The Socioeconomic Determinants of Company-based Savings Plans Risk Exposure

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ABSTRACT

This paper investigates the relationship between the socioeconomic characteristics of 30,000 employees and the level of risk exposure employees have on their savings plans (company-based savings plans and employee stock purchase plans) in the banking sector. We explore three objectives. Our first objective is to describe the employee's investment strategies in the savings plans offered to the employee according to individual characteristics. We use the Sharpe ratio as a measure of portfolio efficiency. Our second objective is to explore the correlation between human capital variables and the Sharpe ratio of individual portfolios. Our third objective is to explore which factors contribute to explain employees' portfolio inefficiency, using a misspecification index.

KEYWORDS: Household finance, bank employees, employee-based savings.

JEL CLASSIFICATION: G11, G23, G32, G34, H31

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1. Introduction

Although most financial crises of the 20th century had little to do with retail investors, a major cause of the subprime crisis was the lack of financial knowledge of these investors. Understanding the household investment behaviors becomes a challenge, as savings decisions of households are associated to major welfare costs. The investigation of household investment behaviors has become an emerging field in finance since the 2000s according to Guiso and Sodini (2013). Among others, the funding of the pension system, of the social security system and more broadly of the states is closely connected to direct or indirect individual investors' choices. Such events, as the loss of their jobs and savings by the employees of Enron after its collapse in 2001 or the subprime crisis, question the investor's rationality assumption and calls for better understanding of individual investors' decisions. Understanding the determinants of economic agents' risk exposure is a major concern of the finance literature, both theoretically and empirically because it has implications for: the calibration of the optimal portfolio choice model; the micro-foundations of the asset pricing theory with heterogeneous agents; the asset pricing debate on the time varying preferences of investors; the assessment of welfare costs of investment mistakes such as under diversification and non-participation in the financial and insurance markets (Guiso and Sodini, 2013). In this paper, we investigate the relationship between individual investors' characteristics and their risk exposure. A large French listed bank employs all those investors. We explore the socio-demographic drivers of bank employees' company-based savings to risk exposure. We investigate company-based savings composition and risk characteristics of a cohort of around 30,000 employees of a French bank. We observe savings invested in the Company-based Savings Plan (hereafter denoted as CSP), as well as Employee Stock Purchase Plan (hereafter denoted as ESPP) offered by the company they work for. Several investment options are offered in these plans including employer's stock. We use this

comprehensive dataset comprising detailed information on each employee and the characteristics of the investment options selected by each employee. The originality of this approach is due to the use of detailed individual data on employees of a listed bank. Further, our research uses data on company-based savings in France. Company-based savings plans in France were put in place in the 1960s and have been a way to access the financial markets for individual investors. As opposed to the US pension system, which was developed in the 1970s allowing individual investors to invest their savings in the financial markets; the French pension system remains mainly public. Furthermore, another originality of this paper is investigating ESPP in association with another form of company-based savings, since very few studies have been done on ESPP so far – papers focused only on ESPP investment strategies. Our analysis aims to achieve three objectives. Our first objective is to describe the employee's investment strategies in each asset category offered by the company divided into two groups as CSP and ESPP. We use the Sharpe ratio as a measure of portfolio efficiency. We provide descriptive statistics of the employee portfolios' Sharpe ratio according to employees' characteristics. Our second objective is to analyze how bank employees invest their company-based savings according to human capital variables, which influence the Sharpe ratio. We will focus on the determinants of the Sharpe ratio in the savings plan offered. We show that employees could improve their portfolios' efficiency. Our third objective is to assess employees' portfolio inefficiency by using a misspecification index. We measure the inefficiency by the percentage difference between an employee portfolio's Sharpe ratio and the Sharpe ratio of a benchmark index. We provide comparative analysis of portfolio inefficiency by measuring employees' investment mistakes. Calvet et al. (2007, 2009) proposed a comparable work highlighting a set of financial and demographic characteristics responsible for inefficiency.

Our results show that several employees' characteristics affect both the probability of investing in offers proposed by the company and the conditional risk-return ratio. We also observe that some employees are more prone to make investment mistakes.

The remainder of the paper is structured as follows. Section 2 presents the literature review. Section 3 describes the data and methods, and offers a presentation of the main characteristics of the French company-based savings system and of the investment options offered by the bank to its employees. Section 4 provides descriptive statistics and the results of estimations. Section 5 offers a discussion of the results, and we conclude in Section 6.

2. Literature Review

Guiso and Sodini (2013) consider revealed preferences approach and elicitation of risk preferences as two empirical streams of literature investigating the determinants of risk preferences. The former approach relies on the observation of secondary data reflecting actual investors' decisions and infers their risk preferences. The latter strategy measures risk preferences through experiments and surveys. In the following sections, we adopt the risk preferences approach considering that risk preferences of the bank employees are revealed by the composition of their portfolio. Common variables identified by the literature causing risk exposure are wealth, background risk, and socio-demographic characteristics. Wealth has always been considered as the cause of the risk exposure (Von Neumann and Morgenstern, 2007; Merton, 1969). In this relationship, relative risk aversion is a key determinant. Several empirical papers documented decreasing relative risk aversion (DRRA) showing that as investors are wealthier, they invest a larger fraction of their wealth in risk assets. Blume and Friend (1975) pioneered this group of research using cross sectional data on individual portfolios. Their findings were confirmed recently by Brunnermeier and Nagel (2008) and Chiappori and Paiella (2011). Calvet et al. (2009) and Calvet and Sodini (2014) establish the

same relationship between wealth and risk exposure using panel data techniques making it possible to control for endogeneity. One of the main drawbacks of revealed preferences measures of risk aversion is that they do not take into account human capital, a major component of individual investors' wealth. Revealed preferences measures are, then, likely to underestimate risk aversion. Human capital is difficult to measure and part of what is commonly referred to as background risk. Moreover, background risk cannot be avoided because it cannot be traded or insured. Merton's model (1969) assumes that investors hold tradable asset, but human capital does not have this characteristic. Because most of the labor income risk is non-hedgeable, it increases risk aversion leading households to invest more cautiously than predicted by the models. However, this assertion is debated. Some authors assume that labor income can be considered as: a safe asset (Cocco et al., 2005); positively correlated to capital income in the long run (Benzoni et al., 2007); negatively correlated to capital income (Storesletten et al., 2007). Other sources of background risks identified in the literature are housing wealth (Flavin and Yamashita, 2002) and private business property (Heaton and Lucas, 2000). Guiso and Sodini (2013) also mention a set of socio-demographic variables that are known to affect risk taking: gender, age and education. Experiments emphasize that women are more risk averse than men (Croson and Gneezy, 2009). Age is also correlated with risk aversion parameters (Dohmen et al., 2011). Viceira's (2001) model predicts that employees approaching retirement age are afraid to lose their savings and are not encouraged to invest in risky assets. As far as education is concerned, Haliassos and Bertaut (1995) argue that it allows to overcome "the barrier to stockholding". Consequently, the more educated the households are, the more likely they will invest in risky assets. Campbell (2006) concludes that education directly predicts equity ownership. Nonetheless, age and education are also related to human capital since its present value is often computed as a function of the current salary and the time over which salary will be received. Thus, younger workers have

