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▶ **To cite this version:**

Nicolas Aubert, Niaz Kammoun, Yacine Bekrar. Financial decisions of the financially literate. Finance, 2018, 39 (2). halshs-01850997v1

HAL Id: halshs-01850997
https://shs.hal.science/halshs-01850997v1

Submitted on 6 Mar 2019 (v1), last revised 22 Mar 2019 (v2)

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Financial decisions of the financially literate

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July 2018

Abstract

This paper investigates the portfolio performance of the company-based savings of a cross section of approximately 30,000 employees of a listed French bank. We have detailed information about each job position in the bank, which enables us to study the employees' financial literacy, specific knowledge of the plans offered, and private information. These better-informed bank employees supposedly adopt behavior that is the closest to that of an informed rational investor. We explore the employees' portfolio performance in the savings plans and find that financial expertise and knowledge of the plans are related to participation in the plans offered by the company. Financial expertise is related to better employee stock purchase plan (ESPP) individual portfolio performance but not to the company-based savings plan (CSP) and the overall performance of the company's plans. For both offered plans, participation is more likely among the job categories that include finance experts, female employees, more educated employees and less financially constrained employees. We find evidence of the mental accounting of company stock highlighted by **?**.

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

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

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1 Introduction

Although most twentieth-century financial crises had little to do with retail investors, a major cause of the subprime crisis was investors' lack of financial knowledge. Understanding household-investment behavior is challenging, as households' savings decisions are associated with major welfare costs, as shown by **?**. Individual investors often rely on their bankers' advice. But do the most financially literate people apply the advice they give to their customers to their own saving decisions? **?** define financial literacy as "people's ability to process economic information and make informed decisions about financial planning, wealth accumulation, debt, and pensions" (p. 6). Not only do bank employees have better access to financial advice and information but some hold positions that require expertise in financial decision making. Therefore, bank employees can be defined as financially literate people who are less likely to "misbehave" in the sense of Richard **?**, i.e., to adopt behavior that departs from the core premise of economic theory. According to **?**, "he core premise of economic theory is that people choose by optimizing." This premise is combined with the equilibrium principle. Most of the advice given by financial advisors is taken from modern portfolio theory and is inspired by the findings of economic theory applied to financial markets. The premises of economic theory were challenged by the work of Richard Thaler. This paper investigates the individual portfolio performance of a sample of bank employees within their company-based savings plans. The aim is to document the link between objective measures of financial literacy or expertise and company-based savings portfolio efficiency. We look at the company-based savings composition and risk/return characteristics for a cohort of approximately 30,000 French bank employees. We observe savings invested in the plans offered by the company they work for, including their employer's stock. We use this comprehensive dataset, comprising detailed information on each employee's job characteristics and details of the investment options selected by them. This original dataset enables us to measure financial literacy and job characteristics with secondary data. Previous literature, with the exceptions of **??** and **?**, often measure self-reported financial literacy by relying on survey data. In addition to financial expertise, our dataset also enables the measurement of several employee characteristics, including specific knowledge of the plans and private information. **?** and **?** relt on samples of bank customers to investigate the consequences of financial advice. **?** show that bank advisors are not sufficient to alleviate the problem of financial literacy, whereas **?** find that advised customers have a lower risk-return trade-off ratio (measured by the Sharpe ratio). These results may be a consequence of poor financial advice. In addition to measuring the financial literacy of bank employees, we also directly observe the performance

of financial advisors, i.e., the front-line staff. This paper is innovative because it investigates the investment behavior of bank employees, who are considered to be the closest to rational and informed economic agents. Indeed, bank employees are well informed because of the sector to which their companies belong. They benefit from reduced fixed-participation costs by having easier access to financial information. Furthermore, we focus on data concerning company-based savings plans offered by the bank to all its employees. All the employees have easy access to the same information through a variety of ways.[1] Within the workplace, bank employees also benefit from the advice of their more financially literate colleagues, for instance, those who are specifically in charge of advising customers about how to invest their savings. We use a dataset that makes it possible to identify employees who hold a position that requires better-than-average financial literacy. Another original element of this paper is its focus on two types of company-based savings plans: a company savings plan (CSP) with features similar to those of the 401(k) in the US, and an employee stock purchase plan (ESPP). We measure portfolio efficiency for all the plans and for each plan separately. This feature enables testing of whether mental accounting affects the employees. This cognitive phenomenon identified by **?** consists of psychologically separating the plans and considering them as non-fungible. In other terms, the employees would separately optimize the two plans. The remainder of this paper is structured as follows. Section 2 presents a literature review and hypothesis development. Section 3 describes the empirical strategy, and section 4 presents the results. In the latter section, we provide descriptive statistics of the employees' portfolio efficiency according to their job characteristics. We also analyze employees' portfolio efficiency according to the financial literacy and job-category variables affecting portfolio efficiency. Among the employees in our dataset, some are trained to understand the financial markets, some know the administrative functioning of the plans, and some are likely to hold private information about the company's future returns. We find that financial expertise and knowledge of the plans are always related to participation in the plans offered by the company. Financial expertise is related to better ESPP individual portfolio performance but not to overall and CSP performance. For both plans offered, participation is more likely among most job categories that include finance experts, female employees, more educated employees and less financially constrained employees. This first set of results is consistent with **?**. We find evidence of the mental accounting of company stock highlighted by **?** since the characteristics related to portfolio performance are not the same for the ESPP, which is invested

[1]The employees have online, secured access to the information about their company-based savings (e.g., key investor information documents, historical prizes). There are also opportunities for arbitrage within the plan.

exclusively in company stock, and the diversified CSP. Section 5 discusses the results, and section 6 concludes.

2 Literature review and hypotheses development

The problem of employees' overinvestment in employer's stocks has been extensively investigated after Enron's bankruptcy at the beginning of the 2000s (**?**). The investigation of employees' investment in their company savings plans, such as the American 401(k), has triggered research on behavioral and household finance in the 2000s. The overinvestment in employers' stock by US workers caught the attention of Richard Thaler and his colleagues and has become a major field of experimentation for behavioral finance (see **?** for a review). Richard Thaler published several papers on this specific issue. **?** report that offering company stock to employees significantly affects their portfolio choices. They highlight the "mental accounting of company stock," which involves putting the company stock into its own separate asset category, different from that of other equities. As the company stock is not considered to be as risky as other stocks, this cognitive phenomenon results in riskier and under-diversified portfolios. Indeed, from a rational investor standpoint, the cost of investing in an employer's stock, as computed by **?** and **?**, is prohibitive. Behavioral finance recognizes that employees' investment in their company stock is a consequence of cognitive biases, such as excessive extrapolation of past returns and endorsement (**?**), endowment (**?**), the framing effect (**??**), loyalty and familiarity (**??**), risk myopia (**?**), the disposition effect (**?**), and default heuristics (**??**). We hypothesize that more financially literate investors are not affected by such cognitive biases. Employer-stock investment has been extensively studied in the context of the US 401(k) pension plan (**?**) and rarely outside the US within other investment contexts. One important question addressed by Richard Thaler is "Could we use behavioral economics to make the world a better place?" (Thaler, 2015; p. 307). Thaler and Benartzi (2004) note that individual investors have to face several behavioral challenges when they decide to save for their retirement: self-control, inertia, framing and loss aversion. As Benartzi says himself in a TED talk, he Thaler and "came up with an embarrassing simple solution called Save More, not today, Tomorrow".[2] Save More Tomorrow (the SMarT program) is a savings plan designed to help employees to save more in their 401(k) pension plan (**?**). "The basic idea is to give workers the option of committing themselves now to increasing their savings rate later, each time they get a raise" (Thaler and Benartzi, 2004; p. S166). Thaler and his colleagues focused mostly on the 401(k), putting aside other company-based savings plans.

[2] `https://www.ted.com/talks/shlomo_benartzi_saving_more_tomorrow?language=en`

In particular, the ESPP is a popular way to invest in employer stock. To the best of our knowledge, only **?**, **?**, **?** and **?** investigate employee investment in ESPPs. The ESPP offers a different context within which investment in company stock can be studied. In the US, **?** document a substantial non-participation rate, even though the ESPP they studied offers an opportunity for employees to increase their gross compensation. **?** confirm these results in France. They find that liquidity constraints, imperfect knowledge of the plan, asset choice and transaction costs affect ESPP investment. **?** find that participation is more likely among employees who are familiar with stocks, more educated, less financially constrained, and those who make fewer errors in valuing financial securities. US employees can sell their discounted stocks at the market prize a day after buying them. Consequently, ESPP investment is a very attractive investment consisting in a riskless profitable operation. However, the authors document that only 30% of eligible employees take advantage of this opportunity. In general, employee stock ownership is a major way for individual investors to access the stock market. Approximately 23 million US workers (National Center for Employee Ownership, 2014) and eight million EU workers (European Federation for Employee Share Ownership, 2015) own stock in the company they work for.

