may seem large, it should be considered in the context of the ratio of wealth between the first and tenth deciles, of the order of 100 to 1...[8]

1. THE WEALTH EQUATION

The wealth equation derived from the life-cycle hypothesis emphasises the role of two explanatory variables : the (demographic) position in the life cycle, described in some detail (to allow for differences in needs or for liquidity constraints, for example) ; and the level of resources. Our aim here is to evaluate the role of preference heterogeneity in explaining the part of the wealth distribution which remains unexplained in this equation.

1.1. Observable determinants of wealth accumulation

The dependant variable is the log of wealth, $Log\ A$ (notably to account for the skewness of the wealth distribution, and the importance of measurement error). The basic equation for wealth at time t is as follows :

$$Log\ A_t = f(a_t, YP, I_t, V, V'_t) + \varepsilon \quad (1)$$

where a_t is the age of the household head, YP a measure of permanent income (over total, past and future life), and I_t represents wealth transfers already received. The variables V and V'_t cover demographic variables, which are either permanent (education) or time-varying (family composition or unemployment, for example). Wealth A_t is a *net* measure, but we will use similar regressions to analyse gross wealth (which does not take debts into account) and financial wealth (which corresponds, for the majority of households, to gross wealth excluding the housing component).

Age is predicted to have a highly non linear, hump-shaped relationship with wealth, reaching a maximum at retirement age. The subsequent running down of wealth will be limited by both precautionary saving, reflecting uncertainty over life expectancy, and any motive for intergenerational transfers.

The estimation of any age effect using cross-section data, as here, is subject to potentially serious biases in both directions. Decumulation of wealth at old age will be under-estimated as mortality is negatively correlated with wealth. On the other hand, cohort effects linked to economic growth and the development of financial markets, will tend to overstate the lower level of wealth of older generations.

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[8] A less enjoyable conclusion in our paper is that there is no satisfactory short-cut which avoids the construction of scores, as carried out here. In particular, the 0 to 10 self-reported *scales* (at the end of the questionnaire), with respect to risk, impatience and time preference, lead to the same qualitative results as evoked in points (i) to (iv), but much less satisfactory.

As saving is only deferred consumption, the proportionality hypothesis should hold : a doubling of permanent income should be associated with a doubling of wealth, *ceteris paribus*. In practice, a number of factors are likely to yield an estimated relationship whereby wealth rises more than proportionately with permanent income : capital market imperfections work to the advantage of richer households (due to threshold effects, increasing returns as a function of the size of the capital investment, and so on); higher earnings may also be more risky, leading to more precautionary saving ; life expectancy rises with wealth ; voluntary bequests are a luxury good, and so on (see Masson, 1988).[9]

Over the whole sample, we proxy *YP* by occupational group, education and current income. For the sub-sample of currently (or previously) salaried households, we follow the method proposed in Lollivier and Verger (1999), and estimate a more precise indicator of permanent income which allows us to split current (non property) income into a long-term component, identified with *YP*, a part linked with age, which picks up systematic life-cycle variation in income, and a short-term component which reflects transitory phenomena (see Table 5c).

Apart from its own resources, *YP*, the household may benefit from transfers from parents, *I*. Life-cycle theory predicts that *YP* and *I* should have an identical effect on saving. Empirical tests, which suppose a sufficiently accurate measure of *I*, find that this is not the case : the propensity to save out of family transfers is higher (see Masson, 1988). It would ideally be useful to control for expected bequests, *I'*, which may have diverse effects on current wealth accumulation (having rich parents may reduce the fixed costs associated with investing, but also discourage saving). We have only introduced a dummy variable for having received bequests (in some specifications we include the size of the bequests : see Tables 5b and 5c).[10]

Demographic characteristics – marital status, family composition, labour market status of the head of household and his/her spouse (retired, employed or unemployed), and current and past health – control for tastes and needs in models of consumption-smoothing over the life cycle (see Attanasio and Browning, 1995). However, these demographic variables can be interpreted in a number of other ways. For example, two-earner households may represent risk-sharing, and facilitate borrowing and increase labour supply flexibility (thus reducing the impact of liquidity or borrowing constraints). Perhaps more worrying, these demographic variables might be indirect measures of the very preferences that we wish to measure independently : being married with children is thus likely to reduce time preference (see the [Time] paper).

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[9] Permanent income *YP* is sometimes decomposed into permanent earnings *YP'* and a wealth equivalent of pension rights, to test for any substitution between these latter and traditional saving. As permanent income only plays the role of a control variable here, we have not undertaken this decomposition.

[10] Expected bequests have not been taken into account, except via the inclusion of parents' social class in Tables 5b and 5c (Theil decompositions). They are used as instruments in the exogeneity tests of the preference indicators (see below and Appendix 2).

Although the function *f* in the wealth equation (1) may be highly non-linear, most of the explanatory variables appear additively. However, age, income and education are introduced as discrete, rather than continuous, variables in order to allow some flexibility (see the first two columns of Appendix Tables A1 to A3).

1.2. The role of individual preferences

This specification of the wealth equation allows us to evaluate the impact of preferences : do the five preference indicators have the effects predicted by theory in explaining part of the residual ε in equation (1) ? We therefore estimate :

$$Log\ A_t = f'(a_t, YP, I_t, V, V'_t) + g(\rho, \delta, \theta, \lambda, \theta^{nf}) + \varepsilon. \qquad (2)$$

The predicted effects from life-cycle theory of the first three preference parameters on wealth are clear, and robust to theoretical extensions. The existence of precautionary saving given uncertainty of income or life-expectancy should yield a positive relationship between wealth and ρ, which is an indicator of general attitudes regarding risk and uncertainty. The effect of the discount rate, δ, is predicted to be negative : a lower value of δ corresponds to a longer horizon and thus to greater life-cycle saving. Last, greater family altruism leads to more saving for the benefit of one's children (a positive effect of θ).

The relationship between wealth and λ, the measure of short-term impatience picking up both individuals who "don't like to wait" and time inconsistency, is much less clear. Regarding asset choice, a higher value of λ should be associated with assets that require little time to manage, or a contractual saving scheme to encourage discipline (especially for the more far-sighted, with a low value of δ) ; alternatively, we might expect unplanned borrowing for those who have little self-control (especially if they are short-sighted). However, despite the work of Laibson (1997), we know little about the influence of λ on the level of saving, which is the subject of the current paper. Indeed, contrary to the discount rate, δ, the degree of short-term impatience tells us nothing about the saver's decision horizon.

We equally cannot predict the impact of non-family altruism, θ^{nf}, which measures the individual's concern for (unrelated) future generations. Some experimental work has interpreted this humanism as (the inverse of) preference for the present ; we, however, are not convinced that θ^{nf} can be identified with the discount rate, δ. As such, non-family altruism may seem irrelevant for wealth accumulation in the majority of individuals or households, with perhaps the exception of the richest, where charitable bequests or gifts to science or for the protection of the environment may come into play.

The estimation of the impact of preferences on wealth accumulation in equation (2) is not straightforward, as preferences themselves may be determined by wealth. We expand on the question of reverse causality below, and in particular in Appendix 2 (which presents the instrumental variable approach).

2. THE EFFECT OF PREFERENCES

The wealth equation (2) is estimated introducing our preference indicators as explanatory variables (either scores, scales, or lottery choices), either as continuous (Appendix Tables A1 to A3) or dummy variables representing the quartiles of the relevant distribution. In each case, three regressions are estimated, covering financial wealth, gross wealth, and net wealth (this latter is calculated by subtracting the current level of debt). The other explanatory variables include age (in five-year groups), current non property income in deciles, education, social class, household type, number of children (not living at home), bequests received, liquidity constraints, spells of unemployment, health problems, and so on.[11]

The first two columns of Appendix Tables A1 to A3 (which correspond to financial, gross and net wealth respectively) show the results from wealth equations estimated on the whole sample of households in the 1997 Insee Wealth survey (10 150 households) and our "experimental" sub-sample (1 130 households). The results are qualitatively similar (given the difference in sample sizes), except for the variables measuring career interruptions (for reasons of unemployment or health) which are insignificant in the smaller sample.[12]

2.1. Preference Scores

The last column of the Appendix Tables introduces preference scores as a continuous variable. The extra explanatory power associated with these variables is only small for all three wealth measures (the R^2 rising by less than two percentage points). Given the skewness of wealth, this is unsurprising. Together, the preference variables are very significantly correlated with wealth. While short-term impatience and non-family altruism are not correlated with wealth, the other three variables are significant (at least at the ten per cent level, and at the one per cent level for time preference), with the signs predicted by theory.

Keeping the same set of explanatory variables, Table 1 shows the results when scores are introduced as dummy variables (representing the quartiles of each distribution) to pick up potential non-linear effects. For all three measures of wealth, prudence, being far-sighted, and being altruistic with respect to the family all increase wealth : household saving therefore has precautionary, foresight, and bequest elements. Impatience and non-family altruism play no role in explaining wealth, which is again in line with theoretical predictions.

2.2. Preference scores are better than other preference measures

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[11] Liquidity constraints are measured using a dummy variable based on two survey questions : whether the household had been refused credit, or if he had avoided asking for credit for fear of being refused.

[12] This "experimental" sub-sample consists of higher-educated households who are relatively infrequently working class ; they are thus less likely to suffer career interruptions from unemployment or poor health, which may be behind this lack of explanatory power.

Table 2 estimates the same wealth regressions, replacing the scores with respect to risk, time preference and impatience by their corresponding self-reported *scales*. It is evident that the latter do a worse job in explaining wealth accumulation than do the associated preference scores. Only the time preference scale has a statistically significant impact, in the expected direction, on wealth.

Table 3 focuses on different measures of risk preferences. The first panel (Table 3a) includes an experimental measure of risk-aversion (in four levels) proposed by Barsky *et al*. (1997). Respondents choose between lotteries concerning career choices (see the [Risk] paper). Around 3 000 households answer these questions (the "recto-verso" questionnaire). The results are weak : the only significant result is that non-respondents have lower levels of wealth… Related research has produced similarly disappointing results, leading to suggestions that this approach be supplanted by more anecdotal questions relating to risk (see Kapteyn and Teppa, 2002).