more human capital than older workers. As for education, it increases the value of human capital. Guiso and Sodini (2013) report the influence of investors' past experience on risk exposure. According to Malmendier and Nagel (2011), investors who experienced low returns in the past are less likely to invest in risky assets and have a higher risk aversion. Benartzi (2001) points out that returns in the past have affected investment in company stocks in 401(k) plans. He states that this extrapolation of past returns is an example of the representativeness effect documented by behavioral economics. Regarding trading behaviors, Barber et al. (2014) document significant higher returns obtained by the most experienced day traders. In the 2000s, the investment mistakes of individual investors (like extrapolation of past returns), became a major concern that stimulated the rise of behavioral finance. Following this stream of research, many cognitive biases are documented. Mitchell and Utkus (2004) and Barber and Odean (2013) reviewed numerous behavioral factors affecting the decision whether to save or not, and, once the decision is taken, the investment preference. These effects are self-control, framing, inertia and procrastination, overconfidence, loss aversion and disposition effect, the lack of firm preferences, and familiarity. Alongside these effects, the employer stock has been a source of academic attention within savings plans offered by the companies to their employees. Company stocks are often offered as an investment option to the employees although the cost of investing in employer's stock documented by Meulbroek (2005) and Ramaswamy (2003) can be prohibitive. Employer stocks' investment has been extensively studied in the context of the 401(k) US pension plan (Benartzi et al., 2007), and more rarely outside the US within other investment context. The ESPP offers a different context within which investment in company stocks can be studied. In the US, Engelhardt and Madrian (2004) documented substantial nonparticipation rate, even though the ESPP they studied offers an opportunity to increase their gross compensation. They find out that four factors affect employees' participation to the ESPP: (1) liquidity

constraints; (2) imperfect knowledge of the plan; (3) asset choice; (4) transaction costs. Studying employees' participation offered by a French bank, Rapp and Aubert (2011) confirm that the same factors affect participation.

2. Plans Eligibility Rules

Company-based Savings Plans (CSP) enables employees to build up savings in the form of a portfolio of securities with the help of their company. Amounts saved come from voluntary payments made by the employees topped up by the company. The CSP can also be fed by "profit-sharing"[4], and benefits from tax incentives. Within the CSP framework, employees are offered several investment options called *employee mutual investment funds*. Some of these funds are primarily invested in the employer's stocks. In terms of investment choices, the CSP functions in a very similar way to the 401(k) plan of the US Internal Revenue Code, where employees have several investment options to choose from. French listed companies can also offer their stocks to their employees within an ESPP in other countries. In this case, they often give a discount on the stock price that is limited by law to 20% of the market prize.

In both plans, namely CSP and ESPP, investments are blocked during a five-year period. Plans require that investors hold their subscribed assets for unavailability duration of five years except in early cases of redemption (such as wedding, children born, disability, death etc.) accepted by the French labor regulation. That said, these constraints linked to the unavailability of dividends and the holding period are offset by some benefits such as the above-mentioned discount, tax benefits, and payments of management fees by the company.

To be eligible to participate in the plans, employees must have been working for the company for three months. The company provides its employees with detailed information

[4] http://www.insee.fr/en/methodes/default.asp?page=definitions/plan-epargne-entreprise.htm, (accessed 9/23/2015)

relating to legal, regulatory and organizational frameworks. The information also contains subscriptions' terms through step-by-step detailed guide, which includes a planned calendar and other documents to fill out and send. Detailed descriptions of the plans' features are displayed in Tables 1 and 2 in the appendix.

While ESPP requires investment only in company stocks, employees can invest, within the CSP, in several funds, and free arbitrage among the investment choices are possible much like with the 401(k) plan. Choices offered to employees are included in the CSP, which incorporates five supplementary assets categories such as company stock, monetary asset, and three different sets of diversified assets. The ESPP allows employees to invest in the employer stocks through two different ways: a "Classic Offer", and a leverage formula, the "Multiple Offer". Classic offer consists of direct investment in company stocks. These two offers both benefit from a 20% discount on stock price. Participants pay the subscription price of the "Classic offer" in full. In both investment options, dividends are automatically reinvested in the plan. With the ESPP, employees must be in line with a calendar provided by the employer. Even though the ESPP has been advertised long before it takes place, the period during which the employees can invest lasts two weeks.

3. Methods

3.1 Data

We analyze a cross section of 29,432 employees of a French (CAC-40) listed bank, who are eligible to participate to the CSP. The data was collected in 2005. We distinguish between the two plans available to employees. The data includes detailed information for every employee such as age, annual gross salary, bonuses, time spent with company, gender, citizenship, employee type (executive or not) and the place of residence. It also includes information on the amount invested by each employee in the investment options offered and

the risk/return characteristics of these options. This data makes it possible to compute employees' risk exposure.

3.2 Methods

We use Heckman's two-steps regressions (Heckman, 1979) in order to analyze the determinants of relative measure of portfolio's return-to-risk ratio. As discussed above, we consider a dataset in which we have employees who invested or chose not to invest in the offerings. This feature makes it necessary to deal with sample selection bias. The originality of Heckman's method allows taking into consideration two stages: by estimating, as a first step, a selection equation, and, as a second step, a substantial equation. A detailed presentation of the method is provided by Wooldridge (2015). The model can be written if we consider the selection function as:

$$SR *_i = \sum_n^N \delta_n w_{ni} + \mu_i \quad (1)$$

$$SR * = 1, if\ SR *_i > 0$$

$$SR * = 0, if\ SR *_i \leq 0$$

Where $SR *_i$ is a latent variable that measures the probability to invest or not in the offer, and w_n is a set of N variables representing the characteristics of an employee *i* that influences the probability of participation in the offer. δ_n is the coefficient that captures the effects of these variables on the probability of being a participant, and μ_i is an error coefficient that follows a standard normal distribution with zero mean. The second step takes the following form:

$$Y_i = \sum_k \beta_k X_{ki} + \mu_i \quad (2)$$

Where the Sharpe ratio is observed only if, $SR * = 1$

The substantial equation is based on the conditional expectation of the observed variable, the Sharpe ratio (Y_i):

$$E\{Yi|SR *_i > 0\} = x_j\beta + \rho\sigma_\mu \lambda (SR_i \hat{a}) + \varepsilon_i \quad (3)$$

Where λ represents the Inverse Mills Ratio (IMR). This selectivity term is constructed in the first step of the model, and introduced as an independent variable in the second step; known as the substantial equation. Certainly, the significance of the coefficient associated to the IMR in the second equation confirms the existence of a selectivity bias in the selection equation. The second step of the Heckman's procedure consists in estimating an ordinary least-square linear equation using the Sharpe ratio as the dependent variable. To be sure, we consider that the selection equation of the model is biased by sample selection since the coefficient of the IMR is significant. Wooldridge (2015; p. 556) recommends the use of an identification variable, which is correlated with the first step (decision to invest or not), but not correlated with the Sharpe ratio in the second step.

The inclusion of an additional identification variable in the first step that is omitted in the second step allows avoiding a potential unobserved selection process. Further, the identification variable selected in that case is the mean of the Sharpe ratio computed per job category. It is relevant for the choice, whether to invest or not, in the offering since we can assume that employees' belonging to the same job category have similar risk preferences and a subsequent similar probability to invest whereas their portfolio's Sharpe ratio is determined by other factors consistent with Goetzmann and Kumar (2008). Our identification variable is not correlated with the dependent variable.