With the pioneering works of Thaler, the investigation of household-investment behavior has become a new field in finance (**?**). Among other factors, the funding of pension and social security systems is closely connected to direct or indirect individual investor choices, and the investor's rationality assumption is challenged by individual investor strategies. Understanding the determinants of economic agents' portfolio performance is therefore a major concern since 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, and the assessment of the welfare cost of investment mistakes, such as under-diversification and non-participation in financial and insurance markets (**?**). **?** consider the revealed-preferences approach and elicitation-of-risk preferences as two empirical streams of literature investigating the determinants of risk preference. The risk-preferences approach relies on the observation of secondary data reflecting actual investors' decisions and infers their risk preferences. We adopt the risk-preferences approach, assuming that the risk preferences of the bank employees we investigate are revealed by the compositions of their portfolios. Transaction costs are another challenge individual investors face. Transaction costs are closely connected to the financial knowledge of individual investors. Indeed, a lack of financial expertise results in higher search costs, i.e., the cost an investor has to bear to understand the functioning of financial products and to make

relevant decisions accordingly. According to Lusardi and Mitchell's review (2014), financial knowledge is a form of investment in human capital. Academic research relies exclusively on survey data—objective (actual knowledge) and subjective (self-assessed) questions—to evaluate financial literacy. Surveys identify three major concepts to assess financial literacy: numeracy and capacity to do calculations related to interest rates, such as compound interest; understanding of inflation; and understanding of risk diversification (Lusardi and Mitchell, 2014; p. 10). The survey questions on risk diversification obtain the weakest proportion of good answers, which reveals that risk diversification is clearly an issue.

Our dataset enables the measurement of most of the variables related to retail investors' risk exposure that are included in previous research. Putting aside financial literacy, we include proxies of the determinants of portfolio choices: human capital (age, salary, education level and job categories: commercial, logistics, administrative and other staff), specific human capital (years employed), liquidity constraints (wealth, salary, bonus, permanent contract), specific knowledge of the plan (HRM staff) and private information (hierarchical rank). Common variables causing risk exposure and affecting portfolio performance identified by the literature are wealth and background risk: sociodemographic characteristics are used as a proxy. Wealth has always been considered to be a cause of risk exposure (**??**). In this relationship, relative risk aversion is a key determinant, although it is not directly observable. Several empirical papers document decreasing relative risk aversion (DRRA), showing that when investors are wealthier, they invest a larger fraction of their wealth in risky assets. **?** pioneered this group of research using cross-sectional data on individual portfolios. Their findings were confirmed by **?** and **?**. **?** and **?** establish the same relationship between wealth and risk exposure using panel data techniques, making it possible to control for endogeneity. Background risk cannot be avoided because it cannot be traded or insured. Merton's model (1969), which assumes that investors hold tradable assets and human capital, does not have this characteristic. Housing wealth (**?**) and private business property (**?**) are also commonly identified as sources of background risk. Human capital is difficult to measure. One of the main drawbacks of revealed-preferences measures of risk aversion is that they do not consider human capital, a major component of individual investors' wealth. Therefore, revealed-preferences measures are likely to underestimate risk aversion. Because most 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 to be a safe asset (**?**), positively correlated with capital income in the long run (**?**), or negatively correlated with capital income (**?**). Human capital decreases with age and

increases with education. The present value of human capital is a function of the current salary and the time over which the salary will be received. Thus, younger workers have more human capital than do older workers. Age is also correlated with risk-aversion parameters (**?**). Viceira's model (2001) predicts that employees approaching retirement age are afraid to lose their savings and are not encouraged to invest in risky assets. Education increases the value of human capital. **?** also argue that education allows individuals to overcome "the barrier to stockholding." Consequently, more educated households invest in riskier assets. **?** concludes that education directly predicts equity ownership. Experiments emphasize that women are more risk-averse than men (**?**). **?** also report significant links between financial literacy and age, gender, education and ability, place of residence (rural/city), income, and employment type. Specific human capital is highly related to the employment characteristics that we are able to account for in this paper.

Several papers using French data focus on the general trading activity and portfolio choices of retail investors. Using a large sample covering eight years, **?** builds a market sentiment index to predict short-term returns on long-short portfolios based on size or on the book-to-market ratio. Similarly **?** investigate investor sentiment on two subsamples decomposed according to their appetite for information and professional advice. They highlight that investors who disregard free information and professional advice earn future returns on a long-short portfolio based on size. **?** use survey data assessing the overconfidence of a sample of finance professionals to predict future stock prices. They use an overconfidence measure to highlight how risk perception and overconfidence can influence the risk-taking behavior of professionals. In the same vein, **?** underline how some particular psychological traits of retail investors are related to trading activity. They show that retail investors are prone to the disposition effect. Some individual characteristics, such as financial sophistication, are strongly related to trading behavior and more efficient financial decisions (**?**).

The previous literature discussed existing empirical results and theoretical predictions concerning the relationship between individuals' financial literacy and their portfolio choices. This literature forms the basis of our main hypotheses. Given the previous literature on financial expertise and since we investigate employees' participation in the plans and their individual portfolio efficiencies, we expect the following:

Hypothesis 1: More financially literate employees have higher participation rates in company-based savings plans.

Hypothesis 2: More financially literate employees have better portfolio performance in company savings plans.

3 Empirical strategy

3.1 Data and variables identification

French company-based savings have some specific features. "The company savings plan (in French *Plan d'Epargne Entreprise*) enables employees to build up savings in the form of a portfolio of securities with the help of their company. Blocked for a minimum period of 5 years, the sums held come from voluntary payments made by the employees topped up by the company. The PEE can also be fed by profit-sharing".[3] Company-based savings plans in France were put in place in the 1960s and have been a way for individual investors to access the financial markets. In contrast to the US pension system, which was developed in the 1970s and allows individual investors to invest their savings in the financial markets, the French pension system remains mainly public. Within the CSP, employees are offered several investment options. Some of the funds are invested in the employer's stock. In the investigated data, one option offers the opportunity to invest in company stocks. In terms of investment choices, the CSP functions in a very similar way to the 401(k) pension plans of the US Internal Revenue Code, where employees have several investment options to choose from. French companies can also offer their employees the chance to invest in ESPPs. In both CSPs and ESPPs, investments are blocked for five years. Some reasons for early withdrawals, such as marriage, a child's birth, disability, death, etc., are accepted by French law. This constraint is offset by some benefits, such as a discount on the stock price and matching contributions offered by the employer, free arbitrage between the funds within the plan, tax benefits, and payments of management fees by the company. In the company we study, all the employees benefit from the same advantages.

We analyze a cross section of 29,432 employees of a French (CAC 40) listed bank who are eligible to participate in the CSP and ESPP. We match three different set of variables: the individual portfolio characteristics (ESPP and CSP), the employees' demographic characteristics, and the employees' job characteristics. The individual portfolio characteristics are used to compute dependent variables. The two latter sets of variables described below are independent variables that include proxies of determinants of portfolio efficiency emphasized in the literature review: financial literacy (finance expert), human capital (age, salary, education level and job categories: commercial, logistics, administrative and other staff), specific human capital (years employed), liquidity constraints (wealth, salary, bonus, permanent contract), specific knowledge of the plan (HRM staff) and private information (hierarchical rank). The

[3]Definition from the INSEE website (the French National Statistics Agency): `https://www.insee.fr/en/metadonnees/definition/c1948`

description of the variables is reported in Table 1 (this table, and all others referenced in the paper, can be found in the Appendix).

