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STOCKHOLDING in FRANCE

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Abstract

In France like in other European countries, the past fifteen years has been a time of drastic financial markets developments due mainly to greater international integration and coordination (in response to European Union directives), financial liberalization (in particular the privatization of public services), and product innovation (especially the rise of retirement accounts –PEP- and life insurance). One of the most striking results has been the quick adjustment of households' behaviors to this new financial context, especially through the increasing share of stocks in portfolios and the diffusion of retirement accounts. In the middle of the eighties, only some 7 percent of French households own stocks directly to compare with around 17 percent of stockholders in 2000. For life insurance and retirement accounts, the rate of ownership has gone up, over the same period, from around 30 percent to around 47 percent of households. In this paper, we study portfolio choice decisions of French households concerning stockholding.

Résumé

Les quinze dernières années ont été marquées, en France comme dans d'autres pays européens, par des changements importants sur les marchés financiers. Ces évolutions ont été le fait de l'intégration et de la coordination européennes, de la libéralisation et de l'innovation financières (en particulier sur l'épargne retraite et les assurances vie). Face à ce nouvel environnement, les acteurs économiques ont adapté leurs choix de portefeuille, en particulier leur demande de valeurs mobilières et d'assurances vie. Dans le milieu des années 80, seulement 7% des ménages français détenaient des actions; ils étaient 17% en 2000. Pour les assurances vie et l'épargne retraite, le taux de diffusion, sur la même période, est passé d'environ 30% à 47% des ménages. Dans ce papier, on étudie plus précisément les comportements d'investissements en actions des ménages français.

Stockholding in France[1]

Luc Arrondel and André Masson

1. Introduction

In France like in other European countries, the past fifteen years has been a time of drastic financial markets developments due mainly to greater international integration and coordination (in response to European Union directives), financial liberalization (in particular the privatization of public services), and product innovation (especially the rise of retirement accounts –PEP- and life insurance). One of the most striking results has been the quick adjustment of households' behaviors to this new financial context, especially through the increasing share of stocks in portfolios and the diffusion of retirement accounts. In the middle of the eighties, only some 7 percent of French households own stocks directly to compare with around 17 percent of stockholders in 2000[2]. For life insurance and retirement accounts, the rate of ownership has gone up, over the same period, from around 30 percent to around 47 percent of households.

In this paper, we study portfolio choice decisions of French households concerning stockholding. The paper is organized as follows: in section 2, we provide a brief analysis of household portfolio composition and its evolution during the last decade (from national accounts). Section 3 presents the main feature of the data and describes stockholding in France. The empirical analysis uses the 1997 INSEE Survey on Wealth ("Patrimoine 97") with a sample of 10,207 French households. In section 4, we examine the respective characteristics of

[2] Data of 2000 come from the survey EPCV, Insee (Dumontier *et al.*, 2001).

stockholders and non-stockholders. Section 5 presents briefly the theory of portfolio choice and its recent developments, in order to justify the econometric specifications used for assets demands. Results for stock ownership and investment are shown in Section 6. Section 7 summarizes the main conclusions.

2.   The household portfolio in France

The last decade witnessed significant developments in the composition of French households. The most significant changes have been are the increased share of financial assets in total gross wealth (from 44% in 1990 to 53% in 1997), a share which is now greater than the one of real assets. Beyond potential changes in households' portfolio choice behaviors, this trend is due mainly to the evolution of asset prices during this period. First, the speculative bubble on Parisian housing market during the eighties broke down: all in all, national housing prices were constant during the nineties. Second, at the same time, the Stock Exchange index (CAC 40) increased by about 100%. On the other hand, taxes on capital gains on financial assets are much more important since 1992.

If we look at savings data rather than wealth data, we note that the French gross saving rate was about 12.5 percent in 1990 and about 16 percent in 1997. This tendency continued in 2000 and 2001, with a saving rate also around 16%. But, during the same period, the financial saving rate has increased from about 3 percent to around 6.6 percent in 2000 and about 7.7 percent in 2001.

Table 1 reports the aggregate shares of financial assets in total financial wealth from 1990 to 1997[3]. These aggregate statistics give us an insight into some of the key changes that occurred in financial wealth holdings in France. The table reveals

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[3] According to the degree of risk, the various types of financial assets listed in table 1 can be divide in three classes: *clearly safe financial assets* include currency, transaction and saving accounts; *fairly safe financial assets* include government bonds, other bonds and cash value of life insurance; *risky financial assets* include stocks, mutual funds and managed investment accounts.

that the composition of households' financial assets has changed significantly over the sample period. The proportion of financial wealth held in currency and bank deposit (transaction and saving accounts) has decreased from 39.3 percent in 1990 to 32.6 percent in 1997. The proportion of financial wealth held in stocks rose markedly, from 26.2 percent to 32.4 percent, whereas that of mutual funds and managed investment accounts (including money market funds) has fallen from 13.7 percent to 7.5 percent. The proportion of financial wealth held in bonds is quite limited and rather constant over the sample period (between 2.5 percent and 4 percent). But the main change in the composition of financial wealth concerns the share of life insurance in portfolios: it has more than doubled over the sample period, increasing from 9.6 percent to 19.4 percent.

These trends can be explained by a number of factors.

The first ones deal essentially with the evolution of relative market prices of transferable securities. As we have seen before, the market value of stocks has increased drastically during the 1990s (the CAC 40 stock exchange index has doubled). Moreover, the relative distribution of (pre-tax) rates of return on financial assets has changed substantially: the annual real rate of return on stocks has risen from 0.4 percent over the period 90-94 to 15.3 percent over the period 95-98; the one on mutual funds has also increased from 2.5 percent (during 90-94) percent to 5 percent (during 94-97), but the rate of return on money market funds has fallen from 6.2 percent to 2.7 percent over the same sample time periods; the rate of return on bonds (from the private sector) has increased from 7.1 percent during 90-94 to 9 percent during 94-97; lastly, the rates of return on non-taxable savings accounts (still in real terms) have remained approximately constant, around 2 percent. Moreover, the privatization of State owned companies[4] since 1993 have been very popular and could be responsible for a larger diffusion of an

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[4] Among the main State owned companies which have been privatized: BNP-Paribas, Aventis, Usinor, Total-Fina Elf, Pechiney, Renault, Altadis, CNP, Air France, Crédit Lyonnais, EADS, France Telecom, Thomson Multimédia.

"equity culture"[5]. All in all, these changes in relative prices and cultural factors help to understand the sizeable increase of the fraction of households holding stocks, from 9.1 percent in 1992 to 14.5 percent in 1997.

On the other hand, capital gains of transferable securities are more heavily taxed than before since 1992. But, in any case, capital gains on French stocks remain tax exempted if households hold their shares during at least five years on a managed investment account (PEA: "Plan Epargne en Actions"): in 1997, 7.3 percent of French households held such accounts and more than 14 percent in 2000[6].

The second group of factors concerns the development of life insurance markets. New long-term saving assets appear at the end of the 1980s and new products have been created (PEP: "Plan Epargne Populaire"). The eventuality of a reform of the social security system and the expectations of diminishing pension benefits have prompted households to rely increasingly on their own saving retirement. These assets have some fiscal allowances, concerning especially their transmission to other individuals: like "pure" life insurance contract, households can bequeath these assets freely and with total exemption of inheritance taxes. Long-term saving assets concern 46 percent of the French households in 1997 (39.5 percent in 1992).

3. Data on stockownership in France

Periodically, the French National Institute for Statistics and Economic Studies (INSEE) carries out households' surveys in order to evaluate the total amount and the composition of their wealth (1986, 1992, 1998). The last one "Patrimoine 97", used in this paper, was made in 1997-1998 on a sample of 10,207 households.

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[5] In 1997, after the privatization of France Telecom, 12.5 percent of direct stockholders did not hold stocks directly or indirectly one year before.

[6] Data of 2000 come from the survey EPCV, Insee (Dumontier *et al.*, 2001).

This survey is an abridged version of the questionnaire from the earlier survey on "Actifs financiers 1992" (Arrondel, 1996).

3.1. The "Patrimoine 1997" survey: brief description

The basic survey unit is the "household" which is defined as a group of individuals sharing the same dwelling. The sample is taken from the data of the previous census of population (1990). It is carried out on an initial representative sample of 14 800 households. To have significant information on non-wage-earners households and on the rich, the latter are over-represented in the sample. Hence, the proportion of farmers, self-employed and professional was initially three times their proportion in the census and the proportion of executives was initially multiplied by 1.5. The response rate was around 70 percent, non-responding families including families who refuse to respond and families who moved.

In particular, the "Patrimoine 97" survey provides:

- detailed information on the socio-economic and demographic situation of the members of the household (diplomas, occupational group, marital status, information about children...), as well as on the biographical and professional paths of each spouse (youth, career, unemployment spells or other interruptions of professional activity);

- detailed data on the household's income, on the amount and the composition of its wealth (including liabilities and professional assets); moreover, some questions aim at measuring their ability of access to the credit market; as far as stocks are concerned, we know also the financial institution in which the households own their stocks, how they manage their portfolio (no management, own management, management with financial advisor, management only by financial advisor) and if they own stocks one year before;

- brief information on the inter-generational transfers received and given (financial helping out, gifts and inheritance) and more generally on the "history of its wealth"; some questions concern also parents' socio-economic

characteristics and wealth composition. Table 2 reports summary statistics of the households' characteristics from the survey.