3.3 Variable definitions

We have two dependent variables of interest: (i) the Sharpe ratio computed for each of the two plans proposed, and (ii) the index of financial investment mistakes. The index of financial mistakes represents the percentage difference between an employee's actual Sharpe ratio and the optimal Sharpe ratio of all the investment options available in the plans. Calvet et al. (2007) use this measure to test the relation between a vector of demographic and financial

characteristics and retail investors' investment mistakes. We control our regressions for a set of independent variables. To measure employees' understanding of the investment decisions, we create a dichotomous variable whose value equals one, if the employee has financial knowledge skills, and 0 if not. This variable captures information about the financial knowledge of each employee, assuming that executive employees with a higher education degree and a monthly income higher than €3,100 have better financial knowledge. We also introduce additional characteristics linked to investment behavior. Age is measured by the number of years. Age squared indicates a non-linearity relation between investment decision and age. A continuous variable measures the time spent with the company for each employee. Moreover, a dichotomous variable, which equals 1 if the employee is male and 0 if the employee is female, measures gender. We also control for the place of residence, which equals 1 for employees living in the Paris area and 0 otherwise, because of high differences in housing costs between Paris and the rest of France (Degeorge, et al., 2004; Rapp and Aubert, 2011). Another dichotomous variable distinguishes employees' citizenship; its value is 1 if the employee is French, and 0 if he or she is a foreigner. We finally create dummy variable indicating employee's level, taking the value of 1 if the employee is an executive and 0 if he or she has lower level(s).

4 Results

4.1 Descriptive analysis

Our first objective is to analyze employees' investment strategies according to their individual characteristics. Each employee of the sample can invest in seven investment options: 5 within the CSP, and 2 within the ESPP. Descriptive statistics are provided in Tables 3 and 4. A majority of the employees of the sample are females (60%). Women also participate in the plans more than males, with contrast more visible for the CSP. In addition,

individuals in the sample do not necessarily have the financial knowledge and skills needed to manage their own investment. Employees who have these skills participate more in the plans. Concerning the place of residence, 56% of employees live outside of the Paris region. Furthermore, employees are practically all of French nationality (99%). Finally, we have over a quarter of employees holding an executive position in the bank. Regular employees have higher participation rates. The average employee is 46, earns € 29,384, and has spent more than 25 years in the company. The participants' mean age is 48 for the ESPP and 46 for the CSP. Employees participating are significantly older, and they earn more and spend more time within the company than the average employee. This could be the result of various factors.

-Insert Table 3 about here-

Table 4 shows participation ratios in each asset category for employees included in the sample. Firstly, we observe a lower participation rate in the ESPP. A small proportion of employees invest in the classic (11.4%) and multiple offers (19.3%). Participants wanting to hold these assets must have some eligibility criteria, such as seniority within the company and have subscribed during the only period of subscription. This condition might be the factor that led to non-participation, whereas participation is higher for the CSP. Monetary funds, company stocks and the three sets of diversified funds represent respectively 56.9%, 65.6%, 34.1%, 46.9% and 40.0%. If we draw a parallel with the employee's personal contribution and salary, we observe some interesting facts. The average wage is higher in the "Classical" (€ 38, 610 and "Multiple" (€ 36, 475) investments compared to other asset categories. However, the trend is reversed concerning the average investment among employees conditional on participating. This is due to the fact that savers among employees prefer to put their personal

investment in monetary assets and diversified assets. However, when we look at the average contribution, the investment is more important in CSP than in ESPP. Participants prefer to put their personal savings massively in company stocks – € 11,360 on average. This represents almost twice the amount invested in monetary assets, and almost four times the amount invested in other assets available.

-Insert Table 4 about here-

Table 5 displays the distribution of employees according to the number of assets available in the two plans. Table 6 reports the number of funds offered within the two plans and the corresponding distribution of employees who selected this number of funds. We report the number of employees and the corresponding percentage of the population that invests in a given asset category. Firstly, 11.6% of employees do not invest any money in the plans offered by the company, while only 1.3 percent of the sample have savings corresponding to all the range of assets offered by the employer. However, about one fifth of the sample holds at least three assets in their portfolio. The number of participants is more significant in the CSP than in the ESPP. Regarding employees' portfolio characteristics, CSP savers have a higher Sharpe ratio (6.376) than ESPP savers (0.056). It is worth restating that the ESPP offers only company stocks. Tables 6 and 7 display the frequency distribution of employees according the Sharpe ratio as a risk-return measure of their investment. As shown above, 88.1% of the employees select the CSP, and only 23.1% the ESPP. Furthermore, participants' strategies are fairly satisfactory in terms of portfolio efficiency. Certainly, more than 18% of employees have a Sharpe ratio between 4 and 5, whereas 60% of participants among our sample have a risk-return ratio higher than 5. This remains the same for the CSP (25.8% for $4 < x <= 5$ and 56.7% for $x > 5$), but differs substantially for the ESPP (4.6% for $4 < x <= 5$).

This difference is partly justified by the massive non-participation in the ESPP (76.9%). It seems that the ESPP is less attractive for the employees. Actually, this plan forces participants to limit their personal contribution and involves only company stocks. We also examine Sharpe ratios distributions sorted by employees' individual characteristics such as annual gross salary, age, bonus, years employed, gender, financial knowledge, place of residence, citizenship and employees' position type (see tables 8, 9 and 10). For each sorting, we test the null hypotheses of equality of means between each subgroup.

Tables 8, 9 and 10 show Sharpe ratios in the overall savings plan (in CSP and in ESPP) for different employees' characteristics. We report significant differences across the characteristics studied. Compared to ESPP, CSP has a higher Sharpe ratio. A high annual salary is associated with a low Sharpe ratio in CSP and ESPP. The number of years employed affect the level of Sharpe Ratio only for the CSP, while it decreases for ESPP when years of employment increase. Concerning age, it is significantly related to the distribution of Sharpe ratio for CSP. The effect of citizenship is significant for the two plans. Male employees, executives and those having a better financial knowledge have a better Sharpe ratio, compared to female employees and those without financial skills in ESPP; this trend is reversed in CSP.

4.2 Regression analysis: determinants of portfolio performance and investment mistakes

First, this section investigates the determinants of the employees' individual portfolio performance using the Sharpe ratios computed for each employee. It then investigates how the same determinants are related to an index of investment mistake also computed at the employee level as a deviation from the optimal portfolio.

4.2.1 Determinants of individual portfolio performance

Tables 11 and 12 display estimation results of the Heckman's two-step regressions, where the first step estimates a *Probit* model and the second stage an *OLS* regression model. In table 11, we investigate the efficiency of the employee's investment strategies in the ESPP and in the CSP using employees' individual portfolio Sharpe-ratio. The ESPP contains classic and multiple offers reserved for employees meeting certain requirements, such as time spent within the company. The CSP combines monetary assets, company stocks and three different diversified funds.