The first group of variables contains the company-based savings variables. This group is used to compute the dependent variables of the regression analyses: the individual employees' portfolio mean returns on CSP, ESPP, and both plans; the individual employee's portfolio standard deviation of returns on CSP, ESPP, and both plans; and the individual employee's portfolio performance for CSP, ESPP, and both plans. **?** and **?** use the Sharpe ratio as a measure of the risk-return trade-off in a French context; we also use the Sharpe ratio. The data on employees' demographics and job characteristics were initially collected in 2005 by the human resource management (HRM) department of the bank. To compute the risks, returns, and portfolio performance for each employee, we required the historical returns of the funds offered by the company. We received access to this data in 2011. The reason for this time lag is that the historical returns of the funds offered within the company-based savings plans (in French *fonds communs de placement entreprise*) are not publicly available. We obtained access to these data through the asset management subsidiary of the bank. Detailed descriptions of the features of the CSP and ESPP and the investment options offered within the plans are displayed in Panels A and B of Table 2. Seven funds are offered to the employees: five are part of the CSP and two are part of the ESPP. The standard deviation of returns, mean returns and Sharpe ratio associated with each of the seven funds are reported in Table 2. Five investment options are available in the CSP: company stocks, monetary assets, and three diversified assets (eurozone stocks, eurozone bonds, and international stocks). The benchmarks are composite indexes, which are also detailed in Table 2. The ESPP allows employees to invest in employer stock in two different ways: a classic offer and a leverage formula (the multiple offer). The classic offer consists of direct investment in company stock. These two offers both provide a 20% discount on the stock price. Participants pay the subscription price of the classic offer in full. In both investment options, dividends are automatically reinvested in the plan. For the ESPP, employees must be in line with a calendar provided by the employer. Although the ESPP is advertised long before its availability, the period during which the employees can invest lasts two weeks. The multiple fund was also offered to the employees of France Telecom (now Orange) during its privatization, as studied by **?**[4]. For France Telecom's ESPP, the authors' neoclassical model

[4] **?** describe the offer as follows: "For a fixed contribution, the employee would receive back a prespecified amount of money (like a bond) and also obtain the upside on ten shares. While not described in these terms, Multiplix delivered the economics of a bond-plus-call portfolio or alternatively a protected-put position. Legally, this payoff was delivered through a peculiar "guaranteed" loan that allowed the employee to buy nine additional shares for each share purchased through personal contributions. What makes this loan unusual is that the repayment is effected through the withholding of the dividends and tax credits (over the five-year

predicts overwhelming participation rates and amounts invested in the multiple offer called 'Multiplix'. Their empirical results do not support this prediction. They interpret this result as a consequence of a high fixed-analysis cost due to the complicated offerings of Multiplix, which deterred employees from selecting it. Panel A of Table 2 describes the characteristics of the different funds offered to employees, while Panel B of Table 2 provides information about the legal constraints applied to the company-based savings plans. We also report the risk return characteristics of the funds. The Sharpe ratios range between -0.45 and 1.68. For comparison, the Sharpe ratio of the French reference index (CAC-40) during the same period was 1.45. The least efficient fund is the money fund, with a Sharpe ratio of -0.45. The diversified fund, which is invested in mostly eurozone country bonds, has the highest Sharpe ratio, at 1.68. The multiple fund previously investigated by **?** has a Sharpe ratio of 0.62.

The second group of variables are the employee-level demographic variables, including age and gender. We create a dummy variable that takes a value of 1 if the employee lives in a large city of more than 200,000 inhabitants and 0 otherwise. We also have information about education levels, ranging from 1 to 5 (1: secondary school degree; 2: high school diploma; 3: bachelor's degree; 4: master's degree; 5: master's degree and higher). We do not have access to information about employees' wealth outside of company savings; therefore, we follow **?** by matching the town zip code and French national statistics agency (INSEE) localized tax revenues system. [5] The logic of **?** is that "the choice of residence is a function of wealth and given the large disparities between towns and neighborhoods, it captures some of the unmeasured variation in household wealth" (p. 181). Age and education level are proxies of human capital, and wealth is a proxy of liquidity constraint.

The third group of variables is related to employees' job characteristics. We include annual gross salary and bonuses in euros. A dummy variable takes a value of 1 if the employee has a permanent contract and 0 otherwise. The salary, bonus and permanent contract variables also capture liquidity constraints. We also know the number of years the employees have worked for the bank. The number of years worked at the bank is a proxy for the employees' human capital. The hierarchical rank is taken from an internal system ranging from 1 to 12, with 1 being the lowest and 12 the highest. Highest-ranked employees are assumed to have superior information about the company prospects. An important feature of this paper is that we have detailed data on employees' job descriptions. A typology of 465 jobs is

life of the plan) and a variable repayment schedule at maturity that was a function of the ultimate France Telecom stock price. In effect, the loan repayment amount was equal to the positive difference between the value of ten shares less the payoff to the employee. The employee was never required to repay more than the value of his or her shares after five years" (p. 173).

[5] The localized tax revenues system reports the average taxable income from all potential sources of revenue.

used by the bank. We use five dummies to characterize these categories. The variables are coded 1 if the employee belongs to the category and 0 if they do not. "Commercial staff" is recorded if the employee interacts with the bank's customers. Such employees are often in a position to advise their clients on the kinds of financial products to invest in. "Commercial staff" consists of 96 job categories and 15,720 employees. "HRM staff" are people who work for the human resource management service. We assume that these employees have superior knowledge of the functioning rules of the company-based savings plans. "HRM staff" includes 29 job categories and 672 employees. "Administrative staff" are involved in many different tasks, including management, accounting, quality and management control, auditing, credit analysis, legal, secretarial, and purchasing. These employees hold positions that do not require advanced knowledge of portfolio management. "Administrative staff" encompasses 227 job categories and 8,443 employees. "Logistics staff" are dedicated to technical tasks such as information technology, information systems, building management, mailing, social work, nursing, and cleaning. "Logistics staff" consists of 73 job categories and 1,048 employees. "Other staff" employees do not belong to any of the preceding categories. Approximately 75% of these employees belong to after-sales services. "Other staff" includes 45 categories and 3,549 employees. Another feature of our data is that the job categories allow us to identify financially literate employees. One can assume that the average knowledge of finance is better in a bank than in another sector. However, within a bank, we also have people who are more financially literate than others, and we can identify these employees with a specific dummy variable called "finance expert" staff. The variable is coded 1 if the employee is a finance expert and 0 otherwise. To compute this variable, we again screened all the job categories to see if they require financial expertise. Traders and portfolio managers belong to this category. "Finance expert" includes 50 categories and 3,386 employees. These job categories can also be coded in the five preceding categories. For instance, a private banking advisor is coded 1 for both the "finance expert" and "commercial staff" variables. **??** also use direct measures of retail investors' sophistication in the French context. They hypothesize that individuals trading derivatives, bonds, and foreign assets and holding multiple accounts are more sophisticated. They investigate the relation between sophistication and the disposition effect, a behavior identified by **?** and defined as the tendency of investors to hold losers too long and sell winners too soon. They conclude that sophisticated investors are also affected by disposition bias, although sophistication attenuates this effect (**?**). They also find that more sophisticated individual investors correct their disposition bias over time (**?**).

3.2 Estimation model

The dependent variable in our regression analyses is the individual portfolio Sharpe ratio for the CSP, the ESPP, and for both plans. In further analyses, we also regress the components of the Sharpe ratios (the individual volatility and returns) on the independent variables. The job-characteristic variables are our variables of interest. We also control our regressions for a set of demographic variables. We regress the individual Sharpe ratios on our set of independent variables using a two-step sample selection model (**?**).[6] Our dataset comprises information about employees who did and did not invest in the plans. This feature allows us to account for sample selection. The presence of potential selection bias may have occurred due to a combination of other, non-observable characteristics. **?** recommends the use of an identification variable that is correlated with the first step (the decision whether to invest or not) but is 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 prevents an unobserved selection process. As an identification variable, we select the mean of the Sharpe ratio computed for each of the 465 job categories. We assume that employees belonging to the same job category have similar risk preferences and a similar probability of investing. Such an assumption is consistent with **?**, who use three occupation dummies that are broader than ours as proxies for investor sophistication (professional: investors who hold technical or managerial positions; non-professional: investors who are blue-collar workers, sales and service workers, clerical workers, house-makers or students; and retired). Our identification variable is not correlated with the dependent variable.

The estimated equation can be written by considering the selection function:

$$(SR_{*i}) = \sum_{n}^{N} \delta_n \omega_{ni} + \mu_n$$

$$(SR_{*}) = 1, if(SR_{*i}) > 0$$

$$(SR_{*}) = 0, if(SR_{*i}) \leq 0$$

where SR_{*i} is a latent variable that measures the probability to invest in the offer or not, ω_n is a set of N variables that represent the characteristics of employee i that influence the probability of participation in the offer, δ_n are coefficients that captures the effects of these variables on the probability of being a participant, and μ_n is an error term following a standard normal distribution with zero mean. The second step takes the following form:

[6] A detailed presentation of the method is provided by **?**.

$$Y_i = \sum_k \beta_n X_{ki} + \mu_i$$

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

$$E\{Y_i|SR_{*i} > 0\} = X_j\beta + \rho\sigma_u\lambda(SR_i\hat{a}) + \epsilon_i$$

where λ represents the inverse Mills ratio (IMR). This selectivity term is constructed in the first step of the model and is introduced as an independent variable in the second step, known as the substantial equation. Indeed, the significance of the coefficient associated with the IMR in the second equation confirms the existence of selectivity bias in the selection equation. The second step of the Heckman procedure consists of estimating an ordinary least squares linear equation using the Sharpe ratio as the dependent variable. Indeed, the selection equation of the model is biased by sample selection since the coefficient of the IMR is significant.