In addition, a complementary questionnaire gives a general idea of individuals' degree of exposure and aversion to risk, as subjectively perceived and assessed by them (cf. appendix). It consists of a "recto-verso" questionnaire, which was distributed to the interviewees at the end of the first interview. Submitted to the whole sample of 10,207 households, this page had to be filled in individually by the interviewee and his/her spouse (if applicable) and to be returned by post to INSEE. Only 4,633 individuals answered this questionnaire (corresponding to 2,954 households). The content is slightly different for employed persons than for unemployed or non-working persons. More specifically, the formers are asked to assess their short- and long-term risks of unemployment, as well as the likely change in their future income over the next 5 years. In addition, a small game on lotteries enables, in two steps, to divide the individuals into four groups according to their degree of relative risk aversion – a method initially introduced by Barsky *et al.* (1995).[7]

3.2. *The quality of amounts*

In order to avoid refusals or evasive answers to questions concerning the value of assets, different solutions have been held. In the case of financial assets (especially stocks), households have three possibilities: they can give the exact amount; or else, they can give a self-assessed bracket, i.e. a minimum and a maximum value; or else again, they can choose among fixed value brackets of

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[7] The "game" consists in determining, sequentially, whether the interviewee would accept to give up his present income and to accept other contracts in a lottery form: she has one chance in two to double her income, and one chance in two for it to be reduced by one third (contract A), by one half (contract B), and by one fifth (contract C). This procedure allows to obtain a range of measures of relative risk aversion under the assumption that preferences are strictly risk averse and utility is of the CRRA type. The degree of relative risk aversion is less than 1 if the individual successively accepts contracts A and B ; between 1 and 2 if she accepts A but refuses B ; between 2 and 3.76 if she refuses A but accepts C ; and finally more than 3.76 if she refuses both A and C. Among the

amounts. For stocks, we know also the method used by households to evaluate amounts: according to bank statements, buying value, minimum anticipated value, market value. To appraise real estate and other capital assets, households give a bracket, i.e. a minimum and a maximum value. Finally, to evaluate total gross wealth, which includes assets declared in the survey but also those not declared (such as gold, durable goods…), fixed value brackets were given to households. When amount of assets are given in brackets, the "simulated residual" method (Gouriéroux *et al*., 1987) has been used to obtain a single value (Arrondel, 1996).

The greatest disparities between the figures of National Wealth Account and the "Patrimoine 97" survey estimates concern (in varying degrees) financial assets, investment in real estate, and some professional assets. Gaps may be due to differences in the scope chosen or in the method of valuation used, but also to the limited reliability of answers in households' surveys. The "Patrimoine 97" survey has the advantage to offer a comprehensive coverage of assets. Yet, it is impossible to avoid errors and biases resulting from omissions, lack of knowledge, deliberate concealment of facts, or a subjective definition of wealth different from the survey's conventional definition (with discount for risk, depreciation of inherited property without usufruct, etc.).

In 1992, Arrondel *et al.* (1996) estimated from the previous wealth survey ("Actifs financiers 92") that the total amount of listed shares measured in the survey represented some 50 to 60 percent of the total amount of listed share evaluated in national accounts. Total financial assets represented 40 percent of the same assets evaluated in national accounts and total gross wealth, 70 percent. With the "patrimoine 1997" survey, results appears to be similar (Talon, 1999). Moreover, it seemed that rates of ownership in the survey were more accurate than data on stockholding amounts: one reason is that information on asset ownership resulted from two parts of the questionnaire (the first part consisting simply of the list of assets that have to be fulfilled by interviewees). On the other

4,633 respondents to the recto-verso questionnaire, 3,483 individuals participated in the lottery game.

hand, there are also several flaws in the national accounts figures, concerning in particular the valuation of the stocks of unlisted shares.

The big difference in the amounts investing in stocks between tables 1 and 3 comes from all these problems of evaluation.[8]

3.3. Data on stockownership

Table 3 looks at the ownership of various forms of stocks as well as at the amounts invested in 1997. The fraction of households with direct stockholding is about 15 percent. More precisely, around 12 percent of households have listed shares, 1.4 percent have non-listed shares and 3.1 percent own employers' shares. The proportion of households with indirect stockholding - mainly through mutual funds - is around 13.5 percent. It follows that the upper bound of (direct or indirect) stockownership in France can be estimated to around 23 percent of the population. The average amount invested in (direct) stocks is about 3,800¤ (25,000¤ among direct stockholders) and households invest on average 6,700¤ in stocks or in mutual funds (29,000¤ among owners)[9].

4.   Descriptive statistics on stockownership

We describe first the population of stockholders. Then, we analyze briefly the amount invested in stocks among households who invest in these assets.

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[8] More precisely, the "Patrimoine 1997" survey records only about 20% of the amounts of stocks registered in National Account. We obtain the same values with the previous survey (Arrondel *et al.*, 1996).

[9] The difference between this amount and those of table 1 issued from national accounts comes from 1) a different definition, 2) a different evaluation method and 3) the under-evaluation of asset demands in survey. With similar definition, the amount evaluated in the "patrimoine 1997" survey represents around 40% of the evaluation in national account (Talon, 1999)

4.1. Who holds stocks?

Table 4 shows that both the ownership of direct stockholding and indirect stockholding displays a hump-shaped age profile, at least in a cross-section (see also 6.1.1.). The proportion of households holding direct stockholding rises from 8.5 percent at young age to a peak of almost 20 percent at ages 50-60, before falling to 13.5 percent after 70 years old. This hump-shaped age profile, albeit less pronounced, is also found for indirect stockholding: around 17 percent of 50-59 aged people own mutual funds but only 14 percent after age 70. This decline at old age could result either from of the selling of stocks for life cycle purposes, i.e. consumption smoothing during retirement (Arrondel and Masson, 1990), or simply from a cohort effect in a cross section: owing to economic growth, older households come from poorer generations. The increase in stockholding during the first part of the lifecycle could be explained by the progressive accumulation of financial information (King and Leape, 1987).

Table 5 reports the ownership of stocks according to the level of education. It shows that education is an important explanatory factor of direct (respectively indirect) stockholding: only 11 percent of households (resp. 10.5 percent) with less than high school education hold stocks to compare with almost 26 percent (resp. 21 percent) of households with college education. The fact that the management of a portfolio needs specific information on stock exchange could explain this effect, at least in part (King and Leape, 1987); but the latter could also represent the influence of labor supply flexibility on risky assets demand (Bodie *et al.*, 1992), if we assume that labor supply flexibility increases with the level of education[10].

The first four columns of tables 6 reports stockholding by financial wealth quartiles; the last two columns focus on households in the top 5 percent and in the top 1 percent of the financial wealth distribution. As expected, stockholding increases sharply with the level of financial wealth. Less than 2 percent of

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[10] Intuitively, households take more risk in their portfolio if they could increase their income to compensate bad investments (see also § 5.1).

households in the first quartile own direct stockholding but almost 37 percent of households in the fourth quartile. This proportion is almost 67 percent in the top 5 percent of the financial wealth distribution and almost 83 percent in the top 1 percent. The rate of ownership of mutual funds rises also with the level of financial wealth, but at a smaller pace: "only" 60 percent of households in the top 1 percent of the financial wealth distribution have indirect stockholding[11].

Standard portfolio choice theory (see § 5.1) with perfect capital market (no transaction costs, no taxes, no information costs, possibility of short sales of assets allowed…) predicts that all investors own each risky asset in a proportion of wealth that depends on the characteristics of assets and on individual's risk aversion (Merton, 1971). Fixed transaction costs, holding costs, imperfect and costly information can explain why portfolios are not perfectly diversified (King and Leape, 1998). So, the effect of household's resources on stocks demand could reflect both the presence of such costs and the fact that risk aversion is decreasing with wealth.

Table 7 reports demographic characteristics of stockholders and non-stockholders. First, the effect concerning age, education and resources confirm previous results in tables 4 to 6: stockholders are younger, better educated and wealthier than non-stockholders are. One sees that male-headed households own more often stocks than female-headed households. Heterogeneity in tastes could explain this effect[12]. This heterogeneity in risk attitudes could also explain why self-employed (heads of) households and wage–earners employed in the private sector hold more stocks, if we assume that occupational choice is endogenous and depends of risk aversion. On the other hand, households with two income

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[11] Income, measured in brackets, has also a positive, but smaller effect on stockholding: less than 5 percent of households in the first income quartile own direct stockholding (respectively 4.5 percent for indirect stockholding) when almost 30 percent of households in the fourth quartile hold this asset (resp. 26 percent). At the level of the top 5 percent of the income distribution, 45.5 percent of the households have direct stockholding (resp. 37 percent). This proportion is almost 60 percent for the top 1 percent of the income distribution (resp. 36 percent).

[12] This gender-specific risk behavior is also obtained by Jianakplos and Bernasek (1998) or Sundén and Surette (1998) but is in contrast with the results of Schubert *et al.*, 1999.

recipients invest more in stocks, and households whose head is unemployed invest less in stocks: these two effects are consistent with Kimball (1992) portfolio choice model in which a household exposed to a higher (exogenous) risk in future income or to strong liquidity constraints reduces its investments in risky assets and increases its insurance coverage or its share of liquid savings. Likewise, increased risk on health seems also to explain less risky portfolio. All these gross effects will have to be confirmed in the econometric analysis (*ceteris paribus)*

Moreover, households whose parents own(ed) risky assets have a greater probability for stockownership. This effect could represent some heterogeneity of information about capital market or also an effect of inheritance expectations. This imperfection concerning information could also explain the effect of education: heads that have college education hold more often stocks.

4.2. *Asset share invested in stocks*

Tables 8 to 10 display average individual shares of financial wealth invested in stocks and mutual funds, according to age, education, and financial asset quartiles, for those who have invested in these assets. Globally, the average share invested in stocks is around 21% of financial wealth for direct stocks and around 28% for direct and indirect stocks together.

There is not a very pronounced age pattern for the share of financial wealth invested in stocks. Old people seem however to invest more in these assets (22% and 31% respectively for direct stocks and direct plus indirect stocks). Households headed by high school graduates hold a higher share of financial wealth in stocks (respectively 23.8% and 30.3%). Lastly, there is rather a decreasing relationship between the share of stocks and the level of financial assets for the bottom 95 % of households, but the relation is reversed among the top (financial) wealth holders.