As mentioned above, the first step of the Heckman model is a *Probit* regression model estimating the probability to participate or not in the plans. In this perspective, some variables are selected in order to test their influence on participation in each of the plans proposed. The inverse Mill's ratios are positive and significant for all specifications. Having a high annual salary, being an executive and receiving bonus, increase the probability to invest in both plans – the ESPP and the CSP. The longer an employee works for the company the more likely he is to participate in the ESPP or the CSP, but the time spent with the company is negatively related to the probability of investing in overall plans. The gender variable has mixed influence since being a man is associated with an increase in the probability to invest in the ESPP, and, inversely, with a decrease in the probability of investing in the CSP and in overall plans. However, age has a positive effect on the participation in the ESPP, but decreases the probability of investment in overall plans and in CSP. The age-squared variable is also associated with a higher probability of investment in the CSP and overall plans, and with a lower probability of investing in the ESPP. Concerning the squared impact of years employed within the company, it had a slight negative effect on participation in all plans available. Financial knowledge and citizenship have no significant effects on the probability to participate in each plan.

The second step of the model consists of estimating an OLS regression on the sub-sample of participants, in order to analyze the efficiency of the employee's strategies via the Sharpe ratio approach. High levels of annual salary are related to lower Sharpe ratio in the ESPP, in the CSP, and in overall plans. Age has a varying effect according to the plan chosen by employees; it is associated with an increase in the portfolio's efficiency of the ESPP and a decrease in overall plans and CSP. Years employed within company affect positively the Sharpe ratios of both the overall plans and the CSP, and negatively the ESPP's Sharpe ratio. Employees who receive a bonus experience a very slight decrease of the Sharpe ratio in all plans available. However, the Sharpe ratio declines only for men in the CSP and overall plans, whereas gender does not have a significant effect on the ESPP's Sharpe ratio. Years employed with the company squared affect negatively the overall plans and CSP's Sharpe ratios, but affect positively the ESPP's ratio. Age squared is associated with higher portfolio efficiency in the CSP and overall plans, and with a decline in the ESPP. Employees with executive position have lower efficiency in all plans. Financial knowledge and citizenship are not significant. Table 12 provides marginal effects after the first step of Heckman's two-step regression. The estimation suggests that the probability of investing in the ESPP is 19%, while the probability of investing increases dramatically to 90% in the CSP and overall plans. In this perspective, CSP and overall plans are both more attractive for employees.

4.2.2. Determinants of the individual investment mistakes

Table 13 reports results from Sharpe ratio optimization process according to assets included in each plan offered. For each level of risk we compute the assets' combination bringing the highest individual portfolio's performance. The sum of the weightings is 100% and short selling is not allowed. The performance measure selected for this study is the Sharpe ratio. The first column provides the Sharpe ratios after optimization, and columns 2 to

7 report the optimal portfolio weights allocated to each asset. We observe several significant findings. First, when we consider ESPP, we note that a higher portfolio performance is obtained, if and only if, investors allocate a little less than three-quarters (71.81%) of their contributions in the classic offer, and the rest (28.19%) in the multiple offer. Second, concerning the CSP, an investment allocation of 4.26% in company stocks, and 95.74% in diversified assets, allow obtaining an optimal risk-return ratio. Finally, when we analyze jointly the ESPP and the CSP, we detect a higher Sharpe ratio obtained when participants invest their savings as follows: 1.30% in classic offer, 0.77% in multiple offer, 3.27% in company stocks and 94.66% in diversified assets.

Table 14 provides results of Heckman's two-step estimations (columns 1 to 6), where the first step estimates a *Probit* model, and the second stage an OLS regression model with an index of financial investment mistake as a dependent variable. Salary and employee type have a positive and significant influence on the index in the second step. This suggests that the employee with higher salary and acting as an executive is more prone to make investment mistakes. Years employed have a mixed effect, since it has a slightly negative impact on investment mistakes in CSP and in overall plans, and a positive influence in ESPP. Age and gender have also a mixed impact. They are negatively correlated with investment mistakes in ESPP, and positively in CSP and in overall plans. Employees who receive a bonus are more likely to make mistakes. Finally, financial knowledge and citizenship have no significant effect on investment mistakes.

The inverse Mill's ratios were significant for all models in tables 13 and 14, indicating that two stages models are relevant.

5 Discussion

We observe extreme behaviors. First, in our sample focusing on overall holdings of stocks, we note that 11.6 percent of employees do not invest any money in the plans offered by their company. This strategy reveals that employees underestimate the advantages of these plans, such as the advantageous fiscal treatment and the very low transaction costs that are actually paid by the employer. Only 1.3 percent of the sample holds all the range of assets offered by these plans. Mitton and Vorkink (2007) show the relationship between under diversification and skewness seeking on a sample of American investors. Their empirical results suggest that investments remain voluntary under-diversified, because investors they have preference for assets with skewed returns' distributions. Roger et al. (2012) confirm this finding.

Our analysis must take into account a number of limitations, which may restrict the interpretation of the results. First, the number of assets offered by the company into the ESPP and the CSP does not fully reflect all investment possibilities available in the financial markets. In fact, our study only observes employees' wealth within the plans offered by their company. Consequently, since only a fraction of the employee's portfolio is observed it is difficult to say investment allocation if their strategies is really efficient. We do not measure employees' wealth outside the CSP and ESPP, such as real estate property or debt. Hence, the conclusion drawn from our results can hardly exceed the company-based savings' sphere and may not involve other wealth components. We are unable to measure the association between wealth and risk exposure, because of the lack of information about employees' overall wealth.

We use a cross-sectional dataset, which takes into consideration a sample of employees at a given point in time. Another limitation related to our dataset can be emphasized, as Benartzi (2001) suggests that employees tend to extrapolate excessively past returns on company stocks. The sample is composed of employees working in the banking sector. We assume that these employees have a broader financial knowledge than the norm. This feature is associated with human capital in the sample. For instance, in table 12, we find that employees with

higher seniority within the company have a higher probability to participate. For these employees, tenure is always positively correlated with Sharpe ratio in the CSP and in overall plans. Employees with a better financial knowledge may prefer not to participate in the ESPP because it might not meet their expectations. They can also have better alternative options. Furthermore, another possible explanation is that ESPP's investment is punctual, while employees may invest in the CSP whenever they want.

Appendix

Table 1: Summary statistics of the characteristics of the different funds offered to the bank employees.

Plans	Funds proposed	Holding period	Benchmark	Guarantee	Asset value per unit	Subscription period	Subscription fee (entrance)	Subscription fee (exit)	Period of analyze
Employee Stock Purchase Plans	Classic offer	5-year required	Evolution of stock market movements (EURONEXT, LIFE, EUREX) in order to value the company share	None	13.68 Euros per asset	Single period which take place between 12 August and 2 September 2003.	None	None	October 2003 to July 2005
	Multiple offer	5-year required	Investment " only " in company stocks quoted on the Euronext Paris market	10% return over five years on personal. Guaranteed repayment of the bank loan	13.68 Euros per asset	Single period which take place between 12 August and 2 September 2003.	None	None	October 2003 to July 2005
Company Savings Plans	Monetary assets	5-year required	Evolution of the Asset value in conjunction with the EONIA rate	None	10.00 Euros per asset	At least 12 hours before the establishment of the asset value	0,90% maximum	None	October 2003 to July 2005
	Company stock	5-year required	Replicate the performance of the company stock	None	20.40 Euros per asset	At the latest of the business day prior to the establishment date of the asset value, before 12 pm	0,10% which are at the company's expense	None	October 2003 to July 2005