4 Empirical results

4.1 Descriptive statistics

Panels A and B of Table 3 provide descriptive statistics about the employees' participation in the plans. Panel A focuses on categorical variables, and Panel B reports statistics on continuous variables. Panel A shows that the participation rate in all plans is higher for females (60.22%), small-city residents (88.36%), less-educated employees (68.03% are high school graduates, and the education of 17.39% is below this level), employees with a permanent contract (98.47%), employees with a lower hierarchical rank (45.06% between 3 and 6, and 11.13% between 1 and 3), and employees without financial expertise (86.99%). Regarding the job categories, the participation of HRM staff is higher (92%, or 621 of 672) than that of administrative staff (90%), commercial staff (88%), logistics staff (86%), and other staff (84%). Panel B of Table 3 shows that participants are as old as non-participants (mean ≈ 46 years; SD ≈ 10.77 years), are wealthier (mean: 35,750 ¿ 34,710; SD: 8,688 ¿ 8,170.77), are better paid (mean: 29,817 ¿ 26,079; SD: 12,823 ¿ 6,154), have a higher bonus (mean: 1,550 ¿ 641; SD: 5,945 ¿ 1,336), and have worked in the company for the same number of years (mean ≈ 26 years; SD ≈ 12 years). Panel B of Table 3 also shows that participants in all plans earn a 9.51% average return (SD: 6.53%) with a 9.95% average return volatility (SD:

10.23%), resulting in an average Sharpe ratio of 0.88. Some outliers affect the distribution of the Sharpe ratios for the ESPP and the CSP. The minimum negative and extremely low values of the ratios are concerning. These values are due to the very high concentration of some employees' savings in the money fund associated with very low volatility in the denominator and a negative difference between the fund return and the risk-free rate in the numerator. This feature of the data suggests that these employees invest massively in liquidity, which is the default option, i.e., the option selected automatically if the employees do not make a choice. The literature refers to this behavior as the default choice heuristic. As a consequence of inertia, another form of behavioral bias, the employees stick to this default choice and do not subsequently rebalance their portfolio. When we remove these outliers (678 for the ESPP and 860 for the CSP), the return and volatility are not affected, and only the Sharpe ratio statistics change (mean Sharpe ratio: 0.31 for the ESPP and 0.9 for the CSP; minimum: -0.48 for the ESPP and 0.06 for the CSP; SD: 0.24 for the ESPP and 0.32 for the CSP). We run the regressions without the outliers. We consolidate our results by considering regressions with outliers but using a robust estimator (see comments about how the results are affected in the additional tests and robustness checks section).

Table 4 displays the participation rates (Panel A) and the amount invested (Panel B) according to the funds and plans offered. For the ESPP participants, the participation rate is higher in the multiple offer (83.77%) than in the classic one (49.54%), with a higher average amount invested in the classic offer (3,551.79 ¿ 2,789.45). For the CSP participants, company stocks are the preferred asset (74.45% of the participants with an 11,360 average investment), followed by the monetary fund (64.66%; 6,838), the diversified fund invested in eurozone bonds (53.30%; 3,931), the diversified fund invested in international stocks (45.37%; 3,626), and the diversified fund invested in eurozone stocks (38.73%; 3,281).

The statistics in Table 5 relate the Sharpe ratios of the returns of all (ESPP and CSP) individual portfolios and the volatility of the individual portfolios with respect to the variables. We focus on only the Sharpe ratios. On average, the Sharpe ratios are higher for older employees, women, small-city residents, employees with an intermediate education level (high school and bachelor's degrees), employees who are less wealthy, employees with lower salaries and bonuses, employees with permanent contracts, the most senior employees, and the lowest-ranked employees. Meanwhile, finance experts, as well as commercial, HRM, and administrative staff, have lower Sharpe ratios than those of their colleagues. The statistics regarding wealth, salary, bonus, hierarchical rank, and financial expertise are counterintuitive. In most cases, they are explained by higher portfolio returns (for finance experts and

wealthier, higher-paid, and better-ranked employees) compensated by even higher volatility. In other words, the Sharpe ratios of these categories are a consequence of higher returns but riskier portfolios. Such choices can be related to the overconfidence of these categories of employees, who tend to take higher risks that do not necessarily translate into better returns. Table 6 displays the correlation matrix of the variables included in the regressions.

4.2 Regression analyses

Tables 7, 8 and 9 report the coefficients of the regressions on the individual Sharpe ratios. For the CSP, ESPP, and both plans, the first and second columns display the probit regression coefficients, and columns 3 to 6 show the OLS regression coefficients. Two sets of independent variables are included in the regressions: demographic and job variables. With respect to the job-related variables, finance experts are financially literate, and HRM staff know the rules of the plan (early withdrawal conditions, for instance). The highest-ranked employees may have better knowledge of the company's future returns. Being a finance expert positively affects the decision to participate in both plans and is positively related to ESPP portfolio efficiency; however, it does not significantly affect the CSP efficiency. When we look at both plans, the probability of participating is higher for financially literate employees, but being financially literate is negatively (sig 10%) related to the overall Sharpe ratio. These initial results suggest that finance experts behave differently when offered their employer's stocks only than when they have to invest in a plan offering several investment options. Therefore, they may be affected by the "mental accounting of company stock" documented by **?**, which involves putting company stock into a different asset category from other equities. HRM staff is assumed to have better knowledge of the rules of the plans. These employees also have to advertise the plans and to provide answers to questions about the plans to their colleagues. The HRM dummy is not significantly associated with participation and efficiency of CSP investment. Overall, these employees participate more but do not have significantly higher efficiency. The result regarding HRM staff as having better knowledge of the ESPP plan is consistent with the previous findings of **?** and **?**. Again the different results for the two plans offered suggest a mental accounting of company stock. Previous knowledge of the plan can be related to individual past experience, as measured by the number of years employed. The number of years employed affects the efficiencies of the overall plans and of the CSP but has no significant relation with participation. This variable can be interpreted in two ways. First, the longer an employee works for a company, the higher her specific human capital and the lower her incentive to invest in the company stock. An informed

diversification strategy should prevent investment of employees whose human capital is more specific and less transferable. Second, **?** find that past experience predicts equity investment. In our case, the company experienced positive past returns over the two previous years. **?** finds that employees tend to excessively extrapolate their company's past returns and link this behavior to the representativeness bias documented by behavioral economics. Our findings validate the two approaches since more experienced employees participate less but have better performance. These employees would secure their past performance by not participating. Our data do not allow for testing the disposition effect, but the lack of significance of the years employed variable can also have some connection with this behavioral bias. Recall that in the French company savings plans, the savings are blocked for five years. Lower participation by more experienced employees may compensate for this legal obligation. Employees with the highest hierarchical rank have better knowledge of the bank's strategy and future returns. The regression coefficients associated with the rank variable display positive signs for ESPP participation and efficiency, indicating that higher-ranked employees participate more in the employer's stock offer and obtain better performance. Conversely, hierarchical rank does not predict participation or better performance in the CSP. These results suggest that higher-ranked employees have better information about their company's performance and do not confirm the previous findings of **?** and (**?**). Commercial staff are financial advisors to the bank's customers. Being a commercial employee is associated with a higher participation rate in the CSP and both plans but is not related to higher efficiency. Our results in this regard are consistent with those of **?** and **?**, who investigate the consequences of financial advice on the portfolio choices of bank customers. **?** show that bank advisors are not sufficient to alleviate the problem of financial literacy, whereas **?** find that advised customers have a lower risk-return trade-off ratio (measured by the Sharpe ratio). Our results suggest that the bank customer choices documented by these authors may be a consequence of bank advisors who do not make the best choices for their own portfolio.

The competencies of the logistics staff are not specific to the finance industry. The logistics staff dummy is negatively related to participation in the ESPP and is not significantly related to the other dependent variables. Holding an administrative position is positively related to participation in both plans, CSP participation, and better ESPP efficiency. Higher wages and bonuses are related to higher participation rates in both plans but not to better Sharpe ratios. Salary positively affects ESPP participation and efficiency, whereas bonuses are negatively associated with both variables. Our proxy of wealth is positively related to participation in the ESPP and the CSP. This result is in line with the Arrow-Pratt absolute risk aversion be-

ing a decreasing function of wealth. As their wealth increases, employees tend to invest more in risky assets. Employees with a permanent contract participate less frequently. Temporary employees are eligible after six months, and they can withdraw the money invested in the plans at the end of their contract while benefiting from tax exemptions. This rule creates a windfall for temporary employees. Salary, bonus, wealth and permanent contract capture the liquidity constraints faced by employees. These variables were included in previous works investigating ESPP and company-based savings (**????**). Our results are in line with previous findings regarding participation in these plans, and we provide new evidence regarding portfolio efficiency.