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5. Theoretical framework and econometric specification

In this section, we present first the inter-temporal portfolio choice model and then underline its recent developments. Finally, we outline the econometric method.

5.1. The inter-temporal portfolio choice model under complete markets

Merton (1969) and Samuelson (1969) have generalized the portfolio choice model of Arrow (1965), integrating it into a life cycle model. At each period, the consumer determines simultaneously her optimal consumption level and wealth composition. She maximizes a Von Neuman-Morgenstern inter-temporal expected-utility function depending on consumption and on all the possible combinations of assets that exist on the market. The capital market is perfect (no taxes, no transaction costs), the path of future incomes and lifetime are known with certainty, all the assets are perfectly divisible and transactions can be made continuously over time. If the consumer's utility function is additively separable over time and if returns on assets are independently distributed over time, then portfolio choices are independent of consumption decisions (*first theorem of separation*). In addition, if instantaneous utilities are iso-elastic (Constant Relative Risk Aversion, CRRA), the fraction of wealth invested in each asset is independent of wealth and even of the investor's age if the distribution of returns on assets is stationary[13]. The portfolio choice depends thus only on instantaneous utility and on returns on assets in the current period[14]. Contrary to consumption decisions, portfolio choices can be described as a myopic behavior, being independent of time considerations[15]. In other words, myopia is optimal.

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[13] If the consumer has labor income, her "wealth" is assumed to include both assets and the present value of her human capital. These two kinds are perfect substitutes because capital market is assumed to be perfect.

[14] If the prices of assets are distributed according to a log-normal distribution, the demands for assets are the same as those found in the static model of Tobin-Markowitz (Merton, 1971)

[15] Apart from the characteristics of the assets (risk and return), this myopia is related to consumers' risk tolerance (the inverse of absolute risk aversion) which must be a linear function of

Merton (1971) has also shown that portfolio choices come to an allocation process between two "mutual funds" that depend only on the technical characteristics of the assets. If there is a riskless asset, the first mutual fund contains only this safe asset, while the second one is a linear combination of the risky assets. In that case, portfolio choices consist only in determining the risky fraction of wealth (*second theorem of separation*). Hence, if all investors have homogeneous price expectations, they own the "market portfolio" and their risky part of wealth has a common composition (Merton, 1973). Being perfectly diversified, their portfolios differ only in the fraction of their wealth invested in risky assets which depends on the inverse of their relative risk aversion. So, the demand for risky asset, *A*, is given by (index *t* omitted):

(1)
$$\frac{A}{W} = \frac{\alpha - r}{\sigma^2 \gamma}$$

where *W* denotes the net wealth of the consumer, γ his relative risk aversion coefficient, α and σ^2 are respectively the expected return and the variance on risky asset, *r* the return on the safe asset.

5.2. Recent developments of portfolio choice

In recent theoretical developments, portfolio choice models include *transaction costs* and reconsider the hypothesis of an *exogenous and certain labor income*. They also study the influence on risky portfolio of other investment decisions like *housing*.

King and Leape (1998 and 1987) have shown that it is possible to generate incomplete portfolios if we introduce some market imperfections: transaction and holding costs (in time and money), costly information, no short sales on assets. As

wealth (Mossin, 1968). Hence, Gollier (2001) shows that if the investor's absolute risk tolerance is increasing and convex, then the share of risky assets in wealth will decrease as age increases and that it is a positive linear function of wealth.

a result, the second theorem of separation, allowing the investor to decide only between the riskless asset and the risky "mutual fund", is no longer valid. Her portfolio may now be incomplete (Mayshar, 1979). Proportional costs and taxes alone cannot lead to incomplete portfolios, because they can be integrated into the net returns on assets; however, they explain already the fact that trade on the market cannot be carried out continuously, but is rather spaced out over time (Constandinides, 1986). More generally, the equivalence with the static portfolio choice model of Tobin-Markowitz no longer holds[16]. However, King and Leape (1998) have shown that, *conditional* on the combination of assets held, the assets demands are the same as in Merton's mean-variance model - relation (1).

Bodie *et al*. (1992) have studied the influence of labor supply flexibility on risky investments. Very briefly, the main prediction of the model is that the more flexible their labor supply, the more risky their investments because households could increase their income if they make *ex post* bad investments.

Recent theoretical saving models and portfolio choice have also placed greater emphasis on prudent behavior in the face of an uncertain future income, and have emphasized the influences of multiple risks and borrowing constraints on portfolio choices.[17]

Pratt and Zeckhauser (1987) establish a set of conditions on preferences - "proper" risk aversion- that guarantee that an additional independent undesirable risk (i.e. decreasing expected utility) increases the sensitivity to other undesirable risks. Kimball (1993) and Gollier and Pratt (1996), building on this notion of proper

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[16] Szpiro (1995) introduces an additional constraint on fixed transaction costs: the investor buys an asset *i* if, and only if, the sum of its discounted expected returns is higher than its holding costs. The higher the sum of the discounted expected returns, the easier it is to exceed fixed costs. Moreover, the longer the horizon of the investment, the higher the likelihood of removing constraints. Favorable taxation increases the expected returns and makes it easier to exceed the fixed costs.

[17] The effect of uninsurable and unavoidable earning risk on consumption and portfolio choice was first studied by Drèze and Modigliani (1972). They show in a two-period model that if absolute risk aversion is decreasing, portfolio choice and saving decisions are not separable (Drèze and Modigliani' "substitution effect"): an endogenous decrease (increase) in demand for risky assets decreases (increases) precautionary saving.

risk aversion, provide a general framework to study the interaction between background risk (uninsurable and unavoidable risk) and other undesirable risks.

Kimball (1993) defines as *"standardness "* the property for a utility function that guarantees that an additional independent undesirable risk increases the sensitivity to other loss-aggravating ones (i.e. when an independent risk is added to the initial loss). He introduces the concept of *temperance* (measured by the ratio $\theta = -u''''/u'''$) which describes the desire to reduce total exposure to risk, i.e. to moderate an endogenous risk in response to an increase in another unavoidable risk. He indeed shows that for an additional independent undesirable risk, the "demand" for an another endogenous risk decreases if and only if absolute risk aversion *and* absolute prudence are decreasing functions. This condition is satisfied for CRRA utility function. Under this assumption of "standardness", temperance is greater than *prudence ($p = -u'''/u''$*, Kimball, 1990), which is itself greater than absolute risk aversion *a* ($\theta > p > a$), and the magnitude of reduction in endogenous risk is a positive function of the difference between temperance and prudence ($\theta - p$). Gollier and Pratt (1996) define a weaker concept, "risk vulnerability" (or weak proper risk aversion), whereby preferences with this property are such that adding a non positive mean (unfair) background risk is equivalent for the consumer to an increase in aversion to any other independent risk.[18]

So, within this static framework, an increase in income risk makes households less willing to bear a rate of return risk, thus reducing their demand for risky securities[19], even when the two risks are independent. In other words, the two

[18] Eeckhoudt *et al.* (1996) propose a synthetic approach of all these concepts. "Standarness" implies that every loss-aggravating risk aggravates every undesirable risk. "Properness" is more restrictive: an undesirable risk can never be made desirable by the presence of an independent undesirable risk. "Risk vulnerability" (an undesirable risk can never be made desirable by an independent unfair risk) includes proper risk aversion and standard risk aversion as particular cases.

[19] Similarly, they should tend to buy more insurance against risks that are insurable (Eeckhoudt and Kimball, 1992).

risks are *substitutes*. These results also hold in a multi-period portfolio model (Elmendorf and Kimball, 2000, Viceira, 1999, Campbell and Viceira, 2002)).

Income risk also affects the relation between borrowing constraints and the composition of the household's portfolio. Koo (1995) has shown that the possibility that consumers will be subject to a liquidity constraint in the future makes them less willing to bear risk today (i.e. it is *as if* their risk aversion raised). Then, constrained households hold less risky assets than others do. More precisely, "liquidity constraints reduce willingness to take risk if absolute risk tolerance is increasing and convex" (Gollier, 2001). In short, the effect of (expected) borrowing constraints reinforces the negative effect of income risk on portfolio choice.

Hence, the main prediction of these theoretical models is that when consumers face several risks simultaneously (of which one is unavoidable and uninsurable), they reduce the optimal investment in risky securities (they reduce endogenous risk). This effect is reinforced if consumers expect to be liquidity constrained in the future. These predictions are, however, not easy to test, the main problem in the empirical analysis being to find appropriate measures of income risk and liquidity constraints (cf. *infra*).

Other investment decisions could also influence risky portfolio allocation. Flavin and Yamashita (1998) assume that preferential tax treatment of owner-occupied housing and transaction costs create frictions large enough to constrain households to take into account, in their portfolio choice, the level of housing consistent with their consumption demand for housing. So, home ownership influences greatly portfolio allocations and consumption and investment decisions are no longer separable. For instance, if the ratio of housing to net worth declines as the household accumulates wealth, the housing constraint induces an age-pattern in financial portfolios: young households will have a strong incentive to reduce portfolio risk (if risk aversion is decreasing in financial wealth), whereas older households will invest more in risky assets.

5.3. Econometric specification

I posit the following relation for the share of risky assets in financial wealth:

(2) $A/F = g(X\beta) + \varepsilon$

with $A >= 0$ is demand for risky assets and F is total financial wealth. X is a vector of variables that influence the demand for risky investments. ε is an error term.

The set of explanatory variables X has been chosen according to the theoretical model. In portfolio choice models where capital markets are imperfect (transaction costs, holding cost, imperfect information) portfolios are incomplete (King and Leape, 1998). So portfolio choice depends on household's income and wealth (to finance transaction and information costs) and on the stock of financial information (proxied by age, education, parents' wealth composition).