In the sub-sample of 423 households who replied to both measures (lottery and "experimental" questionnaire), the lottery measure is insignificant, while the preference score remains positive and significant in the gross wealth equation (at the five per cent level) and the net wealth equation (at the ten per cent level) – see the second panel (Table 3b). Again, the summary measure of preferences outperforms measures based on a single question, however precise this may be.[13]

3. PREFERENCES AND WEALTH : THE PROBLEM OF CAUSALITY

The above discussion ignored the question of reverse causality between preferences and wealth. Standard models of saving and portfolio choice often include the hypothesis of absolute risk aversion decreasing in wealth (Arrow, 1965). Recent theories have also linked lower time depreciation to higher wealth (Becker and Mulligan, 1997). Reverse causality is therefore a potential problem in equation (2) : the rich may take more risks, have more foresight, or again be more altruistic with respect to their children. Simple regression results are therefore difficult to interpret : the negative effect of time preference and the positive effect of family altruism, especially, may be statistical artefacts rather than causal relationships.

We therefore re-estimate our wealth equations using instrumental variables to evaluate the robustness of our results, and to test for the endogeneity of our preference scores (see Appendix 2).

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[13] The lottery variable is a better predictor of the demand for risky assets (Arrondel and Masson, 2003, p. 96) in regressions carried out on "recto-verso" sample. However, over the common sub-sample (423 households), the lottery variable is insignificant – as well as the score –, partly because of small sample size.

3.1. Scores of preference are exogenous

The instruments used for risk and time preference, and family altruism reflect the characteristics of the respondent's *parents* (social class, wealth composition, money problems, and risk and time preferences). Appendix 2 shows that these instruments pass the standard quality and validity tests. The results then show that the preference scores can be considered as exogenous, so that the previous regressions were not significantly affected by causality bias.

This conclusion is in a way not surprising, as the scores can be considered as the sum of a number of elements which can be considered as "natural" instruments (Angrist and Krueger, 2001). Regarding risk attitudes, the question about whether the individual "takes his/her umbrella if there is a chance of rain", which appears strongly correlated with the risk score, has no direct effect on the amount of wealth. Similarly, the "ability to forego current pleasure in order to live longer", which is strongly correlated with the time discount score, does not explain household assets.[14]

3.2. The endogeneity of alternative preference indicators

Following on from the above, it is natural to think that the scores can be used as instruments for other preference parameters. The variables which are instrumented thus become, in a sense, "disguised" scores. Risk-attitude and time preference scales are considered in Appendix 2 : the risk-attitude and time-preference scores are very good instruments for the corresponding scales.

The instrumental variables results show that only the scale of time preference can be considered as endogenous (in all three wealth equations). The OLS results for this scale are thus biased. Nonetheless, the IV results are in the same direction and are actually somewhat stronger : being far-sighted is positively correlated with wealth.[15]

4. THE EXPLANATORY POWER OF SCORES

Having shown that preference scores are indeed correlated with wealth, we can now return to recent debates revolving around the possibility that heterogeneity in preferences explains the distribution of observed wealth (given age and income), as well as the insufficient resources of a number of households when they retire.

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[14] Only the family altruism score seems endogenous (at the six per cent level) in the financial wealth regression. This score is indeed constructed from a smaller number of elements, of which a number are directly related to wealth (notably transfers to children).

[15] We also considered IV estimation for scales without the scores as instruments. Instrument quality is sharply reduced, although it remains acceptable. But the exogeneity of the scales is no longer rejected in this specification, which illustrates the problems of estimation with weak instruments… (see Appendix 2).

4.1. The quantitative effects of preferences on wealth amounts

Table 4 summarises the effects of preference scores on financial, gross and net wealth : the figures show estimated amounts, normalised to 100, everything being equal. The scores are variously entered as quartiles (as in Table 1), or continuously (as in the Appendix Tables).

With respect to the continuous variables, the most prudent individuals (those with the maximum score of risk aversion) possess, *ceteris paribus*, twice as much wealth as the most foolhardy (those with the minimum score), regardless of the type of wealth. Equally, the most far-sighted individuals (those with the lowest discount rate) have 3.5 times as much wealth (financial and gross) as the most short-sighted (and 2.5 times as much net wealth). Last, the most altruistic (in the family sense) have twice as much wealth (financial and gross) as the most egotistical individuals (and 2.5 times as much net wealth).

The same effects remain quantitatively important in the more representative case when respondents are classed according to the quartiles of the different scores. For gross wealth, for example, we predict a difference of 51 % between the most and the least prudent individuals, 84 % between the most and least far-sighted, and 32 % between the most and the least altruistic (in the family sense).

4.2. Preference scores and wealth inequality

We use two approaches to measure the contribution of the different explanatory variables to the distribution of wealth. The first is an analysis of variance, using the regressions described above ; the second uses the Theil indicator, which can be decomposed.

Table 5a presents partial R^2 coefficients for each of the explanatory variables in the regressions. These coefficients measure the strength of the relationship between the explanatory variable in question and wealth, *ceteris paribus*. We can thus create a ranking of the explanatory factors of wealth. Four of the variables have a much stronger explanatory power than the others, in all of the wealth equations, with coefficients over 0.15 : earnings, age, occupational group, and having received inheritances. This underlines the importance of life-cycle effects and resources (income and transfers) on wealth accumulation. After this group, preferences and household type are the next most important variables, with partial R^2 coefficients between 12 and 14 %. The rest of the explanatory variables are some distance behind. Education, for example, has a partial R^2 coefficient of between 5 and 9 %.

Tables 5b and 5c present the Theil decomposition of the distribution of wealth for a number of different samples. The full sample and full salaried sample of the Patrimoine 1997 survey give reference rankings ; the "experimental" sub-samples (equally full and salaried) allow then to compare the preference parameters to the full set of explanatory variables.

The whole sample results in Table 5b confirm the hierarchy presented above with respect to the analysis of variance : the four most important variables in the Theil decomposition are occupational group, the amount of bequests, earnings and age. For gross wealth, occupational group on its own explains 28.5 % of wealth inequality, bequests 24.2 %,

earnings 20.7 % and age 17.4 %. The joint contribution of income and age only explains 28.8 % of wealth inequality, which underlines the disparities in wealth within a given age and income cell.

Behind the top four, we find individual preferences : the scores of risk and time preferences and family altruism explain together 10.2 % of the gross wealth distribution[16]. This figure is far greater than that for other explanatory variables, such as education (5.1 %) or household type (5.3 %).[17]

This classification is largely unchanged for the sample of wage-earners for whom we have calculated a measure of permanent income. As expected, the percentage of gross wealth explained by income (36 %) and age (29.5 %) are much higher in this sample ; the figure for permanent income is somewhat smaller (20 %) than that for current non property income (which includes carrier effects). However, the interaction between age and permanent income explains almost half of the distribution of wealth (47.3 %) : not surprisingly, the life-cycle hypothesis seems to work much better in this sub-sample. Accordingly, individual preference scores – largely inspired by a life-cycle framework – are together more strongly correlated with the distribution of gross wealth (15.6 %), and more so than education (11.5 %) or, notably, household type (2.1 %).

4.3. Insufficient Retirement Saving and Individual Preferences

Do preferences play a role in explaining insufficient retirement saving ? To answer this question, we look at those households in the "experimental" sub-sample whose head is aged between 50 and 65 (268 households out of 1135). We then separate those for whom the ratio of wealth to (estimated) permanent income is under 2 (60 households, representing 22 % of the age cohort). Table 6 shows the distribution of preference parameters (in first, medium – 2nd and 3rd – and last quartiles) for the low savers and other households.

Statistically, only the time preference and family altruism scores are correlated with saving ; risk-aversion plays no significant role. Amongst the low savers we find a greater percentage of short-sighted households (25.9 % against 11 %), and a smaller one of altruistic households (15.5 % against 28.6 %). However, differences in preferences are far from being able to explain the whole phenomenon of inadequate saving, as illustrated by the non negligible percentage of far-sighted households amongst the low savers (25.8 %).[18]

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[16] The large number of cells corresponding to preferences (21) could potentially inflate their impact on the distribution of wealth. It should be noted, however, that the joint contribution of the risk and time preference scores (9 cells) is 6.9 %, and that of time preference and family altruism (also 9 cells) is already 8.8 %.

[17] The "gains and losses in wealth" variable picks up events which have augmented wealth (lottery winnings, changes in prices of goods such as housing or land) or reduced it (gambling losses). By construction, it is unsurprising that this variable is correlated with household assets.

[18] A probit analysis for inadequate saving reveals, for example, a strong impact from liquidity constraints.

5. PREFERENCE INTERACTIONS

The econometric analysis of wealth shows that, even though the gain in the part of variance explained by the introduction of the preference parameters is modest, these variables are powerful predictors of household wealth. The Theil decomposition underlines, moreover, the joint importance of these measures in explaining wealth inequality. These results suggest that the interaction between preferences is an important facet of wealth determination.

We first consider the correlations between the different parameters, and then examine the effect of the *couple* of risk and time preferences scores on wealth.

5.1. The correlations between risk-attitude and time preference

The correlations between different preference measures (scores and scales) are presented in Table 7. The particular link between risk-attitude and time preference appears in Table 8, which shows the distribution of households between weak, average, and strong levels of the two variables (in quartiles).

The most interesting correlation is that (□0.34) between the risk and time preference scores : individuals who are risk-averse tend to be far-sighted. There is also a negative relationship, although weaker, between the two corresponding scales (□0.17). These results reinforce the common confusion between prudence and concern for the future.

Table 8 shows that 49 % of individuals who are only weakly risk-averse have a strong time preference, whereas only 6.5 % are far-sighted. Symmetrically, amongst the risk-averse, 41 % are far-sighted and only 9.8 % have a strong preference for the present. The same phenomenon is found in the scales, although less pronounced, since we find almost 10 % of individuals in the "minority" configurations, as opposed to only 3.8 % in the score analysis.