Diversified assets (8651)	5-year required	Benchmark composite index 45% DJ Stoxx 50 + 17% S&P 500 + 8% MSCI Japon + 5% MSCI Emergents + 20% EuroMTS Global + 5% JPM GBI Global Traded Index hedged EUR	None	1.52 Euros per asset	At the latest of the business day prior to the establishment date of the asset value	0,25% which are at the company's expense	None	October 2003 to July 2005
Diversified assets (8652)	5-year required	Benchmark composite index 70 % EuroMTS Global + 15 % JPM GBI Global Traded Index hedged EUR + 9 % DJ Stoxx 50 + 4 % S&P 500 + 2 % MSCI Japon.	None	1.52 Euros per asset	At the latest of the business day prior to the establishment date of the asset value	0,25% which are at the company's expense	None	October 2003 to July 2005
Diversified assets (8653)	5-year required	Benchmark composite index 27% DJ Stoxx 50 + 12% S&P 500 + 4% MSCI Japon + 2% MSCI Emergents + 40% EuroMTS Global + 15% JPM GBI Global Traded Index hedged EUR.	None	1.52 Euros per asset	At the latest of the business day prior to the establishment date of the asset value	0,25% which are at the company's expense	None	October 2003 to July 2005

Notes: CSP and ESPP are two sub-groups of plans in which we have divided the different funds offers to employee's investment. The holding period required for assets is planned at 5 years except early cases of redemption (before the end of the 5-year period) specified by the regulation. In addition even if the revenues and profits earned on the amounts invested in the plan are tax free, some social security contributions (CSG/CRDS) may be applied during the redemption. The revenues, dividends and other profits realized are reinvested in the program and added to the employee's personal investment by issues of new share. *The Benchmark composite index represents a percentage-weighted indicator of some important stock market index in the world.

Table 2: Characteristics of the investment options offered to participants on the different funds offered.

Plans	Funds proposed	Constraints
Combined ESPP and CSP		The global personal contribution of each subscriber within these two plans combined was limited to the quarter of the employee's gross annual salary during the calendar year.
	Combined Multiple and Classic	The total personal contribution of each investors within these two funds coupled could not exceed 25 000 Euros.
Employee Stock Purchase Plans	Classic offer	Limit in term of personal contribution according to investment constraints both in "Multiple" offer and " Combined Multiple and Classic "
	Multiple offer	The personal contribution of each employee in the "Multiple" offer could not exceed 1200 Euros.
Company Savings Plans	Monetary assets	None
	Company stock	None
	Diversified assets (8651)	None
	Diversified assets (8652)	None
	Diversified assets (8653)	None

Notes: This table provides ceiling for eligible investment in each asset displayed and included in two plans available such as CSP and ESPP.

Table 3: Descriptive Statistics (Dichotomous variables)

	Overall		ESPP				CSP			
			Participation		Non Participation		Participation		Non Participation	
	Obs.	Percent	Obs.	Percent	Obs.	Percent	Obs.	Percent	Obs.	Percent
Gender:										
Male	11,697	39.74%	3,386	49.81%	8,311	36.72%	10,309	39.78%	1,388	39.50%
Female	17,735	60.26%	3,412	50.19%	14,323	63.28%	15,609	60.22%	2,126	60.50%
Financial knowledge:										
Yes	2,895	9.84%	1,518	22.33%	1,377	6.08%	2,763	10.66%	132	3.76%
No	26,537	90.16%	5,280	77.67%	21,257	93.92%	23,155	89.34%	3,382	96.24%
Locations:										
Paris region	12,908	43.86%	3,180	46.78%	9,728	42.98%	11,406	44.01%	1,502	42.74%
Elsewhere	16,524	56.14%	3,618	53.22%	12,906	57.02%	14,512	55.99%	2,012	57.26%
Citizenship:										
French	29,291	99.52%	6,768	99.56%	22,523	99.51%	25,797	99.53%	3,494	99.43%
Elsewhere	134	0.46%	30	0.44%	104	0.46%	116	0.45%	18	0.51%
Unknown	7	0.02%	0	0.00%	7	0.03%	5	0.02%	2	0.06%
Employee type:										
Executive	7,510	25.52%	3,212	47.25%	4,298	18.99%	7,050	27.20%	460	13.09%
Regular	21,922	74.48%	3,586	52.75%	18,336	81.01%	18,868	72.80%	3,054	86.91%

Notes: The table provides descriptive statistics for dichotomous variables. Gender takes the value 1 for a man and 0 for a woman. Financial knowledge equals 1 when the employees have a particular financial expertise (establish according to characteristics of gender, employee type and salary), and 0 otherwise. Location equals to 1 for savers living in Ile-de-France (Paris region) and 0 otherwise. Citizenship takes the value 1 for employees who have the French citizenship and 0 otherwise. Employee type takes the value 1 for employees who are white collar and 0 otherwise.

Table 4: Descriptive Statistics (Continuous variables)

Panel A: Overall

	N	Mean	SD	Min	Max
Age	29,432	46.464	10.730	19	65
Salary	29,432	29,384.711	12,297.094	0	390,000
Bonus	29,432	1,445.679	5,616.934	0	650,000
Years employed	29,432	25.380	12.405	0	46

Panel B: ESPP

	Participation					Non participation				
	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max
Age	6,798	48.134	8.923	21.000	65	22,634	45.962	11.167	19	65
Salary	6,798	36,096.786	18,390.628	0.000	382,860	22,634	27,368.775	8,801.798	0	390,000
Bonus	6,798	30,29.360	7,717.606	0.000	300,000.000	22,634	970.029	4,707.392	0	650,000
Sharpe ratio	6,798	0.056	31.880	-2,380.459	4.744	22,634	NA	NA	NA	NA
Years employed	6,798	26.542	11.162	2	44	22,634	25.031	12.734	0	46

Panel C: CSP

	Participation					Non participation				
	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max
Age	25,918	46.616	10.679	19	65	3,514	46.844	10.384	20	65
Salary	25,918	29,791.768	12,800.615	0	390,000	3,514	26,236.930	6,508.065	0	100,000
Bonus	25,918	1,539.081	6,016.467	0	650,000	3,514	679.009	1,471.996	0	34,000
Sharpe ratio	25918	6.376	2.041	0.646	11.375	3,514	NA	NA	NA	NA
Years employed	25,918	25.530	12.352	0	45	3,514	26.041	12	0	46

Notes: The table shows descriptive statistics for continuous variables. Concerning the continuous variables, salary accounts the annual fixed compensation specified in Euros. Age and years employed are expressed in terms of years. The Sharpe ratio is the relative measure of a portfolio's return-to-risk ratio divided in two sub-groups for taking into consideration the employee savings purchase and company saving plans.

Table 5: Participation rates and amount invested by investment options

Panel A: Participation rates

	ESPP						CSP							
	Classic offer		Multiple offer		Monetary assets		Company stocks		Diversified Assets (8651)		Diversified Assets (8652)		Diversified Assets (8653)	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Participation	3,368	11.4%	5,695	19.3%	16,758	56.9%	19,297	65.6%	10,037	34.1%	13,814	46.9%	11,760	40.0%
Non Participation	26,064	88.6%	23,737	80.7%	12,674	43.1%	10,135	34.4%	19,395	65.9%	15,618	53.1%	17,672	60.0%
Total	29,432	100%	29,432	100%	29,432	100%	29,432	100%	29,432	100%	29,432	100%	29,432	100%

Panel B: Amount invested

	ESPP		CSP				
	Classic offer	Multiple offer	Monetary assets	Company stocks	Diversified Assets (8651)	Diversified Assets (8652)	Diversified Assets (8653)
Average annually Salary	38,610	36,475	31,779	30,954	31,044	29,208	30,093
Average monthly Salary	3,218	3,040	2,648	2,580	2,587	2,434	2,508
Average Personal Contribution	3,552	2,790	6,839	11,360	3,282	3,932	3,627
Average Contribution Ratios	110%	92%	258%	440%	127%	162%	145%

Notes: The table provides statistics on employee participation. In Panel A, we consider the number of employees and the corresponding percentage of the population (Participation ratios) who are eligible to participate or not. For instance, 5,695 employees representing 19,3% of the population made the decision to participate in an employee savings purchase plans. In Panel B, we take into consideration the average annual fixed compensation expressed in Euros and the average personal investment in order to obtain the investment amount as a fraction of monthly salary.