We take into account different sources of future exogenous risk. For risk on *health*, we used current and past health problems. For *family* risks, we control by marital status and number of people in the household. Two sets of explanatory variables are used to take account of *income* risk depending on the sample used in the estimation: the total sample of households (10 207 observations), or only the restricted sample of households (2 954 observations) who have replied to the complementary questionnaire on risk attitudes (cf. *supra*):

- When using the total sample, we introduce the sector of professional activity of the household -public vs. private- and, for those working in the private sector, the existence of past or present unemployment period); we add the nature of professional activity (employee vs. self-employed), professional status (retired vs. active), and the number of income recipients in the household, which may also convey some information on future income riskiness.

- When we regressed stock demand on the restricted sample of respondents to the complementary questionnaire on risk attitudes, we used direct measures of risk aversion (in four brackets) and of subjective income risk (cf. appendix). We added also a proxy variable for individual liquidity constraint (cf. appendix).

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Among the X-variables, the effect of age can be given different interpretations (Arrondel and Masson, 1996). Bodie *et al.* (1992) show that the young enjoy greater labor flexibility than the old and may therefore be more inclined to hold risky asset; Gollier and Zeckhauser (1997) show that young households take on relatively more portfolio risk than more mature households if (and only if) absolute risk tolerance is increasing and convex with wealth. On the other hand, King and Leape (1987) claim that financial information is acquired progressively over the life cycle, which means that the young should have a less diversified portfolio than the old. Life cycle effect could be justified by the fact that if households need liquidity to finance consumption during old age, they will hold less risky portfolios (Arrondel and Masson, 1990). Lastly, if young people want to be homeowner (due to favorable fiscal treatments for example), they will invest less in stocks because they hold less financial wealth (Flavin and Yamashita, 1998).

A simple OLS regression of (2) leads to inconsistent estimates due to the fact that a lot of households do not own risky assets[20]. In the same way, OLS regressions of (2) on the sub-sample of investors who hold risky assets is subject to selection bias (Heckman, 1976). So, we model the demand for risky assets as a two-stage decision process (King and Leape, 1998), where the first step is a Probit model for the probability of ownership and the second step estimates conditional demands for risky assets, while introducing the opposite of the Mill's ratio in the set of regressors to correct selectivity bias. In other words, households choose first whether or not to hold such risky asset, and then, conditional of the combination of assets chosen, decide how to allocate total financial wealth between safe and risky securities[21]. We use different sets of explanatory variables to explain the "discrete" and "continuous" choices. Assuming that information costs mainly

[20] For more details about estimation of household portfolio models, see Miniaci and Weber (2001)

[21] As there are only two categories of assets used in regressions, it is also possible to handle the selection bias by estimating a simple Tobit model on the share of risky assets (with a lower limit of zero holding). However, Tobit estimation constrains the determinants of the probability of ownership and of the demand of risky assets to depend on the same set of variables.

explain the decision to hold or not risky assets (Arrondel and Masson, 1990), we introduce education and the presence of risky assets in parents' wealth only in Probit model. Moreover, this hypothesis guarantees that the opposite of Mill's ratio is not co-linear with the determinants of the continuous choice[22].

6. Econometric analysis for demand of stocks

In this section, we first study participation on the stock market. Then, we analyze the continuous choice of investment in stocks for households who hold these assets.

6.1. Probit regressions for stockownership

Tables 11 and 11bis display results of the econometric analysis concerning, respectively, the total sample and the restricted sample of respondents to the complementary questionnaire on risk attitudes.

6.1.1. Econometric estimates of age

In the probit regression for the participation in stocks, we use a third order age-polynomial (not reported in the tables). Econometric estimates of the effect of age on figures 1 to 3 corroborate the hump-shaped age profile obtained in the descriptive analysis for direct stockholding: everything being equal, participation in stocks is maximum around 40 years old. For mutual funds, we note an increased relationship after 75 years (observed also in the descriptive analysis).

Estimated on cross-section data, this effect of age could reflect, at least in part, cohort effects. Figure 4 plots the average ownership rates of stocks and shares (including direct and indirect stockholding) derived from the Eurostat panel for the

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[22] Moreover, gains or losses on the stock exchange and the mode of portfolio management have been introduced only in demand equation.

period 1994-2000 (Lollivier, 2001). Generally, in cohort graphs, the age effect is interpreted as the "common shape" of the different cohort lines with respect to age; the horizontal distance between the different cohort profiles measures cohort effects; and fluctuations over time, assumed to affect in a similar way all cohort profiles, are period effects. Figure 4 reveals that stock ownership follows a hump-shaped age profile with a peak around 60[23]. So, this result confirms a life-cycle pattern for the demand for stocks and shares.

6.1.2. Other effects

The effects of financial wealth (and inheritance) and income are positive and consistent with the presence of fixed transaction costs (see table 11). The stock of information inherited from parents - proxied by the ownership of the same assets in parents' wealth – also increases the probability of ownership of risky assets. This variables could also proxied an effect of inheritance expectations. The level of education of the household's head has also a positive effect. Workers in the private sector (being less risk averse?) take more risks in their portfolio by holding more stocks. Households with more than one-income recipients have a lower probability of stockownership. These two last effects do not support the assumption of a "temperant" behavior between different sources of risk (cf. *supra*). Gift or inheritance received have a positive effect (with wealth given) on stockholding: perhaps households keep stocks inherited from their parents. Finally, living in town is a favorable factor to hold stocks[24].

Some effects are specific to the definition of stocks. For direct stockholding, results support previous findings that female-headed household have a more risk averse behavior (see note 10). Inversely, single households have a more risky

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[23] This effect is also true everything being equal (Lollivier, 2001).

[24] This effect could be explained by influence of the supply of stocks (more important in town) or/and by a price (higher in big urban area) effect of main residence.

portfolio of direct stocks. For indirect stockholding, we obtain a negative effect of being self-employed.

Probit regressions for stockownership on the restricted sample of respondents to the questionnaire on risk attitudes exhibit similar results for the previous variables (cf. table 11bis)[25]. The coefficient of the proxy for liquidity constraints is negative: households expecting to be liquidity constrained in the future invest less in risky assets. The effect of the individual measure of risk aversion has the expected sign for direct stock ownership: less risk averse households invest more often in risky assets. The coefficient of the expected variance of income is significantly different from zero but it has the opposite sign as expected by new theories of risk management[26]: households whose future income is more risky are also those who invest more in risky assets[27]. In other words, income risk and endogenous risk do not appear to be substitutes[28].

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[25] For more details on the characteristics of this sample, the questionnaire on risk attitudes and the econometric results, see Arrondel (2000).

[26] Only some recent papers study the impact of income uncertainty and precautionary motives on the composition of households' portfolio. On Italian data, households facing uninsurable risk and future liquidity constraints will reduce their share of risky assets (Guiso *et al*., 1996) and increase coverage against the risks that can be avoided (Guiso and Japelli, 1998). Vissing-Jorgensen (1999) also finds evidence that background risk reduces stock market participation in the United States. Hochguertel (1998) results for the Netherlands are inconclusive and those of Alessie *et al.* (2001) for the same country did not find significant effect of income uncertainty on the demand for risky assets.

[27] However there may be a non negligible error in the measurement of the income variance (for example, some of the zeros in the self-reported measure of earnings variance may be artificial). In this case, the coefficients of the variance of earnings are biaised. Additionally, there could be an endogeneity bias due to occupational choice. To account for these facts, we instrument these variables in the wealth equations (Arrondel, 2000). In addition to the set of exogenous variables, we include in the instrumental set parent's social status and portfolio composition. The partial R^2 for the included instruments in the first stage regressions is quite low (1.15%) but F-test (2.69) is significant. Moreover, tests of over-identifying restrictions do not reject the model specification and the chosen instruments. But in the two cases (for direct and indirect stockholding), the test of exogeneity allows us to reject the endogeneity of the variable measuring income variance variable in Heckman's two-stage procedure (Robin, 2000).

[28] From a theoretical point of view, two conclusions could be drawn from these facts. First, the positive effect could be due to a negative correlation between risky portfolio risk and income risk (Heaton and Lucas, 2000, Haliasos, 2002). So households could insure themselves against income risk by buying stocks. Second, household have not DARA+DAP utility function. The only measure of correlation between human capital and non human capital risk for France is those of Bottazzi,

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6.2. Conditional shares of stocks

Like it was found in previous findings, there are few variables that are statistically significant in the conditional asset demand equation (tables 12 and 12bis).

For direct stockholding, the conditional asset share depends positively of "big gains" at the Stock Exchange. Managing portfolio personally or entrust of financial advisors for managing it increases the share of stocks in financial wealth[29]. Total demand for stocks (direct or indirect[30]) show an increasing share with age. We obtain also the same effect of big gains at the Stock Exchange and of the mode of management than for direct stockholding.[31]

So, it appears that conditional demand for stocks are mainly explained by the variables which proxy price fluctuations on the capital market. These results, combined with the previous ones concerning participation in the stock market, seem to confirm, at least in part, the model of King and Leape (1998), where transaction costs are one of the main explanatory factors of portfolios incompleteness. In this model, assets demands, conditional upon ownership, depend mainly on technical characteristics of assets and on the degree of risk aversion of individuals.

Peseti and van Wincoop (1996). This correlation is negative and so, could explain the previous econometric result.

[29] How French households manage their portfolio of stocks? Among direct stockholders, 38 percent hold their portfolio without specific management, 24.5 percent manage their portfolio personally, 23 percent follow their financial advisor to reallocate their portfolio and 15 percent with managing of portfolio of stocks.

[30] For indirect stockholding, there is no variable that is statistically significant.

[31] When we consider the sub-population of respondents to the questionnaire on risk attitudes (tables 12bis), we obtain the same conclusions.