To our knowledge, the only other study which has considered the correlation between risk aversion and time preference is that of Anderhub *et al.* (2001), who present experimental results from 61 students at the University of Haifa, who are asked to evaluate three lotteries. These lotteries differ only by their payment date (immediate, in 4 weeks time, and in 8 weeks time). They find a positive correlation between the two measures : "risk-averse agents tend to discount the future more strongly". However, the estimated discount rate corresponds to monetary gains and can thus be considered more as a self-assessed interest rate than a pure preference for the present.[19]

There is also a strong negative correlation between time preference and altruism (family or non-family) : concern for future generations is concentrated amongst the far-sighted. The relation is stronger between the time preference score and family altruism (□0.38). Last, the

[19] Our questionnaire contains a similar question (IV.Q6), which asks individuals how much they were willing to pay now for a 100 Franc note which would be given in one month's, six months', and one year's time. The correlation between this question on time preference and the risk-aversion score is negative (– 0.11), contrarily to the findings of Anderhub *et al*. (2001) : patience goes with prudence.

correlation between the two altruism measures is fairly small, at around 0.25. It is indeed possible to be altruistic for one's family but not for others.

Short-term impatience and time preference are positively correlated, but weakly so (+ 0.12) : the impatient tend to discount the future more. On the other hand, risk-lovers seem relatively impatient (with a correlation coefficient of −0.21 between the scales).

Being risk-loving or impatient goes hand in hand with a certain egoism, especially within the family, as if taking risks were sometimes incompatible with a concern for one's descendants.

5.2. Score Interactions and Wealth

Table 9 shows the same kind of wealth regressions as Table 1, but interacting the risk and time preference scores (both grouped into three classes). Finally, given some small cell sizes, seven different types of savers are considered. It is those who are most risk-averse and most far-sighted who accumulate the most wealth. On the contrary, present-oriented risk-lovers have the lowest levels of wealth.

The importance of these interacted scores is illustrated in Table 10 by the estimated wealth level of each type of saver (the average level of wealth being normalised to 100).

With continuous scores, individuals who are both the most far-sighted and risk-averse have a level of gross wealth ten times greater, *ceteris paribus*, than those who are the most short-sighted and risk-loving. This ratio is of the order of seven to one for net wealth. The hierarchy is different for financial wealth : here it is the individuals who are the most short-sighted and risk-averse who have the lowest amounts of financial wealth (15 times less than the most risk-averse and the most far-sighted).

With interactions of scores in quartiles, the differences in predicted wealth are smaller but remain sizeable. The most risk-averse and far-sighted hold 82 % more financial wealth than short-sighted risk-lovers, with corresponding figures of 91 % and 54 % for gross and net wealth respectively.

5.3. Perspectives

The importance of interacting preference parameters can also be seen when we consider the *composition* of wealth (see Arrondel *et al.*, 2004). For example, the demand for risky assets (such as shares, mutual funds, or liquid assets) is independent of risk and time preference parameters when these are entered linearly ; however, when we interact the two preference parameters, we find that it is short-sighted and prudent individuals who tend to hold less risky assets.

More generally, we can use preferences over risk and time to define different *types of savers*, with heterogeneous saving decisions and portfolio choices :

- Short-sighted and prudent agents (high δ, high γ) follow buffer-stock behaviour ;

- Far-sighted and prudent agents (low α, high β) will behave more alike the "representative" life-cycle consumer ;
- Short-sighted and less risk-averse households (high α, low β) may, like Achilles, follow risky, self-destructing accumulation strategies (unbalanced budget, high debts…) ;
- Finally, far-sighted and less risk-averse households (low α, low β) will behave more like Ulysses…

Preliminary econometric analysis regarding the amount and composition of wealth shows that this saver typology has significant additional explanatory power with, moreover, differential effects confirming theoretical predictions. For instance, Achilles-like households have typically small amounts of wealth but with a sizeable share of risky assets (see Arrondel *et al.*, 2004).

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Appendix 1

Saving and Wealth Inequality : the Limits of the Behavioural Approach

The risk of an ideological interpretation of the behavioural analysis of saving can be seen in Venti and Wise (2001). Taking a "post-welfarist" position, the authors suppose that it is possible to clearly distinguish the part of savings that is due to exogenous circumstances (*chance*) from that which depends on individual decisions (*choice*). They then identify the latter component with the contribution of preferences. As such, they examine differences in wealth at given age and permanent income (more precisely at retirement age for each decile of lifetime earnings), and try to determine the contributions of circumstances and individual decisions in this distribution.

The importance of "chance" factors is evaluated, for each decile of permanent income, by a wealth equation as a function of a number of variables which are supposed to reflect these factors : inheritances and bequests received, and a number of demographic variables (marital status, family composition, health, and so on). These regressions are, perhaps unsurprisingly, relatively limited with respect to their explanatory power. Venti and Wise then attribute the unexplained part of wealth (85 %) to individual choices. Following similar analyses for the impact of the choice of more or less risky portfolios on wealth, they conclude that "the bulk of the dispersion of wealth [within each income decile] must be attributed to differences in the amounts that households choose to save".

Venti and Wise define also a wealth *norm* by calculating the amount of wealth that households would possess at retirement age "had they saved consistently and invested prudently over the course of their working lives". These norm amounts are substantial, even in the first income decile, and are notably higher than the wealth levels observed in the HRS. The conclusion which seems to naturally follow is that individuals have only limited rationality. They lack self-control, cannot commit to simple saving rules, and do not plan ahead enough. As such they regret not having saved more when they were younger, as is shown in the replies to an experimental savings questionnaire introduced in the HRS.

Other "behavioural" analyses of saving (Lusardi, 2003 and 2004; Ameriks *et al.*, 2003, amongst others) follow the same lines. Venti and Wise go further however. Given that, (1) saving is desirable, both for individuals and for economic growth, (2) accumulated wealth is nothing but a stock of deferred consumption for the household, and (3) the distribution of saving results essentially from individual choices, they conclude that taxation of saving by older households, and notably that of private pensions, is unfair and inefficient. Why, at a given level of life-cycle resources, would we wish to penalise "saving" households, who have chosen to consume less when young and more when older ?

Households with less wealth then only have themselves to blame... However, a number of the key stages leading to this conclusion can be criticised. In particular, it is essential to split chance off from choice, and then to estimate the part of wealth which is due to exogenous circumstances ; the residual is then allocated to choice. The pitfalls of such an approach are well-known, even applied to the simpler problem of assessing the role of inheritances and own saving in personal wealth accumulation. Kotlikoff concludes that inheritances account for 80 % of aggregate wealth (in the United States), whereas Modigliani provides a figure of only 20 %. The large gap between the figures is not explained only by methodological differences but also by *interaction effects* between inherited and saved wealth (Kessler and Masson, 1989).[20]

For those who wish to decompose wealth into chance and choice, (complex) interaction effects likely play a role here too. In this study, we find that preferences over risk and time have significant effects on wealth, but the estimated coefficients imply that only a small part of the distribution of wealth, given age and lifecycle income, is explained. Venti and Wise (2001) find an equally limited role for chance factors in wealth inequality. We can only then attribute the rest of the gap to interactions between the explanatory variables. In explaining wealth, we conclude with the French motto that "success is talent *multiplied* by circumstances".[21]

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[20] For example, an inheritance which is received when investment opportunities are favourable may open the door to new investment. However, the same inheritance, if anticipated for too long, may discourage personal savings and transform the individual into a rentier.

[21] An alternative decomposition, not totally orthogonal to the *choice* and *chance* of Venti et Wise, dates back to the *Wealth Theories* of the 1950s and 1960s : wealth is split into "desired", A^*, and "undesired", $A - A^*$, components. The latter results from constraints and circumstances that the household experiences in the market and in life. In this context, precautionary saving from the buffer-stock model clearly belongs to the second component. Aggregate level analysis has produced a wide range of estimates of the size of this saving : between 1 and 60 % (see Arrondel and Masson, 1996). Low values call into question the explanatory value of the buffer-stock model, but excessively high values pose another problem. If precautionary saving explains 95 % of wealth, then this latter is mostly undesired : a large value of wealth would then be synonymous with severe exposure to imperfections of the capital and insurance markets ; a smaller value of wealth would on the contrary imply that the household is closer to the desired level of accumulation (obtained under certainty and perfect markets)...

Appendix 2

Individual Preferences and Wealth Accumulation: the Problem of Causality

The major contribution of the wealth equations in Appendix Tables concerns the effect of individual preferences on wealth. These equations are estimated by OLS. However, if preferences are themselves determined by wealth, then the OLS coefficients are biased, and our conclusions are potentially erroneous.

Instrumental variables and endogeneity tests

The wealth equation is:

$$W_i = X_{1i} b_1 + X_{2i} b_2 + u_i = X_i b + u_i \qquad \text{(A)}$$

where X_1 denotes the vector of potentially endogenous preference parameters, X_2 the exogenous variables and u a normally-distributed error term.

The usual solution for causality problems is instrumental variables (IV) estimation, where the instruments are supposed to be orthogonal to the dependent variable, W.