Table 6: Diversification measure of employees' portfolio – Number of funds

	Savings Plans Overall		ESPP		CSP	
	N	%	N	%	N	%
0	3,425	11.6%	22,634	76.9%	3,514	12.0%
1	4,856	16.5%	4,533	15.4%	5,043	17.2%
2	5,044	17.1%	2,265	7.7%	5,699	19.3%
3	5,798	19.7%	NR	NR	7,530	25.6%
4	5,290	18.0%	NR	NR	5,595	19.0%
5	3,322	11.3%	NR	NR	2,051	6.9%
6	1,332	4.5%	NR	NR	NR	NR
7	365	1.3%	NR	NR	NR	NR
Total	29,432	100%	29,432	100%	29432	100%

Notes: For each number of fund displayed in the first column, this table shows the number of employees and the corresponding percentage of the population who have invested their savings in a given saving plan category proposed. For instance, 4,533 employees representing 15,4% of the population hold their savings in at least one of the two funds available in the ESPP.

Table 7: Distribution of employees according to the Sharpe Ratios

	Savings Plans Overall		ESPP		CSP	
	N	%	N	%	N	%
$x = 0$	3,409	$x < 0$	804	$x = 0$	3,514	11.9%
$0 < x <= 1$	0	$x = 0$	22634	$0 < x <= 1$	25	0.1%
$1 < x <= 2$	1	$0 < x <= 1$	481	$1 < x <= 2$	58	0.2%
$2 < x <= 3$	14	$1 < x <= 2$	740	$2 < x <= 3$	115	0.4%
$3 < x <= 4$	84	$2 < x <= 3$	1200	$3 < x <= 4$	458	1.6%
$4 < x <= 5$	5,395	$3 < x <= 4$	1572	$4 < x <= 5$	7,594	25.8%
$x > 5$	17,666	$4 < x <= 5$	1332	$x > 5$	16,684	56.7%
Outliers*	2,863	Outliers*	669	Outliers*	984	3.3%
Total	29,432	Total	29432	Total	29,432	100%

Notes: For each range of Sharpe ratio displayed in the first column, this table shows the frequency distribution of the number of employees and the corresponding percentage of the population. For instance, 5,395 employees representing 18.3% of the population and holding their in a plans have a Sharpe ratio between 4 and 5.

Table 8: Statistics by group for Savings Plans Overall – Sharpe Ratios

	N	Mean	Max	Min	Median	Decile 1	Decile 10	SD
Salary								
Under 25,000 €	8,297	6.36***	10.76	1.85	6.19	4.46	8.56	1.56
25,000 – 49,999 €	13,459	6.11***	10.76	2.10	5.90	4.52	7.99	1.36
50,000 – 74,999 €	1,117	5.86***	10.68	3.20	5.77	4.55	7.33	1.09
75,000 – 99,999 €	213	5.95***	9.95	3.78	5.84	4.84	7.34	1.08
Over 100,000 €	74	5.82***	9.68	4.40	5.66	4.53	7.49	1.29
Age								
Under 35	3,803	6.12***	10.76	2.24	5.87	4.42	8.13	1.50
35 – 44	4,388	6.08***	10.73	2.29	5.89	4.49	7.86	1.35
45 – 54	8,537	6.23***	10.76	1.85	5.99	4.54	8.25	1.44
55 – 64	6,425	6.24***	10.76	2.10	6.01	4.59	8.22	1.42
Over 65	7	6.85***	8.47	5.14	6.47	5.38	8.21	2.70
Years employed								
0 – 5 Years	2,986	6.11***	10.76	2.75	5.86	4.42	8.11	1.51
6 – 10 Years	1,087	5.94***	10.70	2.24	5.74	4.46	7.63	1.32
11 – 15 Years	1,580	6.04***	10.73	2.29	5.84	4.49	7.88	1.36
16 – 19 Years	1,579	6.10***	10.70	3.04	5.93	4.51	7.94	1.35
Over 20 Years	15,928	6.24***	10.76	1.85	6.01	4.56	8.24	1.43
Gender:								
Male	9,410	6.00***	10.76	2.29	5.81	4.46	7.71	1.30
Female	13,750	6.32***	10.76	1.85	6.09	4.54	8.41	1.49

Financial knowledge								
Yes	2,636	5.83***	10.69	2.29	5.75	4.52	7.29	1.08
No	20,534	6.23***	10.76	1.85	6.01	4.49	8.25	1.46
Citizenship								
French	23,054	6.19***	10.76	1.85	5.96	4.50	8.16	1.43
Elsewhere	106	5.99***	10.50	3.86	5.82	4.46	7.71	1.45
Employee type								
Executive	6,696	5.92***	10.74	2.29	5.80	4.49	7.48	1.19
Ordinary	16,464	6.30***	10.76	1.85	6.09	4.49	8.38	1.50

Notes: We sort observations by annual salary, age, years employed (as of year of the observation), gender, financial knowledge, citizenship, and employee type. For each sorting, we test the null hypotheses that the means are equal. For instance, we will refer to the following typology: * Significant at 10%, ** significant at 5%, *** significant at 1%.

Table 9: Statistics by group for ESPP – Sharpe Ratios

	N	Mean	Max	Min	Median	Decile 1	Decile 10	SD
Salary								
Under 25,000 €	1,216	2.40***	4.72	-4.20	3.06	-0.82	4.40	2.05
25,000 – 49,999 €	4,046	2.34***	4.74	-4.27	2.85	-0.44	4.30	1.94
50,000 – 74,999 €	648	2.34***	4.64	-4.20	2.89	-0.57	4.27	1.95
75,000 – 99,999 €	157	2.31***	4.60	-3.93	2.71	-0.11	4.16	1.74
Over 100,000 €	62	1.99***	4.55	-4.01	2.25	-1.17	4.35	2.04
Age								
Under 35	724	3.25***	4.72	-4.09	3.83	1.24	4.42	1.53
35 – 44	1,285	2.68***	4.74	-4.26	3.19	0.17	4.39	1.80
45 – 54	2,448	2.29***	4.64	-4.27	2.76	-0.44	4.28	1.92
55 – 64	1,672	1.79***	4.58	-4.20	2.32	-1.49	4.15	2.11
Over 65	0	NA	NA	NA	NA	NA	NA	NA
Years employed								
0 – 5 Years	470	3.48***	4.72	-4.09	3.97	1.97	4.41	1.39
6 – 10 Years	354	2.87***	4.60	-3.05	3.35	0.44	4.43	1.60
11 – 15 Years	504	2.69***	4.74	-4.15	3.26	0.18	4.38	1.82
16 – 19 Years	508	2.60***	4.68	-4.20	3.04	0.15	4.37	1.83
Over 20 Years	4,293	2.11***	4.64	-4.27	2.61	-0.99	4.26	2.01
Gender								
Male	3,077	2.38***	4.74	-4.14	2.90	-0.43	4.32	1.93
Female	3,052	2.32***	4.74	-4.27	2.84	-0.63	4.32	1.99
Financial knowledge								
Yes	1,413	2.37***	4.60	-4.06	2.90	-0.36	4.28	1.89
No	4,716	2.34***	4.74	-4.27	2.87	-0.59	4.34	1.98
Citizenship								
French	6,103	2.35***	4.74	-4.27	2.88	-0.54	4.32	1.96
Elsewhere	26	2.26***	4.54	-3.65	3.33	-0.94	4.28	2.32
Employee type								
Executive	2,966	2.47***	4.74	-4.26	2.99	-0.23	4.30	1.88
Ordinary	3,163	2.23***	4.74	-4.27	2.76	-0.81	4.34	2.02