Most of the regression coefficients associated with the demographic variables are significant, but we document different results depending on the type of plan. With the exception of wealth, the signs of the regression coefficients are often different for the two steps of the Heckman regressions. For the CSP regressions and for both steps of the regressions, the coefficients related to age^2, gender and education level are positive, whereas they are negative for the ESPP regressions. The age coefficients are negative for the CSP and positive for the ESPP. These signs correspond to an inverted U-shaped relation for the ESPP and a U-shaped relation for the CSP. The first result is consistent with previous findings regarding ESPP investment (**????**). Place of residence is significant only for participation in the ESPP. These opposite results reveal the different natures of the two plans. CSP offers various investment options, including company stock, and ESPP offers only company stock. In addition to this difference, ESPP is a one-shot plan, providing the opportunity to invest in the company only once. By contrast, CSP is an ongoing plan the allows continuous investment.

4.3 Additional tests and robustness checks

In addition to the regressions of the Sharpe ratios on the independent variables, we perform regressions of the components of the Sharpe ratio, i.e., the return (fourth column of Tables 7, 8 and 9) and volatility (fifth column of Tables 7, 8 and 9), and for another efficiency measure—the information ratio (sixth column of Tables 7, 8 and 9). The information ratio is an alternative portfolio efficiency measure of risk-adjusted returns in relation to a benchmark. As a benchmark, we use the three-monthly French state treasury bills as a proxy for risk-free return because, first, we have previously documented the high concentration of employee investment in the money fund. Second, **?** advocates the use of the risk-free rate as a benchmark and regard the risk-free rate as the return provided by the passive portion of the investor's portfolio.

We focus on the second step of the Heckman regressions because the probit regression coefficients remain the same. In Table 7, the variables significantly associated with the returns of both plans are age (+), age^2 (-), gender (+), place of residence (+), education level (-), permanent contract (+), hierarchical rank (+), and administrative staff (+). For the CSP returns, the variables associated with the returns are age^2 (+), gender (-), salary (-), finance expert (+), and logistics staff (-). For the ESPP returns, the significant coefficients are age (+), age^2 (-), gender (-), education level (-), salary (+), hierarchical rank (+), commercial staff (+), and HRM staff (+). The regression coefficients of volatility are displayed in the fifth columns of Tables 7, 8 and 9. For both plans, variables significantly associated with volatility are age (+), age^2 (-), gender (-), place of residence (+), education level (+), permanent contract (-), hierarchical rank (+), and administrative staff (-). For the CSP volatility, the significant factors are age^2 (+), gender (-), salary (-), finance expert (+), and logistics staff (-). The significant coefficients for the ESPP volatility are age (+), age^2 (-), gender (-), education level (-), salary (+), hierarchical rank (+), commercial staff (+), and HRM staff (+).

We also run regressions on the information ratio; the results are presented in the sixth columns of Tables 7, 8 and 9. Again, we focus on OLS regression and compare the results to those of the Sharpe ratio regression. We find different results for most of the variables for both plans: age^2, gender, education level, years employed, hierarchical rank, finance expert, commercial staff, and administrative staff. The signs change for age^2, gender, education level, years employed, and hierarchical rank. When we consider the two plans offered to the employees, we note that most of these diverging results are due to differences reported for the CSP. Indeed, the regression results of the ESPP information ratio remain the same. Recall that the information ratio takes the risk-free return as a benchmark and that the CSP contains a monetary fund. The presence of such an option affects the results.

We previously identified the presence of outliers due to the construction of the Sharpe ratios. Very large numerator values of excess returns and very low denominator values of volatility produce these outliers. The regression results presented in Tables 7, 8 and 9 do not account for these outliers. As an additional robustness check, we rerun the regressions for all the observations and using a robust estimator. The coefficients of the participation regression in both plans remain the same, and we find different significance levels only for the second step of the OLS regression.

5 Discussion

We investigate the risk return determinants of a sample of bank employees in their company savings plans. We first find that the determinants differ depending on the type of plan offered: the ESPP and the CSP. The variables affecting both participation and portfolio efficiency are not the same. These contrasting results reveal the very different nature of the two plans. CSP offers various investment options, including company stock, and ESPP offers only company stock. In addition to this difference, ESPP is a one-shot plan that provides the opportunity to invest in the company only once. By contrast, CSP is an ongoing plan that allows continuous investment. Our results suggest that these differences are driven by the mental accounting of company stock. Employees place their employer's stock in a category separate from that of other assets and consequently optimize their savings separately.

Another important result of our analyses is that better-informed employees do not necessarily have better portfolio efficiency. Again, this result depends on the plan investigated. We measure expertise in terms of information held by the employees with three variables, assuming that finance experts have better knowledge of financial markets, that HRM staff members have better knowledge of the administrative functioning of the plan, and that higher-ranked employees have better information about the company's future performance. For this latter category of employees, private information may affect their willingness to invest in company stock, either through the ESPP or the CSP fund that is invested mainly in company stock. Being a finance expert positively affects the decision to participate in both plans, is positively related to ESPP portfolio efficiency and does not affect CSP efficiency. HRM employees participate significantly more frequently in the ESPP than do their colleagues, and they have better ESPP efficiency. Their participation in the CSP and the efficiency of their investment in the CSP are not significantly higher than those of other employees. Higher-ranked bank employees participate more frequently and obtain better efficiency for the ESPP, a plan that is entirely invested in company stock. The portfolio efficiency of higher-ranked employees is lower for the CSP. When we take a closer look at the components of the Sharpe ratios (i.e., returns and volatility), we note that these results are a consequence of the higher returns and higher volatility of the higher-ranked employees and HRM staff in the ESPP and of the higher returns and higher volatility of the finance experts in the CSP. These results are consistent with **?**, who finds that more literate households hold riskier positions when expected returns are higher.

Our analysis has several limitations that may restrict the interpretation of the results. First, the number of assets offered by the company in the ESPP and CSP plans does not

fully reflect all investment possibilities available in the financial markets. Employees may have better alternative options outside the company savings plans. In fact, our study observes employee wealth only within the plans offered by their company, and our wealth variable proxy does not capture the actual wealth composition. Consequently, since only a fraction of the employees' portfolios is observed, it is difficult to assess the overall portfolio efficiency of the employees based on our findings. We do not measure employees' wealth outside the CSP and ESPP, such as real estate property or net debt. We use a cross-sectional dataset of a sample of employees at a given point in time that does not measure portfolio dynamics and rebalancing. **?** suggest that portfolio dynamics within company-based savings are very low and subject to inertia. **?** finds that financially literate individuals actively rebalance their portfolio over time and maintain a constant risk exposure. The stock price of the company we study experiences positive returns, as reported in Table 2.

According to **?**, investors who have experienced low returns in the past are less likely to invest in risky assets and have higher risk aversion. **?** notes that returns in the past affect investment in company stock in 401(k) plans. He states that this extrapolation of past returns is an example of the representativeness effect documented by behavioral economics. **?** review several variables affecting retail investment that we do not include in our regression analysis, i.e., parental status, religion, political opinions, and being an immigrant. Other omitted variables documented by the household finance literature include specific financial education, rational expectations, ambiguity and loss aversion. Finally, we use French data, and according to **?**, France has some idiosyncratic features within the eurozone area. The share of households owning safe (risky) assets is higher (lower) than the eurozone average. Another specificity is that French citizens have less incentive to invest in financial literacy than do citizens of other countries with less generous social security systems (**?**).

The work of Richard Thaler has strongly influenced research on retail investors' behavior, both theoretically and empirically. From a theoretical perspective, **?** develops the notion of mental accounting, which is very important for understanding company-based savings. One application of mental accounting is the behavioral life-cycle hypothesis (**??**), which posits that people mentally frame assets as belonging to either current income, current wealth or future income. This cognitive phenomenon consists of psychologically separating these "accounts" and considering them as non-fungible. As a consequence, the marginal propensity to consume from each account is different. Mental accounting affects company-based savings at two levels. First, the mental accounting of company stocks (**?**) consists of employees considering company stocks as a separate asset. The company that provided the data offers ESPP and company

stocks in the CSP. Second, the mental accounting of company stocks is very likely to affect the employees, but the mental accounting may be important at the level of overall company savings since it is not clear whether employees consider company savings separately from other components of their wealth. On the theoretical side, Thaler challenges the premise of economic theory that people choose by optimizing. His research has contributed to the inclusion of behavioral biases or "supposedly irrelevant factors" (**?**). Although the influence of such factors is not tested directly, they may affect the behavior of the bank employees, including those who have better knowledge of financial securities. In addition to mental accounting, these factors include the framing effect, the role of past experience, the default heuristics, inertia, overconfidence and the disposition effect. On the empirical side, several joint papers of Thaler and Benartzi contribute to a better understanding of company-based savings. Naïve diversification and mental accounting were documented empirically and are now used to help people to make better decisions for their retirement, for example, the SMarT plan (**?**).

6 Conclusion

In this paper, we investigate the portfolio efficiency of bank employees. Some of the bank employees are trained to understand financial markets, some know the administrative functioning of the plans, and some are likely to hold private information about the company's future returns. We do not have access to all the components of the employees' overall wealth, but even these well-informed and trained employees do not appear to adopt efficient investment strategies.