The method of Two-Stage Least Squares (2SLS) provides a class of IV estimators in two stages. First, one or more instruments (denoted hereafter by the vector Z_1) provide, with the other exogenous variables X_2, an OLS "prediction" of the potentially endogenous explanatory variables :

$$X_{1i} = Z_{1i}\gamma_1 + X_{2i}\gamma_2 + v_i = Z_i\gamma + v_i. \qquad \text{(B)}$$

Second, the predicted values ($\hat{X}_1$) are substituted into equation (A) which is re-estimated by OLS:

$$W_i = \hat{X}_{1i} b_{12MC} + X_{2i} b_{22MC} + w_i. \qquad \text{(C)}$$

If the instruments are correlated with the potentially endogenous explanatory variables, but orthogonal to the dependent variable, the 2SLS estimator is consistent. In practice, we have to check (see Tables E) both the quality (correlation between X_1 and Z, and between X_1 and Z_1 in equation (B)) and the statistical validity of the instruments (orthogonality between Z_1 and u) from the following regression, where the coefficients δ should not be significantly different from zero:

$$\hat{w}_i = Z_{1i}\delta + \varepsilon. \qquad \text{(D)}$$

The 2SLS estimators also allow to test the endogeneity of the explanatory variables concerned (Robin, 1999). The usual test of Hausman (1978) consists in comparing the two

estimators (OLS and 2SLS). This test is equivalent to carrying out, by OLS, an "augmented" regression in which the dependent variable, *W,* is estimated as a function of all the explanatory variables (*X*) and of the residuals ($\hat{v}$) estimated in the instrumental equation (B) from the first stage □ (see Holly, 1983) :

$$W_i = X_i b + \hat{v}_i d + u_i. \qquad \text{(E)}$$

If the variables in question are exogenous, the estimated coefficients *d* on the residuals will be insignificant (we can show in fact that $d = \mathrm{Cov}(u,v)/\mathrm{Var}\, v$) ; if the estimated coefficients are significant, then exogeneity is rejected (see Tables E).

The instrumentation of individual preferences : scores, scales and "plans"

Many of the preference measures are potentially endogenous in our wealth equations : the scores themselves, the scales, or even the single questions which are supposed to measure certain taste parameters (such as the propensity to establish long-term projects).

The main difficulty is finding good instruments for preferences which are independent of wealth. When instruments are weak, "the cure can be worse than the disease" (Bound *et al.*, 1995).

a) Scores

Table E1 summarises the results from endogeneity tests of the scores of risk and time preferences and family altruism.

The instruments used reflect characteristics of the *parents* of the respondent (social class, wealth composition, money problems, preferences over risk and time) and the existence of gifts given by the household[22]. In all of the regressions, the instruments are significantly correlated with the scores and largely pass the validity (or over-identification) tests. While the R^2 statistic (of the instruments) is not particularly high (between 4 % and 12 %), it is nonetheless much larger than that resulting from endogeneity tests in American studies (Lusardi, 2003, and Ameriks *et al.*, 2003).

All of the scores bar one pass the exogeneity test. The residuals from the instrumental equations are never significant, except that for family altruism which is significant at the 6 % level in the financial wealth equation. We then conclude that the OLS estimates of equation (A) do not suffer from causality bias.

b) The scales of risk-aversion and time preference

Two series of regressions are analysed here. The first is analogous to that above, applied to the two scales (of risk-aversion and time preference). The second uses, in addition, the scores as natural instruments to explain the scales.

[22] Using parental preference variables as instruments is analogous to the practice in panel econometrics of using lagged variables (Robin, 1999).

The results of the first series of regressions are shown in Table E2. The conclusions are similar to those from the analysis of the scores. For the instruments which pass the quality and validity tests, the two scales seem exogenous ; the OLS estimators are thus unbiased.

The conclusion changes sharply when we instrument the scales with the scores (Table E3). We first note that the introduction of the scores considerably improves the quality of the instrumentation : the partial R^2 coefficients are now between 14 % and 21 % with F-statistics multiplied roughly by a factor of five. Over-identification tests show that the instruments are orthogonal to the residual of equation (A). However, contrary to the results in the first series of regressions, we now reject, for all three measures of wealth, the hypothesis of exogeneity in the case of time preference.

The IV or 2SLS estimators yield a positive correlation between the three wealth measures and the fact of considering oneself as preoccupied by the future on a scale of 0 to 10. The quantitative effect of this variable is however almost four times larger in 2SLS than OLS.

c) Plans (from 0 to 30 years)

A number of American studies (Lusardi, 2003, and Ameriks *et al.*, 2003) have looked at the relationship between an ability to plan for the future (rather than an indicator of time preference) and wealth. They use one or two subjective questions, which are supposed to measure this propensity. Ameriks *et al*. (2003) specifically consider long-term financial planning for retirement ; Lusardi (2003) looks at worries expressed about retirement. [23]

In a similar way, we can use a question in our survey asking individuals if they have (or had) made plans in a number of different areas of their life (career, family leisure time, wealth etc.) over a period of 10, 20, or 30 years or more. In the OLS equations for gross and net wealth, this question attracts a statistically significant coefficient (Table E4).

To instrument planning[24], we use in the first instance only the time preference of the respondent's mother (see Table E4). This instrument passes the tests of quality and validity, but even so the correlation with the planning variable is weak (0.6 %). We therefore have weak instruments which can produce biased IV estimators… as in the two American studies cited (a correlation between 0.2 and 1.2 % in Lusardi, 2003, for example)[25]. Exogeneity is only rejected for gross wealth. The IV estimator, positive, is much larger than its OLS counterpart.

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[23] In the two cited articles, the authors consider that the variable is endogenous, so that they have to turn to instrumentation. They do not carry out exogeneity tests. Ameriks *et al.* (2003) instrument the propensity to plan by other subjective questions supposed to be less correlated with wealth. These concern preparation for holidays, and confidence in one's ability to calculate. Lusardi (2003) instruments "worrying about retirement" by the difference in age between the respondent and his/her eldest brother or sister, and by parents' health, the idea being that one benefits from one's siblings' or parents' experience.

[24] Since the variable to be instrumented is ordinal (the planning horizon in four bands) we should use an ordered Probit for the instrumental regression. Angrist and Krueger (2001) show, however, that a qualitative model does not produce consistent estimators if the specification is inexact.

[25] Ameriks *et al.* (2003) only show the *F*-statistic of the instruments, which is very significant (<0.0001). However, orthogonality (via the over-identification test) is only accepted at the 8% level.

In Table E5 we use the time preference score as an instrument for planning. Instrument quality rises sharply (the partial R^2 is multiplied by 10 and the *F*-statistic by 7). Exogeneity is rejected in all of the wealth regressions. We still find the positive relation between the time-length of planning and household wealth in the IV results, with a quantitatively larger correlation than in the OLS estimations. Note that, for gross wealth, the difference between the IV and OLS estimators is smaller when we use the score as an instrument. The difference between the two IV estimators can be traced back to the weakness of the instruments other than the score (Bound *et al.*, 1995, p. 444).

Table E1. The Instrumentation of Scores

	Log Financial Wealth		*Log Gross Wealth*		*Log Net Wealth*	
Variables	*Statistic*	*Critical Level*	*Statistic*	*Critical Level*	*Statistic*	*Critical Level*
Exogeneity Tests in Augmented Regressions (t-statistic)						
Risk-Aversion	-0,64	0,521	0,56	0,578	0,22	0,829
Time Preference	-0,33	0,740	0,53	0,600	1,15	0,253
Family Altruism	-1,87	0,062	-0,95	0,341	0,33	0,739
Instrument Quality						
Risk-Aversion						
R^2	0,297		0,289		0,301	
F	6,380	< 0,0001	7,01	< 0,0001	7,23	< 0,0001
R^2 (instruments only)	0,115		0,072		0,053	
F (instruments only)	7,18	< 0,0001	7,19	< 0,0001	6,55	< 0,0001
Time Preference						
R^2	0,170		0,162		0,161	
F	3,09	< 0,0001	3,34	< 0,0001	3,23	< 0,0001
R^2 (instruments only)	0,066		0,061		0,056	
F (instruments only)	3,93	< 0,0001	6,05	< 0,0001	6,90	< 0,0001
Family Altruism						
R^2	0,183		0,176		0,179	
F	3,40	< 0,0001	3,68	< 0,0001	3,68	< 0,0001
R^2 (instruments only)	0,075		0,044		0,038	
F (instruments only)	4,46	< 0,0001	4,29	< 0,0001	4,60	< 0,0001
Instrument Validity						
F	0,64	0,882	1,25	0,246	1,13	0,338
Number of Observations	1129		1131		1051	

Source: INSEE Patrimoine 1997 Survey

Instruments. For financial wealth: parents' preferences, money problems when young, parents' social class, bequests or gifts given (20 variables). For gross wealth: parents' preferences, money problems when young, parents' social class, bequests or gifts given (12 variables). For net wealth: parents' preferences, bequests or gifts given (9 variables).

Table E2. The Instrumentation of Scales

	Log Financial Wealth		*Log Gross Wealth*		*Log Net Wealth*	
Variables	*Statistic*	*Critical Level*	*Statistic*	*Critical Level*	*Statistic*	*Critical Level*
Exogeneity Tests in Augmented Regressions (t-statistic)						
Risk-Aversion	1,34	0,18	-0,75	0,452	-0,33	0,739
Time Preference	0,40	0,69	-1,27	0,206	-0,80	0,424
Instrument Quality						
Risk-Aversion						
R^2	0,164		0,148		0,161	
F	2,61	< 0,0001	2,62	< 0,0001	2,67	< 0,0001
R^2 (instruments only)	0,080		0,058		0,065	
F (instruments only)	4,37	< 0,0001	5,26	< 0,0001	5,44	< 0,0001
Time Preference						
R^2	0,130		0,119		0,119	
F	1,99	< 0,0001	2,03	< 0,0001	1,89	< 0,0001
R^2 (instruments only)	0,052		0,041		0,044	
F (instruments only)	2,75	< 0,0001	3,62	< 0,0001	3,62	< 0,0001
Instrument Validity						
F	0,66	0,863	0,77	0,687	0,76	0,697
Number of Observations	1030		1031		959	

Source: INSEE Patrimoine 1997 Survey

Instruments. For financial wealth: parents' preferences, money problems when young, parents' social class, bequests or gifts given (20 variables). For gross wealth: parents' preferences, money problems when young, parents' social class, bequests or gifts given (12 variables). For net wealth: parents' preferences, bequests or gifts given (9 variables).