Notes: We sort observations by annual salary, age, years employed (as of year of the observation), gender, financial knowledge, citizenship, and employee type. For each sorting, we test the null hypotheses that the means are equal. For instance, we will refer to the following typology: * Significant at 10%, ** significant at 5%, *** significant at 1%.

Table 10: Statistics by group for CSP – Sharpe Ratios

	N	Mean	Max	Min	Median	Decile 1	Decile 10	SD
Salary								
Under 25,000 €	9,411	6.85***	11.37	0.70	6.47	4.46	10.77	2.18
25,000 – 49,999 €	14,139	6.17***	11.37	0.67	5.59	4.40	9.08	1.92
50,000 – 74,999 €	1,107	5.32***	10.77	0.65	4.84	4.15	7.33	1.48
75,000 – 99,999 €	209	5.19***	10.77	1.80	4.89	4.07	7.25	1.31
Over 100,000 €	76	4.86***	10.43	1.38	4.45	3.46	7.26	1.66
Age								
Under 35	4,473	6.48***	11.35	0.70	6.06	4.39	10.74	2.10
35 – 44	4,285	6.17***	11.37	0.72	5.61	4.38	9.35	1.98
45 – 54	9,249	6.43***	11.37	0.65	5.85	4.42	10.45	2.07
55 – 64	6,920	6.37***	11.37	0.70	5.81	4.44	9.92	1.99
Over 65	7	6.80***	8.47	5.14	6.47	5.14	8.21	1.36
Years employed								
0 – 5 Years	3,224	6.42***	11.30	0.79	6.02	4.37	10.29	2.07
6 – 10 Years	1,156	6.18***	11.25	0.70	5.51	4.33	10.28	2.07
11 – 15 Years	1,689	6.20***	11.35	0.72	5.51	4.35	9.90	2.07
16 – 19 Years	1,639	6.14***	11.36	0.65	5.58	4.38	9.03	1.92
Over 20 Years	17,226	6.42***	11.37	0.67	5.87	4.43	10.30	2.04
Gender								
Male	9,890	6.03***	11.37	0.65	5.41	4.35	8.89	1.92
Female	15,044	6.60***	11.37	0.70	6.14	4.45	10.77	2.09
Financial knowledge								
Yes	2,630	5.38***	11.32	0.65	4.89	4.16	7.34	1.52
No	22,304	6.49***	11.37	0.67	6.00	4.43	10.56	2.06
Citizenship								
French	24,821	6.38***	11.37	0.65	5.83	4.41	10.21	2.04
Elsewhere	108	6.12***	11.13	2.98	5.60	4.33	9.32	1.94
Unknown	5	5.65***	7.34	3.86	5.92	4.10	7.08	1.47
Employee type								
Executive	6,731	5.64***	11.36	0.65	5.12	4.28	7.73	1.65
Ordinary	18,203	6.65***	11.37	0.70	6.24	4.46	10.77	2.10

Notes: We sort observations by annual salary, age, years employed (as of year of the observation), gender, financial knowledge, citizenship, and employee type. For each sorting, we test the null hypotheses that the means are equal. For instance, we will refer to the following typology: * Significant at 10%, ** significant at 5%, *** significant at 1%.

Table 11: Heckman two-step model regression – Dependent variable: Sharpe Ratios

	ESPP		CSP		Overall plans	
	Probit	OLS	Probit	OLS	Probit	OLS
Salary	1.13e-05*** (14.03)	-1.11e-05*** (2.60e-06)	2.07e-05*** (2.99e-06)	-1.50e-05*** (3.44e-06)	1.96e-05*** (3.24e-06)	-3.65e-06*** (1.33e-06)
Age	0.0515*** (0.0148)	0.0715 (0.0439)	-0.0787*** (0.0171)	-0.0371 (0.0388)	-0.0622*** (0.0178)	-0.0436*** (0.0152)
Age^2	-0.000491*** (0.000173)	-0.00155*** (0.000502)	0.000935*** (0.000204)	0.000212 (0.000465)	0.000786*** (0.000212)	0.000495*** (0.000181)
Years employed	0.0193*** (0.00621)	-0.0953*** (0.0164)	0.00870 (0.00764)	0.0401*** (0.0153)	-0.00247 (0.00801)	0.0222*** (0.00658)
Years employed^2	-0.000442*** (0.000137)	0.00237*** (0.000366)	-0.000262 (0.000170)	-0.000549 (0.000338)	-9.25e-05 (0.000177)	-0.000375*** (0.000145)
LogBonus	0.0351*** (0.0109)	-0.0846** (0.0353)	0.0189 (0.0118)	-0.0932*** (0.0251)	0.0131 (0.0121)	-0.0299*** (0.0111)
Male	0.0596** (0.0239)	0.0502 (0.0686)	-0.120*** (0.0268)	-0.162** (0.0714)	-0.110*** (0.0275)	-0.198*** (0.0276)
Financial Knowledge	0.0114 (0.0403)	-0.104 (0.0967)	0.0435 (0.0643)	-0.139 (0.111)	-0.0107 (0.0674)	0.0107 (0.0454)
Employee type	0.169*** (0.0331)	-0.288*** (0.103)	0.250*** (0.0444)	-0.815*** (0.114)	0.192*** (0.0463)	-0.298*** (0.0422)
Citizenship	0.140 (0.156)	0.0401 (0.423)	0.182 (0.166)	0.0315 (0.369)	0.144 (0.173)	0.116 (0.160)
Mean Sharpe ratio per job category:	0.598*** (0.0360)		0.280*** (0.0432)		0.587*** (0.0535)	
Constant	-3.333*** (0.315)	5.897*** (1.188)	0.282 (0.442)	9.052*** (0.703)	-1.484*** (0.460)	7.356*** (0.308)
Inverse Mill's ratio		-1.323*** (0.197)		-3.498*** (0.973)		1.92*** (4.05)
Observations	28,763		28,448		26,569	
Censored	22,634		3,514		3,409	
Uncensored	6,129	6,129	24,934	24,934	23,160	23,160

Notes: The table presents results of Heckman two-step model in which the first step is a *Probit* model, where the dependent variable is a dummy variable, which indicates whether the employee has held an investment or not in the two different plans proposed. While the second step is an Ordinary Least Square (OLS) regression on the Sharpe ratio of some employees characteristics. Salary is the annual remuneration (Unit: In thousand Euros). Age is the age of the employee as of the year of the observation (Unit: In years). Age^2 is the squared of the variable Age. Years employed refers to the employee's seniority of service with the company as of the year of the observation (Unit: In years). Male is a dummy variable equal to one if the participant is male, zero otherwise. Financial Knowledge is a dummy variable equal to one if the participant has a particular understanding in finance, zero otherwise. Citizenship is a dummy variable equal to one if the participant has a French nationality, zero otherwise. Employee type is a dummy variable equal to one if the participant is a white collar, zero otherwise. We have also provided the Inverse Mill's ratio for testing the presence of selection. T-statistics are reported in parenthesis, while for the significance level we will refer to the following typology: * Significant at 10%, ** significant at 5%, *** significant at 1%.