Our results suggest that financial expertise and knowledge of the plans are related to participation in the plans offered by the company, confirming our first hypothesis. Financial expertise is related to better ESPP individual portfolio performance but not to better overall and CSP performance. Our second hypothesis is validated only for ESPP investment. For both plans offered, participation is more likely among most of the job categories that include finance experts, female employees, more educated employees and less financially constrained employees. We find evidence of the mental accounting of company stock highlighted by **?**.

We also suggest that financially literate investors are affected by behavioral biases such as mental accounting. This result is in line with the previous findings of **??** and **?**, who showed that both sophisticated investors and finance professionals are also subject to behavioral biases, such as the disposition effect, overconfidence and optimism.

Appendices

Table 1: Description of the variables included in the analyses

DEMOGRAPHIC VARIABLES

Variables' names	Description	Source
Age	Age is the employee's age in years.	Company's data
Gender	Gender takes the value of 1 if the employee is a women and 0 otherwise.	Company's data
Place of residence	Place of residence takes the value of 1 if the employee lives in a large city. and 0 otherwise	Company's data
Education level	Education level takes the following values according to the education level: 1: secondary school degree — 2: high school diploma — 3: bachelor's degree — 4: master's degree — 5: master's degree and higher.	Company's data
Wealth	Wealth is a proxy of employee's overall wealth.	INSEE localised tax revenues system

JOB CHARACTERISTICS VARIABLES

Variables' names	Description	Source
Salary	Salary is the employee's gross annual salary in euros.	Company's data
Bonus	Bonus is the annual bonus amount granted to the employee in euros.	Company's data
Permanent contract	Permanent contract takes the value of 1 if the employee has a permanent contract and 0 otherwise.	Company's data
Years employed	Years employed is the number of years the employee has worked for the bank.	Company's data
Hierarchical rank	Hierarchical rank is an internal hierarchical ranking system ranging from 1 (lowest) to 12 (highest).	Company's data
Finance expert	Finance expert takes the value of 1 if the employee is a finance expert and 0 otherwise.	Company's data
Commercial staff	Commercial staff takes the value of 1 if the employee interacts with the bank's customers and 0 otherwise.	Company's data
HRM staff	HRM staff takes the value of 1 if the employee is part of the HRM staff and 0 otherwise.	Company's data
Logistics staff	Logistics staff takes the value of 1 if the employee is part of the logistics staff and 0 otherwise.	Company's data
Administrative staff	Administrative staff takes the value of 1 if the employee is part of the administrative staff and 0 otherwise.	Company's data
Other staff	Other staff takes the value of 1 if the employee cannot be identified as part of other employment dummies.	Company's data

Table 2: Characteristics of the investment options offered to the employees

Panel A: Characteristics of the different funds offered to the employees

Plans	Funds proposed	Benchmark	Volatility over 2 years	Mean returns over 2 years	Sharpe ratios
Employee Stock Purchase Plans	Classic offer	Evolution of stock market movements (EURONEXT, LIFE, EUREX) to value the company stock.	24.09%	21.77%	0.9
	Multiple offer	Investment only in company stocks quoted on the Euronext Paris market.	94.42%	80.99%	0.86
Company Savings Plans	Money	Evolution of the Asset value in conjunction with the EONIA rate	0.17%	2.86%	16.59
	Company stock	Replicate the performance of the company stock	23.41%	22.18%	0.95
	Diversified	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			
	Diversified	Benchmark composite index70 % EuroMTS Global + 15 % JPM GBI Global Traded Index hedged EUR+ 9 % DJ Stoxx 50 + 4% S&P 500 + 2% MSCI Japon,			
	Diversified	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,	7.29%	12.96%	1.78

Panel B: Legal constraints on the investment options offered

Plans	Investment choices offered	Constraints
All plans		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.
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.
	Combined	The total personal contribution of each investors within these two funds coupled could not exceed 25,000 Euros.
	Multiple and Classic	
Company Savings Plans	Monetary assets	None
	Company stock	None
	Diversified assets	None
	Diversified assets	None
	Diversified assets	None

Table 3: Descriptive statistics

Panel A: Dichotomous variables

		All Plans				ESPP				CSP			
		Yes		No		Yes		No		Yes		No	
		N	%	N	%	N	%	N	%	N	%	N	%
Gender	Female	15,672	60.22	2,063	60.52	3,412	50.19	14,323	63.28	15,609	39.78	2,126	39.5
	Male	10,351	39.78	1,346	39.48	3,386	49.81	8,311	36.72	10,309	60.22	1,388	60.5
Place of residence	Large city	3,030	11.64	346	10.15	975	14.34	2,401	10.61	3,012	11.62	364	10.36
	Small city	22,993	88.36	3,063	89.85	5,823	85.66	20,233	89.39	22,906	88.38	3,150	89.64
Education level	1	4,526	17.39	534	15.66	1,260	18.53	3,800	16.79	4,501	17.37	559	15.91
	2	17,704	68.03	2,532	74.27	4,467	65.71	15,769	69.67	17,638	68.05	2,598	73.93
	3	2,884	11.08	312	9.15	633	9.31	2,563	11.32	2,874	11.09	322	9.16
	4	840	3.23	23	0.67	420	6.18	443	1.96	836	3.23	27	0.77
	5	69	0.27	8	0.23	18	0.26	59	0.26	69	0.27	8	0.23
Permanent contract	Yes	25,626	98.47	3,390	99.44	6,793	99.93	22,223	98.18	25,522	98.47	3,494	99.43
	No	397	1.53	19	0.56	5	0.07	411	1.82	396	1.53	20	0.57
Hierarchical rank	1-3	2 867	11.13	545	16.02	279	4.11	3,133	14	2,859	11.14	553	15.77
	3-6	11,610	45.06	1,883	55.36	2,176	32.09	11,317	50.55	11,567	45.08	1,926	54.93
	7-9	9,467	36.75	922	27.1	3,206	47.29	7,183	32.08	9,422	36.72	967	27.58
	10-12	1,820	7.06	52	1.53	1,119	16.5	753	3.36	1,811	7.06	61	1.74
Finance expert	Yes	3,386	13.01	317	9.3	1,046	15.39	2,657	11.74	3,370	13	333	9.48
	No	22,637	86.99	3,092	90.7	5,752	84.61	19,977	88.26	22,548	87	3,181	90.52
Commercial staff	Yes	13,718	52.71	1,822	53.45	3,056	44.95	12,484	55.16	13,661	52.71	1,879	53.47
	No	12,305	47.29	1,587	46.55	3,742	55.05	10,150	44.84	12,257	47.29	1,635	46.53
HRM staff	Yes	621	2.39	51	1.5	277	4.07	395	1.75	614	2.37	58	1.65
	No	25,402	97.61	3,358	98.5	6,521	95.93	22,239	98.25	25,304	97.63	3,456	98.35
Logistics staff	Yes	896	3.44	142	4.17	270	3.97	768	3.39	894	3.45	144	4.1
	No	25,127	96.56	3,267	95.83	6,528	96.03	21,866	96.61	25,024	96.55	3,370	95.9
Administrative staff	Yes	7,585	29.15	819	24.02	2,330	34.27	16,560	73.16	7,555	29.15	849	24.16
	No	18,438	70.85	2,590	75.98	4,468	65.73	6,074	26.84	18,363	70.85	2,665	75.84
Other staff	Yes	3,203	12.31	575	16.87	865	12.72	2,913	12.87	3,194	12.32	584	16.62
	No	22,820	87.69	2,834	83.13	5,933	87.28	19,721	87.13	22,724	87.68	2,930	83.38

Panel B: Continuous variables

All Plans

Participation	Yes					No		
	N	Mean	Min	Max	SD	N	Mean	Min
Age	26,023	46.40	19	65	10.77	3,409	46.94	20
Wealth	24,607	35,750.40	18,386.56	94,954.64	8,688.70	3173	34,710.12	18,522.27
Salary	26,023	29,817.70	8,688	390,000	12,823.77	3,409	26,079.43	8,700
Bonus	26,023	1,550.97	0	650000	5,945.87	3,409	641.91	0
Years employed	26,023	25.28	0	45	12.46	3,409	26.12	0
Portfolio's return	26,023	9.51%	0.00%	50.62%	6.53%	3,409	-	-
Portfolio's vol.	26,023	9.95%	0.00%	94.37%	10.23%	3,409	-	-
Portfolio's SR	26,023	0.88	-0.88	1.78	0.39	3409	-	-
Average amount invested per job category	26,023	16,727.76	13,552.59	25,993.30	3,573.52	3409	16,502.45	13,552.59