Table E3. Instrumentation of scales including scores

	Log Financial Wealth		*Log Gross Wealth*		*Log Net Wealth*	
Variables	*Statistic*	*Critical Level*	*Statistic*	*Critical Level*	*Statistic*	*Critical Level*
Exogeneity Tests in Augmented Regressions (t-statistic)						
Risk-Aversion	0,54	0,59	-0,59	0,556	-0,15	0,878
Time Preference	-2,23	0,03	-3,38	< 0,001	-2,37	0,018
Instrument Quality						
Risk-Aversion						
R^2	0,255		0,256		0,258	
F	5,35	< 0,0001	5,36	< 0,0001	5,04	< 0,0001
R^2 (instruments only)	0,206		0,206		0,204	
F (instruments only)	26,40	< 0,0001	26,46	< 0,0001	24,23	< 0,0001
Time Preference						
R^2	0,187		0,187		0,195	
F	3,60	< 0,0001	3,59	< 0,0001	3,50	< 0,0001
R^2 (instruments only)	0,137		0,137		0,148	
F (instruments only)	16,22	< 0,0001	16,24	< 0,0001	16,41	< 0,0001
Instrument Validity						
F	0,59	0,827	0,55	0,855	0,41	0,944
Estimators of the scale of time preference						
OLS	0,061		0,081		0,068	
	(0,019)	< 0,001	(0,021)	< 0,001	(0,021)	< 0,001
IV	0,222		0,349		0,247	
	(0,082)	< 0,001	(0,092)	< 0,001	(0,085)	< 0,001
Number of Observations	1029		1031		959	

Source: INSEE Patrimoine 1997 Survey

Instruments used: Time Preference and Risk-Aversion Scores, Parents' preferences (10 variables).

Table E4. Instrumentation of plans (from 0 to 30 years)

	Log Financial Wealth		*Log Gross Wealth*		*Log Net Wealth*	
Variables	*Statistic*	*Critical Level*	*Statistic*	*Critical Level*	*Statistic*	*Critical Level*
Exogeneity Tests in Augmented Regressions (t-statistic)	-1,64	0,101	-2,39	0,017	-1,560	0,119
Instrument Quality						
R^2	0,102		0,100		0,099	
F	2,22	< 0,0001	2,21	< 0,0001	2,04	< 0,0001
R^2 (instruments only)	0,007		0,006		0,006	
F (instruments only)	3,77	< 0,02	3,51	< 0,03	3,32	< 0,04
Instrument Validity						
F	0,21	0,812	0,11	0,895	0,13	0,876
Estimators						
OLS	0,008		0,012		0,013	
	(0,005)	0,14	(0,006)	0,04	(0,006)	0,03
IV			0,213			
			(0,122)	0,08		
Number of observations	1030		1131		1052	

Source: INSEE Patrimoine 1997 Survey

Note: The dependent variable takes four values (no plans, plans over 10, 20, or 30 years or more)

Instruments used: Mother's Time Preference (2 variables).

Table E5. Instrumentation of plans (from 0 to 30 years) including the score

	Log Financial Wealth		*Log Gross Wealth*		*Log Net Wealth*	
Variables	*Statistic*	*Critical Level*	*Statistic*	*Critical Level*	*Statistic*	*Critical Level*
Exogeneity Tests in Augmented Regressions (t-statistic)	4,680	< 0,0001	-4,180	< 0,0001	-3,570	< 0,001
Instrument Quality						
R^2	0,167		0,166		0,171	
F	3,85	< 0,0001	3,89	< 0,0001	3,74	< 0,0001
R^2 (instruments only)	0,066		0,066		0,075	
F (instruments only)	26,49	< 0,0001	26,35	< 0,0001	28,43	< 0,0001
Instrument Validity						
F	0,24	0,869	0,76	0,517	0,31	0,821
Estimators						
OLS	0,008		0,012		0,013	
	(0,005)	0,14	(0,006)	0,04	(0,006)	0,03
IV	0,090		0,096		0,081	
	(0,021)	< 0,0001	(0,023)	< 0,0001	(0,021)	< 0,001
Nombre d'observations	1030		1131		1052	

Source: INSEE Patrimoine 1997 Survey

Note: The dependent variable takes four values (no plans, plans over 10, 20, or 30 years or more)

Instruments used: Mother's Time Preference and time preference score (3 variables).

Appendix Table A1. Financial Wealth Equations (Log)

	Total Population		"Experimental" Sample		"Experimental" Sample	
Variables	*Coefficient*	*T-statistic*	*Coefficient*	*T-statistic*	*Coefficient*	*T-statistic*
Household non property income (Omitted category: 1st decile)						
2nd decile	0,231	3,21	0,365	1,60	0,335	1,49
3rd decile	0,567	7,80	0,169	0,70	0,160	0,67
4th decile	0,772	10,47	0,477	2,10	0,427	1,90
5th decile	0,939	12,59	0,765	3,29	0,683	2,97
6th decile	1,249	16,37	1,063	4,53	0,979	4,21
7th decile	1,342	17,26	1,223	5,25	1,129	4,88
8th decile	1,477	18,71	1,101	4,48	1,053	4,31
9th decile	1,588	19,47	1,287	5,22	1,177	4,81
10th decile	2,074	24,52	2,017	7,64	1,916	7,25
Age (Omitted category: under 25)						
25-30	0,136	1,28	0,190	0,60	0,192	0,62
30-35	0,402	3,77	0,274	0,85	0,332	1,04
35-40	0,435	4,04	0,689	2,12	0,683	2,12
40-45	0,470	4,34	0,405	1,23	0,375	1,15
45-50	0,618	5,75	0,458	1,37	0,393	1,19
50-55	0,854	7,82	0,795	2,36	0,662	1,97
55-60	1,055	9,40	1,157	3,32	1,012	2,92
60-65	1,094	9,69	0,840	2,32	0,722	1,99
65-70	1,282	11,27	1,398	4,00	1,248	3,56
70-75	1,403	12,15	1,643	4,54	1,493	4,09
75+	1,480	13,25	1,976	5,26	1,711	4,51
Social class of the reference person (Omitted category: Artisan, shopkeeper, factory owner)						
Farmer	0,265	3,64	0,272	1,01	0,279	1,05
Liberal profession	0,250	1,96	0,245	0,65	0,187	0,50
Executive	-0,350	-5,01	-0,560	-2,71	-0,590	-2,88
Employee (high qualification)	-0,463	-7,86	-0,348	-1,86	-0,377	-2,03
Employee (low qualification)	-0,572	-9,88	-0,737	-3,96	-0,785	-4,23
Workers (high qualification)	-0,679	-12,04	-0,873	-4,59	-0,900	-4,76
Workers (low qualification)	-0,766	-11,81	-1,100	-4,88	-1,148	-5,12
Inactive	-0,672	-4,86	-0,492	-1,16	-0,638	-1,52
Education (Omitted category: No qualifications)						
Primary level	0,411	9,54	0,489	3,12	0,454	2,93
Secondary level	0,595	10,87	0,594	3,37	0,534	3,03
Baccalaureate	0,680	11,39	0,666	3,48	0,589	3,07
University degree	0,674	10,12	0,538	2,67	0,449	2,21
"Grandes écoles"	0,793	9,53	0,795	3,35	0,726	3,05
Household Type (Omitted category: Single)						
Couple without children (at home)	0,222	4,83	0,227	1,58	0,175	1,23
Couple with one child (at home)	-0,079	-1,40	-0,078	-0,49	-0,154	-0,97
Couple with two children (at home)	-0,004	-0,06	0,067	0,41	-0,005	-0,03
Couple with three or more children (at home)	-0,240	-3,57	-0,184	-1,00	-0,273	-1,48
Single parent family	-0,195	-2,98	-0,516	-2,98	-0,593	-3,44
Other	0,046	0,55	0,402	1,67	0,330	1,38
Number of children living away from home	-0,124	-10,43	-0,142	-3,23	-0,157	-3,61
Town Size (Omitted Category: Rural Community)						
< 20 000 inhabitants	-0,101	-2,17	-0,392	-2,26	-0,354	-2,07
20-100 000 inhabitants	-0,154	-3,02	-0,382	-2,12	-0,354	-1,99
Over 100 000 inhabitants	-0,106	-2,51	-0,429	-2,98	-0,411	-2,88
Paris Conurbation	-0,267	-4,90	-0,334	-2,37	-0,307	-2,19
Paris	-0,146	-1,86	-0,221	-1,21	-0,154	-0,85
Bequests received (Omitted category: Nothing)	0,553	17,26	0,655	6,88	0,612	6,48
Liquidity constraints	-0,741	-15,58	-0,792	-5,92	-0,780	-5,90
Past Illness (labour force interruption)	-0,279	-3,63	-0,432	-1,78	-0,385	-1,60
Short period of unemployment or illness	-0,128	-3,99	0,002	0,02	0,009	0,10
Past unemployment (long period)	-0,199	-3,91	-0,039	-0,28	-0,055	-0,40
Unemployed	-0,192	-2,47	-0,025	-0,12	-0,038	-0,18
Risk-Aversion (continuous score)					0,013	1,66
Time preference (continuous score)					-0,047	-3,27
Impatience (continuous score)					0,009	0,53
Family Altruism (continuous score)					0,060	1,97
Non-Family Altruism (continuous score)					0,023	0,78
Constant	9,296	73,18	9,776	23,25	9,591	22,65
Number of observations	10150		1 130		1 130	
R^2	0,393		0,447		0,464	

Source: INSEE Patrimoine 1997 Survey. ***, **, *: Coefficients significant at the 1, 5 and 10 per cent significance level, respectively.

Appendix Table A2. Gross Wealth Equations (Log.)