7. Conclusions

Let us sum up the main conclusions. In 1997, around 15% of French households own stocks directly and around 23 % directly or indirectly (through mutual funds). Stockholding exhibits a humped-shaped pattern according to age, with a peak of 28 percent in the 50-59 age bracket, and increases very sharply with the level of (financial) wealth, concerning 85 percent of the households in the top centile. Stockholders are better educated, more often self-employed or employees in the private sector. Moreover, the frequency of stockownership is higher for male-headed or two income recipients households, and also when parents themselves own(ed) stocks.

The econometric analysis confirms most of these descriptive results and shows the relevance of explanatory factors behind the classic portfolio choices based on transaction and agency costs, and heterogeneous information. It emphasizes also the negative effect of (proxies for) liquidity constraints (as new theoretical models predict) and risk aversion but, more surprisingly, the positive effect of future income risk. Contrary to the predictions of new risk theory, income risk and portfolio risk do not appear to be substitutes: households whose income is more risky are those who invest more often in stocks. These conclusions need however further qualifications and more investigations concerning, notably, the (presumably negative) correlation between income and capital return.

This study should also allow for a better understanding of the equity premium puzzle in France. In the long run (during XXth century), the real average annual return on equity was between 5 to 8% percent higher than the return on risk free asset (Allais and Nalpas, 1999). To account for this equity premium (which is still lower than in the US), the standard portfolio choice model predicts that the optimal share of wealth invested in risky assets should equal 160 percent and 40 percent, respectively, for a relative risk aversion of 1 and 4. The presence of (transaction and information) costs and credit constraint could in part explain this puzzle.

References

Alessie, R., Hochguertel, S. and van Soest, A. (2001), "Household Portfolios in The Netherlands", in *Household Portfolios*, Guiso L., Haliassos M. and T. Japelli eds, MIT Press.

Allais O. and Nalpas, N. (1999), "The Equity Premium Puzzle: an Evaluation of the French Case", *mimeo*, University of Paris I.

Arrondel, L and Masson A. (1990), "Hypothèse du cycle de vie, diversification et composition du patrimoine", *Annales d'Economie et de Statistique*, 17, 1-45.

Arrondel, L. (1996), "Patrimoine des ménages : toujours le logement, mais aussi les actifs de précaution", *Economie et Statistique*, n° 296-297, 33-62.

Arrondel, L. (2000), "Risk Management, Liquidity Constraints, and the Demand for Risky Assets in France", Paris, DELTA Doc. 00-20.

Arrondel, L. and Masson A. (1996), Gestion du risque et comportements patrimoniaux", *Economie et Statistique*, 296-297, 63-89.

Arrondel, L. and Masson, A. (1989), "Déterminants individuels de la composition du patrimoine: France 1980", *Revue Economique*, 40, 441-502.

Arrondel, L., Guillaumat-Tailliet F. and Verger, D. (1996), "Montants du patrimoine et des actifs : qualité et représentativité des déclarations des ménages", *Economie et Statistique*, 296-297, 145-164.

Arrow, K.J. (1965), *Aspect of the Theory of Risk Bearing*, Yrjö Johnson Lectures, Helsinki.

Barsky, R.B., Kimball, M.S., Juster, F.T. and Shapiro, M.D. (1995), "Preference Parameters and Behavioral Heterogeneity : An Experimental Approach in the Health and Retirement Survey", *Quarterly Journal of Economics*, CXII, 2, 537-580.

Bodie, Z., Merton, R. C. and Samuelson, W. F. (1992) "Labor Supply Flexibility and Portfolio Choice in a Life-cycle Model", *Journal of Economic Dynamics and Control*, 16, 427-449.

Bottazzi L., Pesenti P. and van Wincoop, E. (1996), "Wages, Profits and the International Portfolio Puzzle", *European Economic Review*, 40, 219-254.

Campbell J.Y. and Viceira L. M. (2002), *Strategic Asset Allocation: Portfolio Choice for Long-Term Investors*, Clarendon, Lectures in Economics, Oxford University Press.

Constantinides, G.M. (1986), "Capital Market Equilibrium with Transaction Costs", *Journal of Political Economy*, 94, 842-862.

Drèze, J. and Modigliani, F. (1972), "Consumption Decisions under Uncertainty", *Journal of Economic Theory*, 5, 308-335.

Dumontier, F., Martinez C., Roineau C., Rougerie C. and Tanay, A. (2001), "Patrimoine des ménages en 2000: une épargne plus risquée", *Insee Première*, n°756.

Eeckhoudt , L. and Kimball, M. (1992), "Background Risk, Prudence, and the Demand for Insurance", in *Contributions to Insurance Economics*, Dionne, G. (ed.), London, Kluwer Academic Press.

Eeckhoudt, L., Gollier, Ch. and Schlesinger, H. (1996), "Changes in Background Risk and Risk Taking Behavior", *Econometrica*, 64(3), 683-689

Elmendorf, D. W., and Kimball, M. S. (2000), "Taxation of Labour Income and the Demand for Risky Assets", *International Economic Review*, 41, 801-832.

Flavin, M. and Yamashita, T. (1998) "Owner-Occupied Housing and the Composition of the Household Portfolio Over the Life-Cycle", NBER Working Paper No. W6389

Gollier, Ch. (2001), *The Economics of Risk and Time*, MIT Press, Cambridge.

Gollier, Ch. and Pratt, J. W. (1996), "Weak Proper Risk Aversion and the Tempering Effect of Background Risk", *Econometrica*, 64(5), 1109-1123.

Gollier, Ch. and Zeckhauser, R. (1997), Horizon Length and Portfolio Risk, NBER, Technical Working Paper 216.

Gouriéroux, C., Monfort, A., Renault and Trognon, A. (1987), "Simulated Residuals", *Journal of Econometrics*, 34, 201-252.

Guiso, L. and Jappelli, T. (1998), Background uncertainty and the demand for insurance against insurable risk", *The Geneva Papers on Risk and Insurance Theory*, 23, 7-27.

Guiso, L., Jappelli, T. and Terlizzese, D. (1996), "Income Risk, Borrowing Constraints and Portfolio Choice", *American Economic Review*, 86, 158-172.

Haliasos, M. (2002), Stockholding: Lessons from Theory and Computations", this volume.

Heaton J. and Lucas, D. (2000), "Portfolio Choice in the Presence of Background Risk", *Economic Journal*, 110, 1-26.

Heckman, J. (1976), "The Common Structure of Statistical Models of Truncation, Sample Selection and Limited Dependent Variables and a Simple Estimator for Such Models", *Annals of Economic and social Measurement*, 5, 475-492.

Hochguertel, S. (1998), "Households' Portfolio Choices", Tilburg, CentER Dissertation Series, n°38.

Jianakoplos, N. and A. Bernasek (1998), "Are Women More Risk- Averse?", *Economic Inquiry* 36: 620-630.

Kimball, M. S. (1990), "Precautionary Saving in the Small and in the Large", *Econometrica*, 58, 53-73.

Kimball, M. S. (1992), "Precautionary Motives for Holding Assets", in John Eatwell, Murray Milgate and Peter Newman (Eds) *The New Palgrave Dictionary of Money and Finance*, London MacMillan.

Kimball, M.S. (1993), "Standard Risk Aversion", *Econometrica*, 61, 589-611.

King, M. A. and Leape, J. I. (1987) "Asset Accumulation, Information, and the Life Cycle", N.B.E.R. WP2392.

King, M. A. and Leape, J. I. (1998), "Wealth and Portfolio Composition : Theory and Evidence", *Journal of Public Economy*, 69, 155-193.

Koo, H. K. (1991), Consumption and Portfolio Choice with Uninsurable Income Risk", Princeton University, mimeo.

Lollivier S. (2001), "Dynamique des patrimoines individuels", *mimeo* Crest, Paris.

Mayshar, J. (1979), "Transaction Costs in a Model of Capital Equilibrium", *Journal of Political Economy*, 87, 673-700.

Merton, R. C. (1971), "Optimal Consumption and Portfolio Rules in a Continuous Time Model", *Journal of Economic Theory*, 3, 373-413.

Merton, R.C. (1969), "Lifetime Portfolio Selection under Uncertainty: the Continuous Time Case", *Review of Economic Studies*, 51, 247-257.

Merton, R.C. (1973), "An Intertemporal Capital Asset Pricing Model", *Econometrica*, 41, 867-887.

Miniaci R. and G. Weber (2001), "Econometric Issues in the Estimation of Household Portfolio Models", in *Household Portfolios*, Guiso L., Haliassos M. and T. Japelli eds, MIT Press.

Mossin, J. (1968), "Optimal Multiperiod Portfolio Policies", *Journal of Business*, 41, 215-229.

Pratt, J. and Zeckhauser, R. (1987), "Proper Risk Aversion", *Econometrica*, 55(1), 143-154.

Robin, J. M. (2000), "Modèles structurels et variables explicatives endogènes", Doc. Méthodologie statistique n°2002, INSEE, Paris

Samuelson, P.A. (1969), "Lifetime Portfolio Selection by Dynamic Stochastic Programming", *The Review of Economic Studies*, 51, 239-246.

Schubert R., M. Brown, M. Gysler and Brachinger, H. W. (1999), "Financial Decision-Making: Are Women Really More Risk-Averse? *American Economic Review*, vol. 89, issue 2, pages 381-385

Szpiro, D. (1995), "La diffusion des produits financiers auprès des ménages en France*", Economie et Statistique*, 281, 41-60.

Sundén, Annika and Brian J. Surette. 1998. "Gender Differences in the Allocation of Assets in Retirement Savings Plans," *American Economic Review Papers and Proceedings* 88(2), 207-211.

Talon G. (1999), "Structure et disparités du patrimoine des ménages", *Synthèses*, n°28, Insee, Paris.