ESPP

Participation	Yes					No		
	N	Mean	Min	Max	SD	N	Mean	Min
Age	6,798	48.13	21	65	8.92	22,634	45.96	19
Wealth	6,458	37,081.17	18,386.56	87,860.09	9,255.58	21,322	35,192.53	18,522.27
Salary	6,798	36,096.79	14,904	382,860	18,390.63	22,634	27,368.77	8,688
Bonus	6,798	3,029.36	0	300,000	7,717.61	22,634	970.03	0
Years employed	6,798	26.54	2	44	11.16	22,634	25.03	0
Portfolio's return	6,798	1.91%	0.00%	50.62%	5.93%	22,634	-	-
Portfolio's vol.	6,798	3.17%	0.00%	94.37%	9.96%	22,634	-	-
Portfolio's SR	6,798	0.02	-321.44	0.67	4.25	22,634	-	-
Average amount invested per job category	6,798	17,362.02	13,552.59	25,993.30	3,734.85	22,634	16,503.32	13,552.59

CSP

	N	Mean	Min	Max	SD	N	Mean	Min
Wealth	24,509	35,756.81	18,386.56	94,954.64	8,695.65	3,271	34,693.27	18,522.27
Salary	25,918	29,811.49	8,700	390,000	12,824	3,514	26,236.93	8,688
Bonus	25,918	1,549.63	0	650,000	5,953.44	3,514	679.01	0
Years employed	25,918	25.29	0	45	12.45	3,514	26.04	0
Portfolio's return	25,918	7.60%	0.00%	14.83%	4.00%	3,514	-	-
Portfolio's vol.	25,918	7.48%	0.00%	23.39%	5.66%	3,514	-	-
Portfolio's SR	25,918	-24.47	-594197.44	1.78	3,705.92	0	-	-
Average amount invested per job category	25,918	16,726.88	13,552.59	25,993.3	3,571.584	3,514	16,515.60	13,552.59

Table 4: Participation rates and amount invested by investment options

Panel A: Participation rates

		Participation		Non Participation		Total
		N	%	N	%	N
ESPP	Classic offer	3,368	49.54	3,430	50.46	6,798
	Multiple offer	5,695	83.77	1,103	16.23	6,798
CSP	Monetary assets	16,758	64.66	9,160	35.34	25,918
	Company stocks	19,297	74.45	6,621	25.55	25,918
	Diversified Asset 8651	10,037	38.73	15,881	61.27	25,918
	Diversified Asset 8652	13,814	53.30	12,104	46.70	25,918
	Diversified Asset 8653	11,760	45.37	14,158	54.63	25,918

Panel B: Amount invested

		N	Mean	Min	Max	SD
ESPP	Classic offer	3,368	3551.79	5.38	44,751.45	4,157.69
	Multiple offer	5,695	2789.45	47.66	5,719.57	1,510.02
CSP	Monetary assets	16,758	6,838.97	.11	155,086.4	9,597.12
	Company stocks	19,297	11,360.23	.01	454,515	17,698.03
	Diversified Asset 8651	10,037	3,281.74	.01	113,036.4	5,529.79
	Diversified Asset 8652	13,814	3,931.33	.02	115,907.3	6,567.11
	Diversified Asset 8653	11,760	3,626.09	.06	140,439.7	5,759.29

Table 5: Statistics by groups

	Sharpe ratios						Portfolio return						Portfolio volatility					
	N	Mean	Median	Min	Max	SD	N	Mean	Median	Min	Max	SD	N	Mean	Median	Min	Max	SD
Age																		
Under 35	4,481	.8239	.8174	-.8794	1.7830	.5091	5,031	.0929	.0878	0	.5062	.0687	5,031	.0984	.0742	0	.9437	.1097
35–44	4,881	.8590	.8225	-.8794	1.7798	.3826	5,470	.1030	.0960	0	.5062	.0735	5,470	.1122	.0902	0	.9437	.1173
45–54	9,570	.9059	.8436	-.8794	1.7829	.3673	10,888	.0946	.0896	0	.5062	.0650	10,888	.0982	.0792	0	.9437	.1008
55–64	7,084	.9042	.8393	-.8794	1.7830	.3420	8,035	.0918	.0898	0	.5062	.0567	8,035	.0935	.0798	0	.9437	.0866
Over 65	7	.9894	.9714	.6364	1.3161	.2251	8	.0861	.0978	0	.1203	.0402	8	.0759	.0785	0	.1515	.0490
Gender																		
Male	10,351	.8378	.8025	-.8794	1.7817	.3737	11,697	.1019	.0997	0	.5062	.0691	11,697	.1112	.0932	0	.9437	.1087
Female	15,672	.9121	.8668	-.8794	1.7830	.4027	17,735	.0906	.0878	0	.5062	.0623	17,735	.0918	.0728	0	.9437	.0971
Place of residence																		
Large city	3,030	.8529	.8123	-.8794	1.7830	.3888	3,376	.1008	.0964	0	.5062	.0684	3,376	.1083	.0913	0	.9437	.1078
Small city	22,993	.8865	.8379	-.8794	1.7830	.3935	26,056	.0944	.0893	0	.5062	.0649	26,056	.0984	.0791	0	.9437	.1015
Education level																		
1	4,526	.8223	.8064	-.8794	1.7830	.4298	5,060	.1020	.0956	0	.5062	.0734	5,060	.1118	.0903	0	.9437	.1165
2	17,704	.9082	.8491	-.8794	1.7830	.3706	20,236	.0923	.0878	0	.5062	.0630	20,236	.0950	.0766	0	.9437	.0975
3	2,884	.8485	.8280	-.8794	1.7741	.4559	3,196	.0966	.0909	0	.5062	.0664	3,196	.1022	.0815	0	.9437	.1065
4	840	.7972	.7802	-.8794	1.7649	.3459	863	.1138	.1076	0	.5062	.0592	863	.1247	.1068	0	.9437	.0976
5	69	.7149	.8063	-.8794	1.4041	.4758	77	.0953	.0977	0	.2482	.0569	77	.1003	.1014	0	.2996	.0753
Wealth																		
Under 20,259	4	1.8447	1.9859	.9351	2.4719	.6482	6	.1115	.0884	0	.3873	.1428	6	.0001	2.64e-06	0	.0004	.0002
20,260–24,279	800	1.6158	1.3179	.8367	9.3008	1.2494	911	.1340	.1285	0	.8099	.0978	911	.0001	.0000	0	.0024	.0002
24,280–28,569	5,380	1.5556	1.2716	.8203	9.5819	1.2246	6,188	.1391	.1296	0	.8099	.1026	6,188	.0001	.0000	0	.0024	.0002
28,570–33,469	4,933	1.5836	1.2479	.8367	9.5635	1.3192	5,626	.1401	.1303	0	.8099	.1011	5,626	.0001	.0000	0	.0024	.0002
33,470–39,079	5,225	1.5480	1.2360	.8234	9.4696	1.2485	5,841	.1447	.1364	0	.8099	.1029	5,841	.0001	.0000	0	.0024	.0002
39,080–46,519	5,998	1.5564	1.2222	.8203	9.3377	1.3180	6,707	.1484	.1398	0	.8099	.1044	6,707	.0001	.0000	0	.0024	.0002
46,520–59,489	1,912	1.5769	1.2064	.8367	9.4991	1.4425	2,115	.1519	.1429	0	.8099	.1015	2,115	.0001	.0000	0	.0024	.0002
Over 59490	355	1.5110	1.1908	.8392	9.3008	1.3586	386	.1548	.1469	0	.7251	.1001	386	.0001	.0000	0	.0018	.0002
Salary																		
Under 24,999	9,742	.9300	.8979	-.8794	1.7830	.4409	11,523	.0836	.0828	0	.5062	.0613	11,523	.0830	.0641	0	.9437	.0937
25,000–74,999	14,722	.8627	.8161	-.8794	1.7829	.3604	16,312	.1007	.0956	0	.5062	.0666	16,312	.1075	.0896	0	.9437	.1055
50,000–74,999	1,174	.7616	.7653	-.8794	1.6899	.3358	1,205	.1218	.1124	0	.5062	.0663	1,205	.1384	.1186	0	.9437	.1101

Table 5 is continued on the next page

Statistics by groups (continued)