	Total Population		**"Experimental" Sample**		**"Experimental" Sample**	
Variables	*Coefficient*	*T-statistic*	*Coefficient*	*T-statistic*	*Coefficient*	*T-statistic*
Household non property income (Omitted category: 1st decile)						
2nd decile	0,187	2,45	0,398	1,61	0,364	1,49
3rd decile	0,494	6,40	0,379	1,45	0,373	1,44
4th decile	0,954	12,19	1,051	4,27	0,998	4,10
5th decile	1,102	13,92	1,259	4,99	1,171	4,69
6th decile	1,322	16,32	1,205	4,73	1,110	4,39
7th decile	1,527	18,50	1,551	6,14	1,453	5,79
8th decile	1,724	20,55	1,758	6,59	1,715	6,47
9th decile	1,815	20,95	1,879	7,02	1,760	6,62
10th decile	2,129	23,69	2,450	8,54	2,346	8,18
Age (Omitted category: under 25)						
25-30	0,302	2,68	0,011	0,03	0,004	0,01
30-35	0,984	8,67	0,557	1,59	0,611	1,76
35-40	1,367	11,94	1,344	3,80	1,326	3,79
40-45	1,505	13,09	1,245	3,48	1,205	3,41
45-50	1,760	15,41	1,164	3,21	1,083	3,02
50-55	2,054	17,70	1,706	4,67	1,549	4,25
55-60	2,122	17,79	1,747	4,62	1,576	4,18
60-65	2,160	18,01	1,606	4,08	1,469	3,73
65-70	2,219	18,35	2,201	5,79	2,025	5,32
70-75	2,240	18,26	2,142	5,44	1,965	4,96
75+	2,098	17,67	2,297	5,62	1,989	4,82
Social class of the reference person (Omitted category: Artisan, shopkeeper, factory owner)						
Farmer	0,076	0,99	0,068	0,23	0,070	0,24
Liberal profession	-0,186	-1,37	-0,174	-0,43	-0,237	-0,59
Executive	-0,859	-11,58	-1,030	-4,58	-1,069	-4,81
Employee (high qualification)	-1,036	-16,55	-0,962	-4,74	-0,996	-4,95
Employee (low qualification)	-1,221	-19,85	-1,268	-6,27	-1,329	-6,60
Workers (high qualification)	-1,192	-19,90	-1,479	-7,16	-1,514	-7,37
Workers (low qualification)	-1,373	-19,94	-1,577	-6,44	-1,639	-6,73
Inactive	-1,315	-8,96	-1,065	-2,31	-1,237	-2,71
Education (Omitted category: No qualifications)						
Primary level	0,380	8,30	0,426	2,50	0,388	2,30
Secondary level	0,655	11,26	0,617	3,22	0,555	2,90
Baccalaureate	0,667	10,51	0,604	2,91	0,522	2,50
University degree	0,682	9,64	0,594	2,71	0,502	2,28
"Grandes écoles"	0,818	9,24	0,735	2,85	0,664	2,57
Household Type (Omitted category: Single)						
Couple without children (at home)	0,438	8,99	0,146	0,94	0,088	0,57
Couple with one child (at home)	0,265	4,45	0,027	0,16	-0,060	-0,35
Couple with two children (at home)	0,472	7,61	0,247	1,38	0,166	0,93
Couple with three or more children (at home)	0,338	4,73	0,167	0,83	0,071	0,35
Single parent family	-0,288	-4,15	-0,918	-4,90	-1,013	-5,43
Other	0,280	3,14	0,313	1,19	0,230	0,89
Number of children living away from home	-0,104	-8,24	-0,115	-2,41	-0,132	-2,80
Town Size (Omitted Category: Rural Community)						
< 20 000 inhabitants	-0,261	-5,26	-0,526	-2,79	-0,480	-2,58
20-100 000 inhabitants	-0,518	-9,58	-0,754	-3,85	-0,724	-3,74
Over 100 000 inhabitants	-0,485	-10,80	-0,696	-4,44	-0,676	-4,37
Paris Conurbation	-0,622	-10,74	-0,893	-5,82	-0,862	-5,67
Paris	-0,662	-7,91	-0,877	-4,41	-0,805	-4,09
Bequests received (Omitted category: Nothing)	0,685	20,14	0,929	8,98	0,880	8,58
Liquidity constraints	-0,569	-11,27	-0,613	-4,22	-0,598	-4,17
Past Illness (labour force interruption)	-0,197	-2,42	-0,270	-1,02	-0,215	-0,82
Short period of unemployment or illness	-0,229	-6,74	-0,134	-1,36	-0,124	-1,27
Past unemployment (long period)	-0,376	-6,96	-0,259	-1,72	-0,277	-1,86
Unemployed	-0,268	-3,25	0,192	0,83	0,180	0,79
Risk-Aversion (continuous score)					0,017	1,97
Time preference (continuous score)					-0,047	-3,04
Impatience (continuous score)					0,008	0,43
Family Altruism (continuous score)					0,066	1,91
Non-Family Altruism (continuous score)					0,039	1,20
Constant	10,262	76,04	10,894	23,87	10,679	23,25
Number of observations	10162		1131		1131	
R^2	0,506		0,543		0,557	

Source: INSEE Patrimoine 1997 Survey. ***, **, *: Coefficients significant at the 1, 5 and 10 per cent significance level, respectively.

Appendix Table A3. Net Wealth Equations (Log)

	Total Population		"Experimental" Sample		"Experimental" Sample	
Variables	*Coefficient*	*T-statistic*	*Coefficient*	*T-statistic*	*Coefficient*	*T-statistic*
Household non property income (Omitted category: 1st decile)						
2nd decile	0,220	2,96	0,520	2,13	0,498	2,07
3rd decile	0,572	7,56	0,592	2,26	0,590	2,28
4th decile	1,041	13,56	1,204	4,92	1,159	4,78
5th decile	1,209	15,56	1,254	5,04	1,181	4,80
6th decile	1,306	16,51	1,199	4,78	1,090	4,38
7th decile	1,448	18,02	1,658	6,65	1,555	6,29
8th decile	1,644	20,16	1,659	6,38	1,592	6,16
9th decile	1,740	20,66	1,834	6,99	1,706	6,55
10th decile	2,010	23,07	2,350	8,39	2,236	7,97
Age (Omitted category: under 25)						
25-30	0,136	1,15	-0,260	-0,70	-0,219	-0,59
30-35	0,737	6,19	0,454	1,19	0,558	1,47
35-40	1,164	9,70	1,207	3,14	1,236	3,24
40-45	1,380	11,48	1,192	3,07	1,193	3,10
45-50	1,663	13,95	1,139	2,91	1,106	2,84
50-55	1,935	16,05	1,607	4,11	1,528	3,91
55-60	2,049	16,60	1,666	4,13	1,582	3,93
60-65	2,075	16,73	1,556	3,71	1,515	3,61
65-70	2,093	16,78	2,039	5,06	1,968	4,87
70-75	2,102	16,66	1,973	4,75	1,896	4,53
75+	1,934	15,78	2,143	5,00	1,940	4,48
Social class of the reference person (Omitted category: Artisan, shopkeeper, factory owner)						
Farmer	0,112	1,53	0,172	0,61	0,187	0,67
Liberal profession	-0,033	-0,25	0,031	0,08	-0,007	-0,02
Executive	-0,736	-10,33	-0,805	-3,66	-0,835	-3,83
Employee (high qualification)	-0,956	-15,94	-0,811	-4,10	-0,824	-4,21
Employee (low qualification)	-1,081	-18,22	-1,122	-5,69	-1,149	-5,83
Workers (high qualification)	-1,118	-19,42	-1,339	-6,62	-1,355	-6,73
Workers (low qualification)	-1,305	-19,60	-1,425	-5,86	-1,451	-5,99
Inactive	-1,326	-9,09	-1,041	-2,23	-1,142	-2,47
Education (Omitted category: No qualifications)						
Primary level	0,360	8,03	0,395	2,33	0,342	2,03
Secondary level	0,555	9,71	0,507	2,65	0,427	2,23
Baccalaureate	0,586	9,45	0,526	2,53	0,428	2,05
University degree	0,599	8,67	0,649	2,95	0,534	2,42
"Grandes écoles"	0,703	8,21	0,634	2,48	0,537	2,09
Household Type (Omitted category: Single)						
Couple without children (at home)	0,425	8,99	0,148	0,95	0,102	0,66
Couple with one child (at home)	0,232	3,97	0,118	0,69	0,049	0,29
Couple with two children (at home)	0,408	6,71	0,133	0,75	0,067	0,38
Couple with three or more children (at home)	0,262	3,69	0,060	0,29	-0,007	-0,04
Single parent family	-0,287	-4,20	-0,925	-4,86	-1,005	-5,30
Other	0,240	2,80	0,207	0,81	0,128	0,51
Number of children living away from home	-0,097	-7,94	-0,083	-1,76	-0,099	-2,13
Town Size (Omitted Category: Rural Community)						
< 20 000 inhabitants	-0,237	-4,95	-0,512	-2,77	-0,461	-2,52
20-100 000 inhabitants	-0,429	-8,15	-0,583	-2,97	-0,543	-2,80
Over 100 000 inhabitants	-0,397	-9,13	-0,590	-3,83	-0,567	-3,73
Paris Conurbation	-0,481	-8,50	-0,761	-5,03	-0,734	-4,90
Paris	-0,486	-5,95	-0,606	-3,08	-0,548	-2,81
Bequests received (Omitted category: Nothing)	0,683	20,91	0,891	8,82	0,839	8,38
Liquidity constraints	-0,440	-8,59	-0,448	-2,99	-0,440	-2,96
Past Illness (labour force interruption)	-0,236	-3,01	-0,264	-1,02	-0,234	-0,91
Short period of unemployment or illness	-0,217	-6,54	-0,175	-1,78	-0,158	-1,61
Past unemployment (long period)	-0,278	-5,17	-0,186	-1,23	-0,197	-1,32
Unemployed	-0,257	-3,12	0,019	0,09	-0,008	-0,04
Risk-Aversion (continuous score)					0,013	1,67
Time preference (continuous score)					-0,037	-2,39
Impatience (continuous score)					0,021	1,13
Family Altruism (continuous score)					0,086	2,51
Non-Family Altruism (continuous score)					0,036	1,13
Constant	10,272	74,67	10,734	22,71	10,431	21,88
Number of observations	9544		1 052		1 052	
R^2	0,500		0,545		0,559	

Source: INSEE Patrimoine 1997 Survey. ***, **, *: Coefficients significant at the 1, 5 and 10 per cent significance level, respectively.