Table 12: Marginal effects after the first step of Heckman two-step regression – Dependent variable: Sharpe Ratios

	ESPP		CSP		Overall plans	
	(1)	(2)	(1)	(2)	(1)	(2)
Salary	3.28e-06	5.89e-07	3.58e-06	5.62e-06	3.31e-06	7.74e-07
Age	0.015	0.124	-0.014	-0.116	-0.010	-0.058
Age^2	-0.0001	-0.002	0.0002	0.001	0.0001	0.0007
Years employed	0.006	-0.075	0.002	0.049	-0.0004	0.022
Years employed^2	-0.0001	0.002	-0.00005	-0.0008	-0.00002	-0.0004
LogBonus	0.010	-0.049	0.003	-0.074	0.002	-0.027
Male	0.017	0.111	-0.021	-0.282	-0.019	-0.223
Financial Knowledge	0.003	-0.093	0.007	-0.096	-0.002	0.008
Employee type	0.050	-0.115	0.041	-0.576	0.031	-0.256
Citizenship	0.038	0.185	0.035	0.229	0.027	0.151
Mean Sharpe ratio per job category	0.173	0.614	0.049	0.279	0.099	0.133
Predicted probability	0.21	2.53	0.90	6.32	0.90	6.17

Note: This table reports the marginal effects computed after the first step of Heckman two-step regression. Column (1) and (2) represents the marginal effects for the probability to have a Sharpe ratio in a given saving plan category observed.

Table 13: Optimal Sharpe ratio observed and maximized percentage of investment associated in each plans.

Optimal Sharpe ratios and percentage									
		In % of investment in each plan							
Plans	Sharpe ratio	Classic offer	Multiple offer	Monetary assets	Company stocks	Diversified Assets (8651)	Diversified Assets (8652)	Diversified Assets (8653)	Total
ESPP	4.7512	71.81%	28.19%						100%
CSP	11.4541			0.00%	4.26%	0.00%	94.18%	1.56%	100%
Overall	12.0613	1.30%	0.77%	0.00%	3.27%	0.00%	94.17%	0.49%	100%

Note: For each plan displayed in the first column, this table shows the optimal Sharpe ratio achieved after the maximization process and the corresponding percentage of investment in each plan proposed. For instance, the optimal Sharpe ratio in the CSP is 4,7512 with an investment of 71,81% and 28,19% respectively in the 4024 and 4025 funds.

Table 14: Heckman two-step model regression – Dependent variable: Index of financial investment mistake

	ESPP		CSP		Overall plans	
	Probit	OLS	Probit	OLS	Probit	OLS
Salary:	1.13e-05***	2.33e-06***	2.07e-05***	1.31e-06***	1.96e-05***	3.03e-07***
	(1.35e-06)	(5.47e-07)	(2.99e-06)	(3.00e-07)	(3.24e-06)	(1.10e-07)
Age:	0.0515***	-0.0151	-0.0787***	0.00324	-0.0622***	0.00362***
	(0.0148)	(0.00924)	(0.0171)	(0.00339)	(0.0178)	(0.00126)
Age^2:	-0.000491***	0.000327***	0.000935***	-1.85e-05	0.000786***	-4.11e-05***
	(0.000173)	(0.000106)	(0.000204)	(4.06e-05)	(0.000212)	(1.50e-05)
Years employed:	0.0193***	0.0201***	0.00870	-0.00350***	-0.00247	-0.00184***
	(0.00621)	(0.00344)	(0.00764)	(0.00134)	(0.00801)	(0.000546)
Years employed^2:	-0.000442***	-0.000498***	-0.000262	4.79e-05	-9.25e-05	3.11e-05***
	(0.000137)	(7.70e-05)	(0.000170)	(2.95e-05)	(0.000177)	(1.20e-05)
Log Bonus:	0.0351***	0.0178**	0.0189	0.00813***	0.0131	0.00248***
	(0.0109)	(0.00744)	(0.0118)	(0.00219)	(0.0121)	(0.000919)
Male:	0.0596**	-0.0106	-0.120***	0.0141**	-0.110***	0.0165***
	(0.0239)	(0.0144)	(0.0268)	(0.00624)	(0.0275)	(0.00229)
Financial Knowledge:	0.0114	0.0220	0.0435	0.0121	-0.0107	-0.000889
	(0.0403)	(0.0203)	(0.0643)	(0.00966)	(0.0674)	(0.00376)
Citizenship:	0.140	-0.00844	0.182	-0.00275	0.144	-0.00961
	(0.156)	(0.0891)	(0.166)	(0.0322)	(0.173)	(0.0132)
Employee type:	0.169***	0.0606***	0.250***	0.0711***	0.192***	0.0247***
	(0.0331)	(0.0217)	(0.0444)	(0.00999)	(0.0463)	(0.00350)
Mean Sharpe ratio per job category:	0.598***		0.280***		0.587***	
	(0.0360)		(0.0432)		(0.0535)	
Constant:	-3.333***	-0.241	0.282	0.210***	-1.484***	0.390***
	(0.315)	(0.250)	(0.442)	(0.0613)	(0.460)	(0.0255)
Inverse Mill's ratio:		0.278***		0.305***		0.0671***
		(0.0415)		(0.0850)		(0.0210)
Observations:	28,763		28,448		26,569	
Censored	22,634		3,514		3,409	
Uncensored	6,129	6129	24,934	24,934	23,160	23,160

Notes: The table presents results of Heckman two-step model in which the first step is a Probit model, where the dependent variable is a dummy variable which indicates whether the employee has held an investment or not in the two different plans proposed. While the second step is an Ordinary Least Square (OLS) regression on the Index of financial investment mistake against some employees characteristics. Salary is the annual remuneration (Unit: In thousand Euros). Age is the age of the employee as of the year of the observation (Unit: In years). Age^2 is the squared of the variable Age. Years employed refers to the employee's seniority of service with the company as of the year of the observation (Unit: In years). Male is a dummy

variable equal to one if the participant is male, zero otherwise. Financial Knowledge is a dummy variable equal to one if the participant has a particular understanding in finance, zero otherwise. Citizenship is a dummy variable equal to one if the participant has a French nationality, zero otherwise. Employee type is a dummy variable equal to one if the participant is a white collar, zero otherwise. We have also provided the Inverse Mill's ratio for testing the presence of selection. T-statistics are reported in parenthesis, while for the significance level we will refer to the following typology: * Significant at 10%, ** significant at 5%, *** significant at 1%.

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