Viceira, L. M. (1999), "Optimal Portfolio Choice For Long-Horizon Investors With Non-tradable Labor Income", N.B.E.R. WP7409.

Vissing-Jorgensen, A. (1999), "Towards an explanation of Household Portfolio Choice Heterogeneity: Non-financial Income and Participation Cost Structures", mimeo, University of Chicago.

Appendix

The Definition of Relative Risk Aversion,
Earnings Uncertainty and Borrowing Constraints

Relative risk aversion

Suppose that you have a job which guarantees for life your household's current income R. Other companies offer you various contracts which have one chance out of two (50%) to provide you with a higher income and one chance out of two (50%) to provide you with a lower income.

Are you prepared to accept Contract A which have 50% chances to double your income R and 50% chances that your income will be reduced by one third?

For those who answer YES : the Contract A is no longer available. You are offered Contract B instead which have 50% chances to double your income R and 50% chances that it will be reduced by one half. Are you prepared to accept?

For those who answer NO : you have refused Contract A. You are offered Contract C. which have 50% chances to double your income R and 50% chances that it will be reduced by 20%. Are you prepared to accept?

Earning uncertainty

Within the next 5 years, your total household revenue (the rise in prices excluded):

- ... will have increased by more than 25%
- ... will have increased by 10 to 25%
- ... will have increased by less than 10%
- ... will be constant
- ... will have decreased by less than 10%
- ... will have decreased by 10 to 25%

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- ... will have decreased by more than 25%
- ... will have marked ups and downs (indicate the minimum and maximum annual income)

You dispose of 100 points to be distributed among the 8 items, according to the degree to which you agree or you disagree with the relative statement.

The probability of being liquidity constrained

In "Patrimoine 97" survey, households are asked two questions aimed at measuring their ability to access the credit market. These questions are similar to that of the SHIW Italian survey (Guiso *et al.* 1996). We classify consumers as liquidity constrained if they respond positively to at least one of the two following questions. The first indicates whether a consumer is a "discouraging borrower", the second whether he is a "turned down applicant":

- Did you renounce to finance expenditures on durable goods (main residence, cars ...) or did you renounce to restore your home because you expected that bank or other financial intermediaries will refuse the loan or the mortgage?

- Did you renounce to finance expenditures on durable goods (main residence, cars ...) or did you renounce to restore your home because bank or other financial intermediaries refused the loan or the mortgage?

There are 11.7% of households who are liquidity constrained in the total sample and 9.8% in the sample of respondents at the recto-verso questionnaire.

We estimate first the probability of being liquidity-constrained controlling individuals' characteristics and we use the predicted measure as proxy for the existence of future borrowing constraints in asset-demand equation. The instruments of borrowing constraints are the following: global income, age, dummy for retirement, occupation dummies, education, household's composition, social status of parents, wealth of parents, dummies for unemployment (present and past), dummies for health problems (severe or minor), dummies for professional status and regional localization.

Table 1

Composition of Household Financial Wealth: Aggregate Financial Accounts

Financial assets	Asset shares	
	1990	1997
Currency, transaction and savings accounts	39,32	32,63
Government bonds	3,88	2,72
Other bonds		
Stocks	26,19	32,44
Mutual funds and managed investment accounts [*]	13,70	7,46
Defined-contribution pension funds	-	-
Cash value of life insurance	9,56	19,39
Other financial assets	7,35	5,35
Total financial assets (in billion of French Francs)	9.145	15.898
Total financial assets (in billion of Euro)	1.394	2.424
Memo: Stocks, mutual funds and defined contribution pension funds	39,89	39,90
Average financial assets per household (in French Francs)	426.360	669.996
Total number of households	21.449.000	23.728.500

Source. National accounts INSEE

Note. *Including money market funds

Table 2

Summary Statistics

Variable	Sample mean	Standard deviation
Age	51,10	17,72
Education: less than high school	0,70	0,46
Education: high school	0,13	0,33
Education: college	0,17	0,38
Married	0,53	0,50
Male	0,75	0,43
Singles	0,30	0,46
Between 2 and 4 household members	0,62	0,49
More than 4 household members	0,08	0,27
One income recipient	0,47	0,50
Two income recipients	0,44	0,50
More than two income recipients	0,05	0,23
Unemployed	0,06	0,24
Wage earner	0,71	0,45
Self-employed	0,14	0,35
Pension recipient	0,30	0,46
Income*	22.122	17.204
Total financial assets*	32.171	114.281
Participation		
Proportion investing in stocks	0,15	0,36
Proportion investing in mutual funds	0,13	0,34
Proportion investing in stocks or mutual funds	0,23	0,42
Amount invested		
In stocks, among stockholders*	25.116	90.822
In mutual funds, among those who invest have mutual funds*	21.358	71.971
In stocks, mutual funds and pension funds, among those who invest in these assets*	28.828	106.547
Number of observations	10.207	10.207

Source. Patrimoine 97 INSEE survey

Note. * In Euro

Table 3

Data on Direct and Indirect Stockholding

	Detail on survey questions		
	Ownership (%)	Amount (in FF)	Amount (in Euro)
Direct Stockholding			
Stocks	*15,0*	*25.044*	*3.818*
Listed stocks	11,9	20.252	3.087
Unlisted stocks	1,4	3.857	588
Employers' stocks	3,1	934	142
Indirect stockholding		-	
Mutual funds (excluding money market funds) and other managed accounts	13,5	18.900	2.881

Source. Patrimoine 97 INSEE survey

Table 4

Direct and Indirect Stockholding by Age (in %)

	<30	30-39	40-49	50-59	60-69	>=70	Total
Direct stockholding	8,5	14,5	16,7	19,3	16,4	13,4	15,0
Indirect Stockholding	7,5	13,5	14,7	16,7	12,2	14,1	13,5
Direct plus indirect stockholding	14,3	23,6	25,1	28,0	23,6	21,3	23,1
Sample proportion	11,8	19,1	20,3	15,9	13,4	19,5	100,0

Source. Patrimoine 97 INSEE survey

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Table 5

Direct and Indirect Stockholding by Education

	Less than High School	High School	College	Average
Direct stockholding	10,9	23,8	25,8	15,0
Indirect Stockholding	10,6	19,7	20,9	13,5
Direct plus indirect stockholding	18,1	33,3	36,0	23,1
Sample proportion	70,3	12,5	17,2	100,0

Source. Patrimoine 97 INSEE survey

Table 6

Proportion of Households Investing in Stocks, by Financial Asset Quartiles

	Quartile I	Quartile II	Quartile III	Quartile IV	Top 5 %	Top 1 %	Average
Direct stockholding	1,8	7,3	13,9	37,2	66,7	82,9	15,0
Indirect Stockholding	1,7	6,0	13,3	33,0	55,1	59,5	13,5
Direct plus indirect stockholding	3,5	12,5	23,9	52,5	80,3	84,9	23,1

Source. Patrimoine 97 INSEE survey

Table 7

Demographic Characteristics of Stockholders and Non-stockholders

Variable	Direct Stockholders	Indirect Stockholders	Direct plus indirect stockholders	Non Stockholders
Age	51,9	52,6	51,7	50,9
Less than high school	0,51	0,55	0,55	0,75
High school	0,20	0,18	0,18	0,11
College	0,29	0,27	0,27	0,14
Gross financial wealth*	105.600	97.400	84.400	16.700
Current Income*	33.125	32.350	31.600	19.250
Married	0,62	0,64	0,62	0,50
Male	0,83	0,83	0,83	0,73
Singles	0,24	0,22	0,23	0,32
Between 2 and 4 household members	0,69	0,72	0,70	0,60
More than 4 household members	0,06	0,05	0,06	0,08
One income recipient	0,43	0,41	0,42	0,54
Two income recipients	0,52	0,53	0,53	0,41
More than two income recipients	0,05	0,06	0,06	0,05
Wage earner	0,75	0,79	0,77	0,70
Self-employed	0,18	0,15	0,16	0,13
Unemployed	0,03	0,03	0,03	0,07
Pension recipient	0,31	0,31	0,31	0,30
Work in private sector	0,49	0,53	0,51	0,44
Work in public sector	0,16	0,13	0,15	0,15
Inheritance and gift received	0,54	0,54	0,52	0,33
Inter vivos transfers	0,36	0,37	0,35	0,25
Past illness (short periods)	0,30	0,30	0,32	0,37
Past illness (long periods)	0,02	0,02	0,02	0,05
Urban resident	0,65	0,64	0,63	0,58
Parents own risky assets	0,21	0,19	0,19	0,08
Number of observations	1.702	1.492	2.556	7.651

Source. Patrimoine 97 INSEE survey

Note. * In Euro

Table 8

Asset Share Invested in Stocks, Mutual funds (for stockholders) by Age

	<30	30-39	40-49	50-59	60-69	>=70	Total
Direct stockholding	20,4	23,1	21,8	19,4	22,2	22,5	21,7
Indirect Stockholding	21,6	23,7	24,1	22,7	24,3	26,4	24,1
Direct plus indirect stockholding	23,4	27,7	28,6	27,0	28,0	31,5	28,2

Source. Patrimoine 97 INSEE survey

Table 9

Asset Share Invested in Stocks, Mutual funds (for stockholders) by Education

	Less than High School	High School	College	Total
Direct stockholding	21,8	24,3	19,6	21,7
Indirect Stockholding	25,4	22,6	22,4	24,1
Direct plus indirect stockholding	27,9	30,7	27,0	28,2

Source. Patrimoine 97 INSEE survey

Table 10

Asset Share Invested in Stocks, Mutual funds (for stockholders) by Financial Asset Quartiles

	Quartile I	Quartile II	Quartile III	Quartile IV	Top 5 %	Top 1 %	Total
Direct stockholding	44,7	27,5	21,3	19,6	23,0	30,4	21,7
Indirect Stockholding	44,5	32,8	27,6	20,0	20,6	23,0	24,1
Direct plus indirect stockholding	45,0	31,7	27,7	26,4	33,3	45,8	28,2