Table 1. Wealth Regressions with Banded Scores

	Log Financial Wealth		Log Gross Wealth		Log Net Wealth	
Variables[1]	*Coefficient*	*T-statistic*	*Coefficient*	*T-statistic*	*Coefficient*	*T-statistic*
Risk Aversion (Ref: lowest 25%)						
Medium (Middle 50%)	0,164	1,43	0,178	1,43	0,153	1,23
High (Top 25%)	0.226*	1,66	0.412**	2,56	0.238*	1,70
Time Preference (Ref: Top 25%)						
Medium (Middle 50%)	0.249***	3,93	0.486**	3,98	0.379***	3,09
Low (Lowest 25%)	0.609**	2,21	0.614**	3,65	0.525***	3,14
Impatience (Ref: lowest 25%)						
Medium (Middle 50%)	0,059	0,60	0,066	0,62	0,167	1,60
High (Top 25%)	0,015	0,11	0,082	0,55	0,151	1,01
Family Altruism (Ref: lowest 25%)						
Medium (Middle 50%)	0,157	1,46	0,142	1,22	0.280**	2,41
High (Top 25%)	0.308**	2,24	0.277*	1,87	0.381***	2,60
Non-Family Altruism (Ref: lowest 25%)						
Medium (Middle 50%)	-0,045	-0,48	-0,025	-0,24	0,002	0,02
High (Top 25%)	-0,055	-0,37	0,050	0,32	-0,042	-0,27

Source: INSEE Patrimoine 1997 Survey. ***, **, *: Coefficients significant at the 1, 5 and 10 per cent significance level, respectively.

Note: The other right-hand side variables are detailed in the Appendix Tables.

The table should be read as follows . Belonging to the top quartile of far-sighted households has a positive effect on gross wealth (with a coefficient of 0.614, significant at the 5% level).

Table 2. Wealth Regressions with Scales

	Log Financial Wealth		Log Gross Wealth		Log Net Wealth	
Variables[1]	*Coefficient*	*T-statistic*	*Coefficient*	*T-statistic*	*Coefficient*	*T-statistic*
Risk Aversion (Ref: lowest 25%)						
Medium (Middle 50%)	0,060	0,59	-0,097	-0,88	-0,037	-0,34
High (Top 25%)	-0,061	-0,45	-0,012	-0,08	0,008	0,06
Time Preference (Ref: Top 25%)						
Medium (Middle 50%)	0.277***	2,62	0.274*	2,39	0.238**	2,08
Low (Lowest 25%)	0.350***	2,90	0.541**	4,14	0.436***	3,38
Impatience (Ref: lowest 25%)						
Medium (Middle 50%)	-0,051	-0,48	-0,094	-0,81	-0,057	-0,50
High (Top 25%)	0,034	0,27	0,059	0,43	0,091	0,68

Source: INSEE Patrimoine 1997 Survey. ***, **, *: Coefficients significant at the 1, 5 and 10 per cent significance level, respectively.

Note: 1) As we do not have a scale for the altruism scores, we introduce scores as regressors, so as to compare with Table 1. The other right-hand side variables are detailed in the Appendix Tables.

The table should be read as follows . Belonging to the top quartile of forward-looking households has a positive effect on gross wealth (with a coefficient of 0.541, significant at the 5% level).

Table 3. Wealth Regressions (Lotterys vs. Scores)

a) Recto-verso questionnaire

	Log Financial Wealth		**Log Gross Wealth**		**Log Net Wealth**	
Variables	*Coefficient*	*T-statistic*	*Coefficient*	*T-statistic*	*Coefficient*	*T-statistic*
Risk Aversion (Ref: CRRA>3.76)						
No Reply	-0,218***	-2,74	-0,169***	-2,30	-0,147**	-2,08
2=<CRRA<3.76	0,139*	1,92	0,048	0,72	0,037	0,57
1=<CRRA<2	0,158	1,46	-0,062	-0,62	-0,001	-0,01
CRRA<1	0,159	1,15	-0,136	-1,07	-0,120	-0,97
Number of Observations	2944		2944		2944	

b) Recto-verso questionnaire and "experimental" sub-sample

	Log Financial Wealth		**Log Gross Wealth**		**Log Net Wealth**	
Variables	*Coefficient*	*T-statistic*	*Coefficient*	*T-statistic*	*Coefficient*	*T-statistic*
Risk Aversion (Ref: CRRA>3.76)						
No Reply	0,151	0,62	0,122	0,50	0,064	0,27
2=<CRRA<3.76	0,104	0,59	0,136	0,78	0,092	0,53
1=<CRRA<2	-0,067	-0,26	0,015	0,06	-0,112	-0,45
CRRA<1	0,468	1,47	0,094	0,30	0,081	0,26
Risk aversion score	0,013	1,09	0,023**	2,01	0,015*	1,68
Number of Observations	423		423		423	

Source: INSEE Patrimoine 1997 Survey. ***, **, *: Coefficients significant at the 1, 5 and 10 per cent significance level, respectively.

The table should be read as follows . A value of risk-aversion under 1 is positively correlated with financial wealth (with coefficients of 0.159 in the Recto-Verso questionnaire and 0.468 in the "experimental" sub-sample). However, these correlations are not statistically significant.

Table 4. Risk-Attitude, Time Preference and Wealth

Saver Types	Financial Wealth	Gross Wealth	Net Wealth
Quartile Scores (1st and 4th quartiles)[1]			
Risk-loving (ref.)	87	83	87
Risk-averse	109*	125***	110*
Short-sighted (ref.)	66	63	68
Farsighted	121***	116***	114***
Impatient (ref.)	n.s	n.s	n.s
Patient	n.s	n.s	n.s
Family egoist (ref.)	87	88	80
Family altruist	118**	116**	117***
Non-Family egoist (ref.)	n.s	n.s	n.s
Non-Family altruist	n.s	n.s	n.s
Continuous Scores (max and min)[2]			
Risk-loving (ref.)	72	64	70
Risk-averse	137*	151**	138*
Short-sighted (ref.)	45	44	53
Farsighted	158***	159***	144**
Impatient (ref.)	n.s	n.s	n.s.
Patient	n.s	n.s	n.s.
Family egoist (ref.)	68	65	58
Family altruist	124**	127**	136**
Non-Family egoist (ref.)	n.s	n.s	n.s.
Non-Family altruist	n.s	n.s	n.s.
Average	**100**	**100**	**100**

Source: INSEE Patrimoine 1997 Survey. ***, **, *: Coefficients significant at the 1, 5 and 10 per cent significance level, respectively.

Notes: 1) Estimated wealth corresponds to the regressions in Table 1.

2) Estimated wealth corresponds to the regressions in Appendix Tables A1 to A3.

The table should be read as follows . The average household in the sample holds wealth normalised to 100. The farsighted hold 84% more gross wealth than the short-sighted the reference category. This difference is statistically significant at the one per cent level.

Table 5a. Ranking of Partial R^2 Coefficients in Wealth Regressions

Variables	*Financial Wealth*	*Gross Wealth*	*Net Wealth*
Current non property income	0,200	0,206	0,224
Age	0,174	0,200	0,196
Social Class	0,169	0,194	0,190
Bequests Received (dummy)	0,147	0,176	0,177
Preferences (risk-aversion, time preference, family altruism)	**0,128**	**0,127**	**0,120**
Household Type (marital status, number of children)	0,126	0,142	0,131
Town Size	0,076	0,121	0,107
Liquidity Constrained (dummy)	0,133	0,085	0,087
Education	0,085	0,069	0,055
Employment interruptions (unemployment, health)	0,040	0,054	0,053
Overall R^2	0,463	0,559	0,559
Number of observations	1 129	1 131	1 051

Source: INSEE Patrimoine 1997 Survey

The table should be read as follows . The partial correlation coefficient of preferences with gross wealth is 0.127. This correlation is calculated from regressions including the other control variables.

Table 5b. Decomposition of Wealth inequality (in %): Theil Index

Variables	*Total Population*			*"Experimental" Sample*		
	Financial Wealth	*Gross Wealth*	*Net Wealth*	*Financial Wealth*	*Gross Wealth*	*Net Wealth*
Current non property income (in deciles)	16,0	18,0	15,3	11,8	20,7	18,2
Age (12 levels)	8,1	13,1	13,7	15,1	17,4	19,2
Income*Age (24 levels)	22,0	24,6	24,1	24,8	28,8	30,2
Social Class (10 levels)	17,9	27,5	26,0	16,7	28,5	27,1
Bequests Received (dummy)	9,5	11,8	12,2	14,9	16,9	17,3
Bequests (Amount: 4 levels)	15,1	19,5	20,1	22,1	24,2	24,8
Preferences (Risk-aversion-Time preference-Family altruism: 21 levels)				**7,6**	**10,2**	**10,4**
Parents' Social Class (9 levels)	7,6	7,2	7,1	8,4	7,3	7,7
Education (6 levels)	8,6	7,5	6,8	7,5	5,1	5,2
Household Type (7 levels)	3,7	7,4	6,6	3,0	5,3	4,2
Town Size (6 levels)	4,0	3,1	3,2	7,3	3,6	3,9
Liquidity Constrained (dummy)	3,5	1,7	1,4	2,9	1,7	1,2
Employment interruptions (unemployment, health: 4 levels)	3,6	5,9	5,3	3,1	4,5	4,7
Wealth Gains or Losses (4 levels)	6,4	6,5	5,9	8,1	12,5	11,2
Theil	1,25	0,76	0,79	1,32	0,82	0,82
Number of observations	10 207			1 135		

Source: INSEE Patrimoine 1997 Survey

Note : 1) Population of Households whose Reference Person (Male) is Salaried.

The table should be read as follows . The preference parameters explain 10.2% of the gross wealth distribution, as measured by the Theil Index in the "experimental" (unweighted) sample.

Table 5c. Decomposition of Wealth inequality (in %, salaried population): Theil Index

Variables	*Total Salaried Population* [1]			*Salaried Sample* [1]		
	Financial Wealth	***Gross Wealth***	***Net Wealth***	***Financial Wealth***	***Gross Wealth***	***Net Wealth***
Current non property income (in deciles)	18,6	27,6	23,9	27,1	36,0	33,4
Permanent Income (in deciles)	12,7	17,4	14,4	15,1	20,0	18,2
Age (12 levels)	10,9	14,7	16,6	28,8	29,5	29,5
Permanent Income*age (24 levels)	24,5	32,8	32,6	45,1	47,3	50,0
Social Class (10 levels)	17,4	20,2	19,6	22,4	24,1	25,1
Bequests Received (dummy)	8,8	12,0	12,7	13,8	17,7	18,0
Bequests (Amount: 4 levels)	15,3	19,9	21,0	22,4	27,9	28,2
Preferences (Risk-aversion-Time preference-Family altruism: 21 levels)				**16,3**	**15,6**	**17,1**
Parents' Social Class (9 levels)	9,4	7,8	7,8	10,4	8,9	8,5
Education (6 levels)	11,5	11,8	10,8	11,7	11,5	11,8
Household Type (7 levels)	2,9	3,9	4,0	6,1	2,1	2,9
Town Size (6 levels)	3,6	2,4	2,9	7,2	4,9	5,6
Liquidity Constrained (dummy)	4,0	3,8	3,2	3,2	2,8	1,8
Employment interruptions (unemployment, health: 4 levels)	4,4	4,7	4,0	4,0	4,4	4,7
Wealth Gains or Losses (4 levels)	5,3	5,9	5,4	5,0	8,6	7,3
Theil	1,14	0,60	0,62	1,10	0,66	0,66
Number of observations		5 808			693	

Source: INSEE Patrimoine 1997 Survey

Note : 1) Population of Households whose Reference Person (Male) is Salaried.

The table should be read as follows. The preference parameters explain 15.6% of the gross wealth distribution, as measured by the Theil Index in the "experimental" (unweighted) sample.

Table 6. Adequacy of saving and Individual Preferences

Saver Types	N		Distribution (%) of the Population of 50-65 Year-olds								
			Risk-Aversion			*Time Preference*			*Family Altruism*		
	Sample	*Aged 50-65*	Weak	Medium	Strong	Weak	Medium	Strong	Weak	Medium	Strong
A/YP<2	470	60	19,0	60,3	20,7	**25,8**	**48,3**	**25,9**	**50,0**	**34,5**	**15,5**
Other	665	208	12,4	55,2	32,4	**44,7**	**44,3**	**11,0**	**21,0**	**50,4**	**28,6**
Total	1135	268	13,8	56,3	29,9	40,7	45,1	14,2	27,2	47,0	25,8

Source: INSEE Patrimoine 1997 Survey

Note: The Weak and Strong categories correspond to the lowest and highest quartile of the distribution of scores in the total population. The medium category corresponds to the middle quartiles. The two distributions are significantly different at the 1% level for time preference and family altruism. They are not are significantly different for risk-aversion. Permanent income, *YP* , is predicted from an earnings equation using household characteristics.

The table should be read as follows . Households with a reference person aged between 50 and 65 and with *A/YP<2* are more than twice as likely to belong to the most short-sighted quartile of households (25.9%) as are other households (11.0%).

Table 7. Correlations Between Risk and Time Preferences

Scores

Scores	*Weak Risk-Aversion*	*Weak Time Preference*	*Low Impatience*	*Weak Non-Family Altruism*	*Weak Family Altruism*
Weak Risk-Aversion	1,00	**-0,34**	**-0,10**	0,05	**0,14**
Weak Time Preference		1,00	**0,12**	**-0,30**	**-0,38**
Low Impatience			1,00	0,05	**0,12**
Weak Non-Family Altruism				1,00	**0,25**
Weak Family Altruism					1,00

Source: INSEE Patrimoine 1997 Survey

Note: Significant correlations at the 5% level are shown in bold.

The table should be read as follows . The weighted correlation between the time preference score and risk-aversion, 0.34, is calculated using questions which are allocated to one measure only. If we use all of the questions, the correlation is 0.50.

Scales

Scales	*Weak Risk-Aversion*	*Weak Time Preference*	*Low Impatience*
Weak Risk-Aversion	1,00	**-0,17**	**-0,21**
Weak Time Preference		1,00	**0,12**
Low Impatience			1,00

Source: INSEE Patrimoine 1997 Survey

Note: Significant correlations at the 5% level are shown in bold.

Scores (rank correlation)

Scores	*Weak Risk-Aversion*	*Weak Time Preference*	*Low Impatience*	*Weak Non-Family Altruism*	*Weak Family Altruism*
Weak Risk-Aversion	1,00	**-0,20**	**-0,05**	0,01	**0,07**
Weak Time Preference		1,00	**0,09**	**-0,19**	**-0,25**
Low Impatience			1,00	0,01	**0,08**
Weak Non-Family Altruism				1,00	**0,15**
Weak Family Altruism					1,00

Source: INSEE Patrimoine 1997 Survey

Note: Significant correlations at the 5% level are shown in bold.

The table should be read as follows . The correlation between the time preference score and risk-aversion, -0.20, is calculated using questions which are allocated to one measure only. If we use all of the questions, the correlation is -0.32.

Table 8. Distribution of the population according to risk-aversion and time-preference

Scores (correlation = −0.34)

Risk-Aversion / *Time Preference*	*Weak*	*Medium*	*Strong*	**Total**
Weak	1,6	13,2	9,1	23,9
Medium	10,7	29,8	11,1	51,6
Strong	12,0	10,3	2,2	24,5
Total	24,3	53,3	22,4	100,0

Source: INSEE Patrimoine 1997 Survey

Scales (correlation = −0.20)

Risk-Aversion / *Time Preference*	*Weak*	*Medium*	*Strong*	**Total**
Weak	4,7	15,7	7,2	27,6
Medium	8,6	30,8	7,1	46,5
Strong	8,7	13,0	4,2	25,9
Total	22,0	59,5	18,5	100,0

Source: INSEE Patrimoine 1997 Survey

Note: The Weak and Strong categories correspond to the lowest and highest quartile of the distribution of scores in the total population. The medium category corresponds to the middle quartiles.

The Table should be read as follows. 1.6% of the population belong to the first quartile of both the risk-aversion and time preference distributions.

Table 9. Wealth Equations (Interactions of Preference Scores)

	Log Financial Wealth		Log Gross Wealth		Log Net Wealth	
Variables	*Coefficient*	*t-statistic*	*Coefficient*	*t-statistic*	*Coefficient*	*t-statistic*
Risk-Aversion and Time Preference (Omitted category: Risk-loving and Short-sighted)						
Risk-loving and medium or strong foresight	0,114	0,650	0.353*	1,850	0,269	1,420
Medium risk-aversion and strong foresight	0.529***	2,890	0.559***	2,810	0.495***	2,510
Risk-averse and strong foresight	0.596***	2,930	0.646***	2,920	0.441**	2,040
Medium risk-aversion and medium foresight	0.267*	1,750	0.453***	2,720	0.415***	2,500
Medium risk-aversion and short-sighted	0,012	0,070	0,128	0,650	-0,034	-0,170
Risk-averse and medium foresight or short-sighted	0,189	1,030	0.581***	2,920	0.370*	1,870
Impatience (Omitted category: Lowest quartile)						
Medium (two middle quartiles)	0,049	0,500	0,038	0,360	0,153	1,470
Strong (Top quartile)	-0,009	-0,070	0,052	0,350	0,132	0,890
Family altruism (Omitted category: Lowest quartile)						
Medium (two middle quartiles)	0,170	1,590	0,162	1,390	0.290***	2,500
Strong (Top quartile)	0.296**	2,140	0.305**	2,020	0.388***	2,620
Non-Family altruism (Omitted category: Lowest quartile)						
Medium (two middle quartiles)	-0,048	-0,500	-0,013	-0,130	0,000	0,000
Strong (Top quartile)	-0,050	-0,340	0,063	0,400	-0,043	-0,270

Source: INSEE Patrimoine 1997 Survey. ***, **, *: Coefficients significant at the 1, 5 and 10 per cent significance level, respectively.

The table should be read as follows . Being risk-averse with strong foresight is positively correlated with gross wealth. This effect (0.596) is significant at the 1% level.

Table 10. Preference Attitudes and Wealth (interaction effects)

Saver Types	Financial Wealth	Gross Wealth	Net Wealth
Continuous Scores (max. and min.)[1]			
Short-sighted and Risk-loving	73***	20***	21**
Short-sighted and Risk-averse	25***	96***	133**
Farsighted and Risk-loving	73***	126***	143**
Farsighted and Risk-averse	369***	193***	139**
Quartile Scores (7 levels)[2]			
Short-sighted and Risk-loving (Reference)	78	67	74
Risk-loving and medium or strong foresight	88	95*	96
Medium risk-aversion and strong foresight	133***	117***	121***
Risk-averse and strong foresight	142***	128***	114**
Medium risk-aversion and medium foresight	102*	105***	111***
Medium risk-aversion and short-sighted	79	76	71
Risk-averse and medium foresight or short-sighted	94	120***	106*
Mean	**100**	**100**	**100**

Source: INSEE Patrimoine 1997 Survey. ***, **, *: Coefficients significant at the 1, 5 and 10 per cent significance level, respectively.

Notes: 1) The significance of the coefficients concerns the simultaneous test of the three estimators: risk-aversion, time preference, and interaction.

2) Estimated wealth levels correspond to the estimates in Table 2.

The table should be read as follows . The average household in the sample has wealth normalised to 100. Those who are farsighted and risk-averse hold 91% more gross wealth (128/67) than those who are short-sighted and risk-loving (the omitted category). The difference is statistically significant at the 1% level.