Source. Patrimoine 97 INSEE survey

Table 11

Probit Regressions for Participation in Stocks and Mutual Funds

Variable	Stocks		Mutual funds		Stocks and mutual funds	
	Coefficient	Asympotic t Stat.	Coefficient	Asympotic t Stat.	Coefficient	Asympotic t Stat.
Age 30-39	0,017	1,189	0,013	0,950	0,021	1,140
Age 40-49	0,017	1,165	0,006	0,410	0,003	0,180
Age 50-59	0,020	1,237	0,001	0,100	-0,001	-0,070
Age 60-69	0,009	0,406	-0,012	-0,630	-0,016	-0,600
Age >70+	-0,009	-0,439	0,005	0,270	-0,026	-0,970
High School	0,058	5,514	0,023	2,450	0,060	4,470
College	0,048	4,966	0,014	1,590	0,049	3,960
Second financial wealth bracket	0,124	7,355	0,090	5,830	0,170	9,110
Third financial wealth bracket	0,212	11,896	0,198	11,800	0,310	16,080
Fourth financial wealth bracket	0,398	20,530	0,357	19,310	0,527	26,420
Second income bracket	0,050	3,846	0,009	0,830	0,049	3,150
Third income bracket	0,071	5,077	0,047	3,740	0,106	6,140
Fourth income bracket	0,132	8,225	0,090	6,250	0,186	9,420
Married	0,002	0,196	0,001	0,060	-0,001	-0,040
Male	0,025	2,331	0,003	0,320	0,023	1,610
Between 2 and 4 household members	0,031	-2,420	-0,001	-0,110	-0,026	-1,640
More than 4 household members	-0,019	-1,215	-0,023	-1,600	-0,033	-1,610
Two income recipients	0,013	-1,444	-0,015	-1,810	-0,023	-1,970
More than two income recipients	0,048	-3,516	-0,032	-2,510	-0,067	-3,580
Self-employed	0,006	-0,732	-0,039	-5,300	-0,044	-3,950
Private sector, no unemployment period	0,039	3,915	0,086	8,500	0,107	7,980
Private sector, unemployment period in the past	0,025	1,330	0,082	4,180	0,094	3,860
Private sector, currently unemployed	0,050	2,309	0,062	2,910	0,072	2,640
Retired or no activity	0,031	1,677	0,048	2,690	0,071	2,900
Never active	0,031	1,418	0,003	0,140	0,020	0,740
Inheritance and gift received	0,023	3,326	0,028	4,330	0,044	4,790
Inter vivos transfers	0,011	1,365	0,012	1,720	0,026	2,490
Past illness (short periods)	0,004	0,502	-0,001	-0,090	0,008	0,870
Past illness (long periods)	0,008	-0,406	-0,021	-1,180	-0,030	-1,210
Urban area (>20,000 habitants)	0,024	3,564	0,012	1,940	0,029	3,300
Parents own risky assets	0,064	6,076	0,031	3,340	0,072	5,180
Number of observations	10.207		10.207		10.207	
Number of Households holding the asset	1.702		1.492		2.556	
Chi2 (31 d.l.)	1.935,08		1.615,64		2.611,85	

Source. Patrimoine 97 INSEE survey

Note : The coefficients are the change in the the probability of ownership.

    Reference groups are :
      -Less than high school
      -First financial wealth bracket
      -First income bracket
      -Single
      -One income recipient
      -Public sector

Table 11 bis
Probit Regressions for Participation in Stocks and Mutual Funds

Variable	Stocks		Mutual funds		Stocks and mutual funds	
	Coefficient	Asympotic t Stat.	Coefficient	Asympotic t Stat.	Coefficient	Asympotic t Stat.
Age (10E-1)	0,135	3,240	0,069	1,880	0,119	2,420
Age^2 (10E-2)	-0,013	-3,380	-0,008	-2,400	-0,014	-2,950
High School	0,007	0,270	0,018	0,770	0,028	0,900
College	0,028	1,180	0,006	0,300	0,014	0,470
Financial wealth (10E-7)	2,760	12,050	1,910	9,600	4,590	13,790
Financial wealth^2 (10E-14)	-1,680	-10,490	-1,100	-7,750	-2,740	-12,310
Income (Log.)	0,060	3,010	0,043	2,380	0,094	3,870
Income risk (standard error of future income*10E-5)	0,140	2,190	0,120	2,060	0,236	2,840
Married	0,060	2,190	0,016	0,660	0,053	1,640
Male	0,055	1,970	0,040	1,550	0,062	1,820
Between 2 and 4 household members	-0,134	-3,670	-0,013	-0,420	-0,105	-2,580
More than 4 household members	-0,117	-3,130	-0,072	-1,920	-0,147	-2,940
Two income recipients	0,003	0,110	-0,036	-1,740	-0,044	-1,550
More than two income recipients	-0,083	-2,300	-0,067	-2,030	-0,111	-2,400
Self-employed	-0,042	-1,840	-0,041	-1,960	-0,064	-2,210
Inheritance and gift received	0,058	3,230	0,055	3,300	0,082	3,720
Inter vivos transfers	-0,003	-0,150	0,009	0,500	0,034	1,340
Past illness (short periods)	0,013	0,670	0,004	0,260	0,018	0,780
Past illness (long periods)	-0,039	-0,830	-0,060	-1,330	-0,063	-1,080
Urban area (>20,000 habitants)	0,026	1,460	0,008	0,520	0,014	0,660
Parents own risky assets	0,115	4,370	0,007	0,340	0,097	3,110
Borrowing constraint	-0,352	-2,230	-0,540	-3,650	-0,667	-3,550
No answer	0,069	2,380	0,000	0,000	0,072	2,120
2=<CRRA<3.76	0,052	2,530	0,014	0,750	0,052	2,100
1=<CRRA<2	0,037	1,180	-0,018	-0,660	-0,003	-0,090
CRRA<1	0,077	1,860	0,015	0,410	0,059	1,220
Number of observations	2.387		2.387		2.387	
Number of Households holding the asset	516		445		750	
Chi2 (26 d.l.)	529,4		354,1		651,8	

Source. Patrimoine 97 INSEE survey

Note : The coefficients are the change in the the probability of ownership.

    Reference groups are :
     -Less than high school
     -Single
     -One income recipient
     - CRRA>=3,76

Table 12
Regressions for the Asset Share invested in Stocks and Mutual Funds

Variable	Stocks		Mutual funds		Stocks and mutual funds	
	Coefficient	Asympotic t Stat.	Coefficient	Asympotic t Stat.	Coefficient	Asympotic t Stat.
Age 30-39	0,435	0,652	0,106	0,155	0,405	0,930
Age 40-49	0,477	0,718	0,454	0,642	0,692	1,537
Age 50-59	0,511	0,735	0,551	0,727	0,779	1,616
Age 60-69	0,827	0,929	0,947	0,975	1,159	1,823
Age >70+	0,785	0,837	0,944	0,980	1,250	1,887
Second financial wealth bracket	-1,153	-0,500	-0,456	-0,225	-1,102	-0,842
Third financial wealth bracket	-1,795	-0,789	-0,839	-0,388	-1,686	-1,253
Fourth financial wealth bracket	-2,278	-0,962	-1,349	-0,518	-2,248	-1,471
Second income bracket	-0,371	-0,503	0,035	0,051	-0,155	-0,326
Third income bracket	-0,289	-0,431	-0,083	-0,123	-0,306	-0,680
Fourth income bracket	-0,399	-0,601	-0,128	-0,157	-0,383	-0,760
Married	0,137	0,379	0,173	0,473	0,152	0,616
Male	0,164	0,340	-0,098	-0,205	0,053	0,164
Between 2 and 4 household members	-0,315	-0,623	0,071	0,136	-0,083	-0,238
More than 4 household members	-0,574	-0,904	0,014	0,020	-0,303	-0,663
Two income recipients	-0,066	-0,231	-0,050	-0,163	-0,056	-0,275
More than two income recipients	-0,236	-0,389	-0,216	-0,357	-0,256	-0,615
Self-employed	0,075	0,268	-0,193	-0,479	-0,077	-0,344
Private sector, no unemployment period	0,155	0,429	0,186	0,291	0,200	0,645
Private sector, unemployment period in the past	0,288	0,378	0,227	0,261	0,248	0,479
Private sector, currently unemployed	0,278	0,301	-0,351	-0,336	0,099	0,139
Retired or no activity	0,170	0,291	-0,071	-0,101	-0,064	-0,142
Never active	0,094	0,090	0,235	0,158	0,558	0,656
Inheritance and gift received	-0,119	-0,484	0,092	0,285	-0,068	-0,364
Inter vivos transfers	-0,133	-0,532	-0,047	-0,185	-0,192	-1,068
Past illness (short periods)	-0,132	-0,519	0,070	0,280	-0,093	-0,538
Past illness (long periods)	-0,187	-0,184	-0,240	-0,194	-0,208	-0,273
Urban area (>20,000 habitants)	0,010	0,039	0,145	0,549	0,064	0,359
Gains at Stock exchange	0,842	2,892	-0,047	-0,143	0,946	3,691
Loose at Stock Exchange	0,140	0,280	0,217	0,313	0,240	0,586
Manage portfolio individually	0,568	3,860	0,166	0,743	0,606	4,836
Follow their financial advisor	0,343	2,085	0,036	0,198	0,324	2,805
Financial advisor manager	0,673	3,658	0,119	0,561	0,555	4,197
No indication about managing	0,829	1,017	0,255	0,484	0,451	1,155
Constant	0,041	0,013	-1,601	-0,340	0,255	0,114
Mill's ratio	-0,418	-0,517	0,192	0,114	-0,634	-0,753
Number of Households holding the asset	1.702		1.492		2.556	
R2	0,10		0,09		0,07	

Source. Patrimoine 97 INSEE survey

Note : The dependent variable is the logistic transformation of asset share in financial assets .

Reference groups are :
  -Less than high school
  -First financial wealth bracket
  -First income bracket
  -Single
  -One income recipient
  - Public sector
  -No specific management

Table 12 bis
Regressions for the Asset Share invested in Stocks and Mutual Funds

Variable	Stocks		Mutual funds		Stocks and mutual funds	
	Coefficient	Asympotic t Stat.	Coefficient	Asympotic t Stat.	Coefficient	Asympotic t Stat.
Age (10E-1)	-0,232	-0,230	1,064	0,724	0,454	0,637
Age^2 (10E-2)	0,023	0,245	-0,086	-0,678	-0,039	-0,614
Financial wealth (10E-7)	2,490	0,518	-4,520	-0,064	3,440	0,986
Financial wealth^2 (10E-14)	-1,170	-0,365	0,085	0,020	-1,990	-0,816
Income (Log.)	-0,052	-0,092	-0,075	-0,089	-0,035	-0,081
Income risk (standard error of future income*10E-5)	-0,272	-0,252	0,407	0,295	0,120	0,151
Married	0,219	0,312	0,260	0,385	0,256	0,613
Male	0,225	0,322	0,408	0,418	0,372	0,777
Between 2 and 4 household members	-0,399	-0,463	0,002	0,002	-0,175	-0,322
More than 4 household members	-0,386	-0,336	-0,479	-0,330	-0,545	-0,708
Two income recipients	0,003	0,007	-0,121	-0,229	-0,076	-0,250
More than two income recipients	-0,051	-0,050	0,007	0,006	-0,215	-0,351
Self-employed	-0,127	-0,294	-0,512	-0,802	-0,378	-1,105
Inheritance and gift received	-0,112	-0,291	-0,076	-0,139	-0,084	-0,301
Inter vivos transfers	0,175	0,437	-0,069	-0,135	-0,009	-0,030
Past illness (short periods)	-0,085	-0,221	-0,162	-0,338	-0,188	-0,693
Past illness (long periods)	0,268	0,164	0,138	0,055	0,052	0,048
Urban area (>20,000 habitants)	0,232	0,550	0,215	0,433	0,276	0,987
Borrowing constraint	0,691	0,104	0,280	0,029	0,861	0,170
No answer	0,360	0,643	0,309	0,401	0,320	0,802
2=<CRRA<3.76	0,277	0,692	-0,056	-0,118	0,183	0,653
1=<CRRA<2	0,306	0,552	-0,042	-0,056	0,359	0,847
CRRA<1	0,188	0,263	0,146	0,174	0,311	0,621
Gains at Stock exchange	1,496	2,590	-0,018	-0,028	0,906	1,862
Loose at Stock Exchange	-0,697	-0,798	0,235	0,274	-0,154	-0,231
Manage portfolio individually	0,492	2,075	-0,146	-0,346	0,472	2,263
Follow their financial advisor	0,383	1,512	-0,042	-0,122	0,368	1,877
Financial advisor manager	1,049	3,192	0,013	0,033	0,886	3,689
No indication about managing	0,806	0,428	0,373	0,372	0,519	0,786
Constant	-2,258	-0,292	-5,169	-0,407	-3,851	-0,656
Mill's ratio	0,451	0,467	0,671	0,352	0,503	0,676
Number of Households holding the asset	516		445		750	
R2	0,12		0,12		0,08	

Source. Patrimoine 97 INSEE survey

Note : The dependent variable is the logistic transformation of asset share in financial assets .

Reference groups are :
-Single
-One income recipient
-CRRA>=3,76
-No specific management

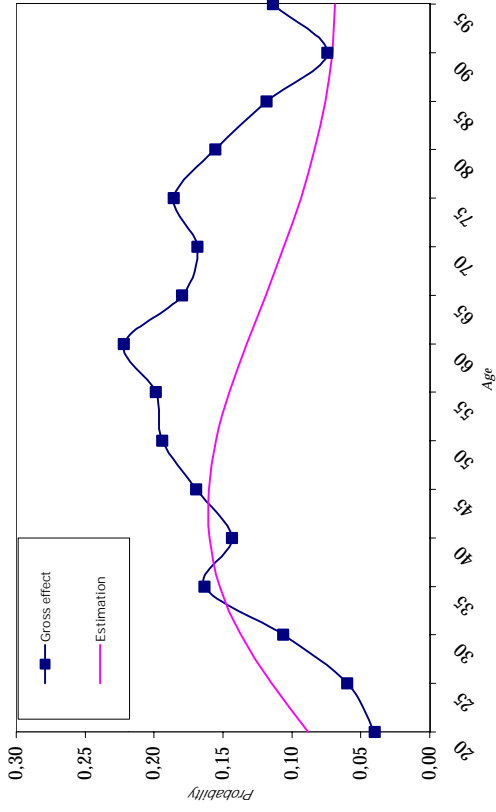**Figure 1**
Direct stockholding by age (probability)

Figure 2
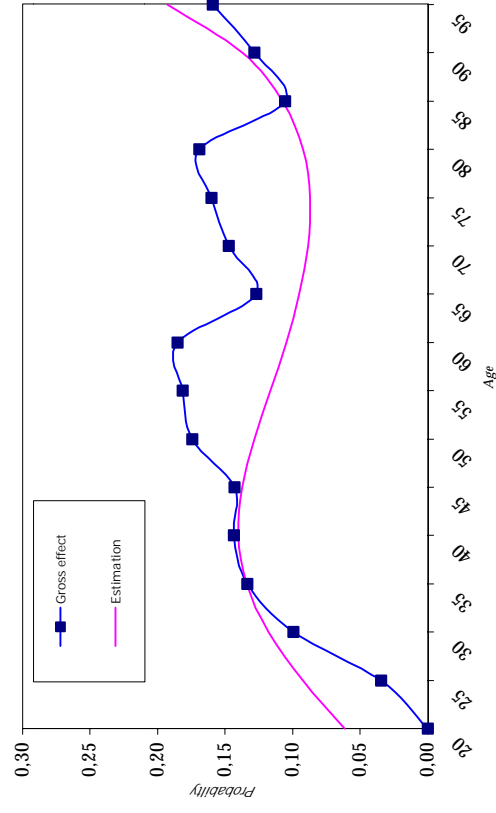**Indirect stockholding by age (probability)**

Figure 3
Direct and indirect stockholding by age (probability)

Figure 4
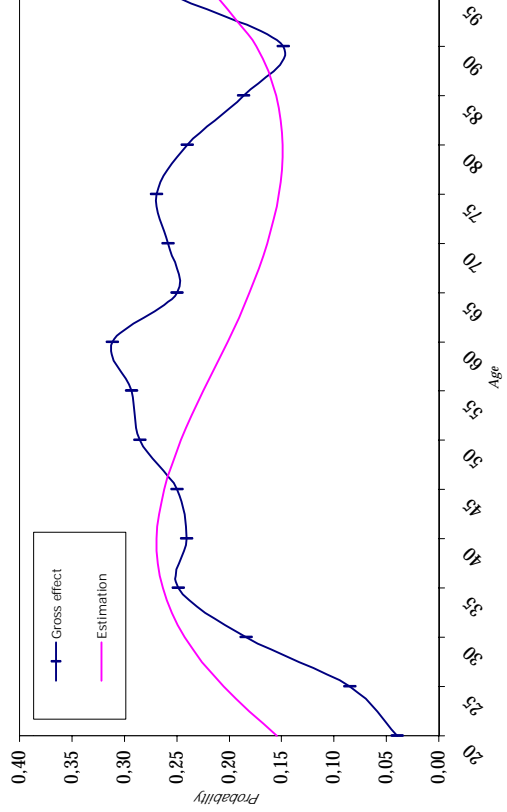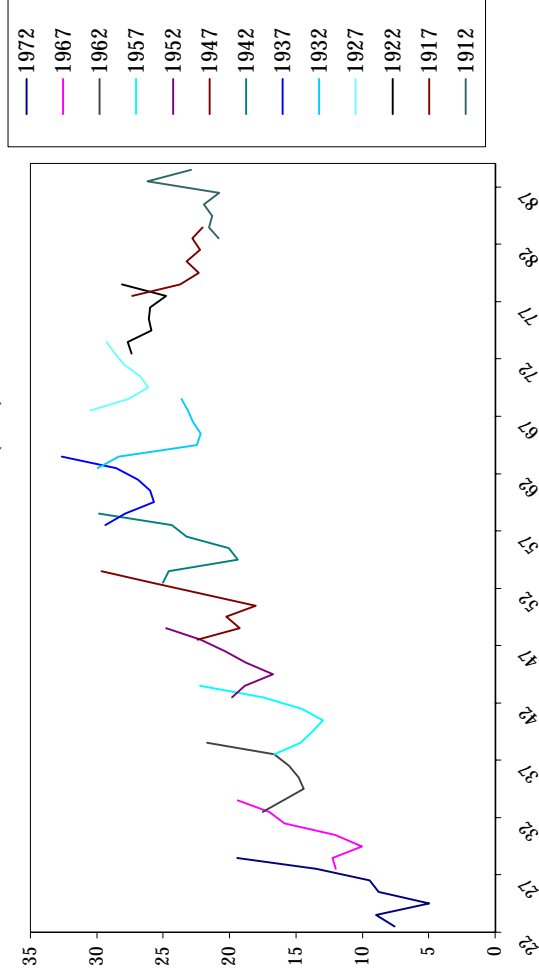**Stocks and share (in%)**

<u>Source</u> : Patrimoine 1997 Insee survey for figure 1 to 3. Europanel (1994-2000) for figure 4.
<u>Note</u> : The estimated profile is obtained by a probit on a third order age polynomial.