		Sharpe ratios						Portfolio return						Portfolio volatility					
		N	Mean	Median	Min	Max	SD	N	Mean	Median	Min	Max	SD	N	Mean	Median	Min	Max	SD
	75,000–99,999	217	.7945	.7945	-.8794	1.6899	.2570	219	.1280	.1219	0	.5062	.0605	219	.1432	.1254	0	.9437	.1045
	Over 100,000	75	.7561	.7329	-.8794	1.4488	.2677	76	.1263	.1087	0	.5062	.0676	76	.1505	.1213	0	.7841	.1200
Bonus																			
	Under 500	5,464	1.6877	1.3147	.8367	9.5635	1.4525	6,245	.1307	.1296	0	.8099	.0935	6,245	.0001	.0000	0	.0024	.0002
	500–999	4,782	1.6177	1.2784	.8367	9.3449	1.3855	5,476	.1376	.1296	0	.8099	.1018	5,476	.0001	.0000	0	.0024	.0002
	1,000–4,999	6,138	1.4728	1.1783	.8367	9.4991	1.2493	6,651	.1639	.1519	0	.8099	.1118	6,651	.0001	.0000	0	.0024	.0002
	5,000–9,999	1,492	1.3798	1.1408	.8367	9.5819	1.2366	1,544	.1903	.1721	0	.8099	.1129	1,544	.0001	.0001	0	.0024	.0003
	Over 10,000	436	1.3925	1.1410	.8367	9.3008	1.2835	441	.1966	.1838	0	.8099	.1005	441	.0001	.0001	0	.0024	.0002
Permanent contract																			
	Yes	25,626	.8840	.8344	-.8794	1.7830	.3888	29,016	.0953	.0902	0	.5062	.0655	29,016	.0998	.0805	0	.9437	.1026
	No	397	.7860	.8600	-.8794	1.6899	.6028	416	.0844	.0878	0	.5062	.0450	416	.0815	.0728	0	.7841	.0703
Years employed																			
	0–5 Years	3,510	.8035	.8112	-.8794	1.7830	.5212	3,885	.0937	.0878	0	.5062	.0666	3,885	.0990	.0759	0	.9437	.1061
	6–10 Years	1,249	.8226	.7947	-.8794	1.7448	.4458	1,431	.1011	.0949	0	.5062	.0788	1,431	.1133	.0913	0	.9437	.1298
	11–15 Years	1,777	.8723	.8175	-.8794	1.7798	.3716	1,996	.1024	.0951	0	.5062	.0727	1,996	.1116	.0896	0	.9437	.1139
	16–19 Years	1,728	.8585	.8252	-.8794	1.7649	.3652	1,893	.1061	.0981	0	.5062	.0735	1,893	.1153	.0932	0	.9437	.1186
	Over 20 Years	17,759	.9057	.8441	-.8794	1.7830	.3605	20,227	.0932	.0892	0	.5062	.0622	20,227	.0960	.0788	0	.9437	.0959
Hierarchical rank																			
	1	2,867	.9464	.9275	-.8794	1.7830	.4754	3,412	.0792	.0805	0	.5062	.0555	3,412	.0757	.0605	0	.9437	.0821
	2	11,610	.9273	.8742	-.8794	1.7830	.3988	13,493	.08727	.0862	0	.5062	.0621	13,493	.0878	.0702	0	.9437	.0958
	3	9,467	.8311	.8011	-.8794	1.7817	.3531	10,389	.1059	.1007	0	.5062	.0696	10,389	.1160	.096176	0	.9437	.1113
	4	1,820	.7758	.7691	-.8794	1.7649	.3153	1,872	.1219	.1147	0	.5062	.0654	1,872	.1378	.1192	0	.9437	.1083
Finance expert																			
	Yes	3,386	.8161	.8014	-.8794	1.7817	.3740	3,703	.1059	.1016	0	.5062	.0686	3,703	.1152	.0983	0	.9437	.1064
	No	22,637	.8925	.8417	-.8794	1.7830	.3950	25,729	.0936	.0883	0	.5062	.0647	25,729	.0973	.0775	0	.9437	.1015
Commercial staff																			
	Yes	13,718	.8737	.8367	-.8794	1.7830	.4110	15,540	.0945	.0886	0	.5062	.0665	15,540	.0991	.0781	0	.9437	.1042
	No	12,305	.8924	.8320	-.8794	1.7830	.3720	13,892	.0958	.0915	0	.5062	.0639	13,892	.1000	.0830	0	.9437	.1001
HRM staff																			
	Yes	621	.8789	.8298	-.8794	1.7721	.3481	672	.1087	.0983	0	.5062	.0744	672	.1169	.0916	0	.9437	.1194
	No	25,402	.8826	.8346	-.8794	1.7830	.3942	28,760	.0948	.0898	0	.5062	.0650	28,760	.0991	.0801	0	.9437	.1018

Table 5 is continued on the next page

Statistics by groups (continued)

		Sharpe ratios						Portfolio return						Portfolio volatility					
		N	Mean	Median	Min	Max	SD	N	Mean	Median	Min	Max	SD	N	Mean	Median	Min	Max	SD
Logistics staff																			
	Yes	896	.9128	.8445	-.8794	1.7631	.3837	1,038	.0933	.0899	0	.5062	.0667	1,038	.0969	.0799	0	.9437	.1025
	No	25,127	.8815	.8342	-.8794	1.7830	.3934	28,394	.0952	.0901	0	.5062	.0653	28,394	.0996	.0804	0	.9437	.1022
Administrative staff																			
	Yes	7,585	.8781	.8213	-.8794	1.7816	.3656	8,404	.0982	.0933	0	.5062	.0636	8,404	.1036	.0865	0	.9437	.1016
	No	18,438	.8844	.8403	-.8794	1.7830	.4039	21,028	.0939	.0886	0	.5062	.0660	21,028	.0979	.0779	0	.9437	.1025
Other staff																			
	Yes	3,203	.9231	.8546	-.8794	1.7830	.3858	3,778	.0887	.0878	0	.5062	.0612	3,778	.0900	.0732	0	.9437	.0912
	No	22,820	.8768	.8316	-.8794	1.7830	.3938	25,654	.0960	.0907	0	.5062	.0658	25,654	.1009	.0814	0	.9437	.1037

Table 6: Correlation matrix

	1	2	3	4	5	6	7	8	9	10
1. Sharpe ratio all plans	1									
2. Sharpe ratio ESPP	-0.0717***	1								
3. Sharpe ratio CSP	0.0047	-0.0019	1							
4. Age	0.0745***	-0.0231	-0.0050	1						
5. Age^2	0.0731***	-0.0229	-0.0050	0.9934***	1					
6. Gender	0.0924***	-0.0007	0.0072	-0.0353***	-0.0360***	1				
7. Place of residence	-0.0274***	0.0060	0.0007	-0.0555***	-0.0517***	-0.0356***	1			
8. Education level	-0.0005	0.0031	0.0001	0.0660***	0.0677***	-0.0217***	0.0387***	1		
9. Wealth	-0.0456***	0.0165	-0.0092	-0.0443***	-0.0535***	0.0180***	0.0639***	0.0504***	1	
10. Salary	-0.1026***	0.0180	-0.0018	0.1876***	0.1743***	-0.2557***	0.1055***	0.1756***	0.2096***	1
11. Bonus	-0.0570***	0.0154	-0.0021	0.0160***	0.0081	-0.1368***	0.0783***	0.0998***	0.1088***	0.6680***
12. Permanent contract	0.0306***	-0.0026	-0.0008	0.2662***	0.2295***	-0.0043	-0.0183***	0.0378***	0.0247***	0.1725***
13. Years employed	0.0935***	-0.0271**	-0.0038	0.9418***	0.9377***	0.0159***	-0.0874***	0.0577***	-0.0693***	0.0872***
14. Hierarchical rank	-0.1364***	0.0266**	-0.0060	0.1256***	0.1079***	-0.3017***	0.0707***	0.0843***	0.1763***	0.7028***
15. Finance expert	-0.0654***	0.0036	0.0009	-0.1245***	-0.1312***	-0.0700***	0.0078	0.0027	0.0086	0.0350***
16. Commercial staff	-0.0237***	0.0199	-0.0052	-0.3433***	-0.3388***	0.0161***	-0.0373***	-0.0357***	-0.1293***	-0.2009***
17. HRM staff	-0.0014	0.0054	0.0011	0.0705***	0.0689***	0.0270***	0.0164***	0.0150***	0.0441***	0.0874***
18. Logistics staff	0.0145**	0.0022	0.0013	0.0805***	0.0825***	-0.0928***	0.0398***	0.0201***	0.0433***	0.0610***
19. Administrative staff	-0.0072	-0.0219	0.0043	0.2048***	0.1988***	-0.0177***	0.0243***	0.0250***	0.0989***	0.1807***
20. Other staff	0.0387***	-0.0030	0.0008	0.1600***	0.1608***	0.0389***	-0.0065	0.0017	0.0151***	-0.0168***

	11	12	13	14	15	16	17	18	19	20
11. Bonus	1									
12. Permanent contract	0.0298***	1								
13. Years employed	-0.0366***	0.2224***	1							
14. Hierarchical rank	0.3149***	0.1403***	0.0587***	1						
15. Finance expert	0.0053	0.0272***	-0.1328***	0.1903***	1					
16. Commercial staff	-0.0535***	-0.0746***	-0.3119***	-0.1072***	0.2733***	1				
17. HRM staff	0.0355***	0.0164***	0.0752***	0.0911***	-0.0580***	-0.1617***	1			
18. Logistics staff	0.0157***	-0.0099	0.0268***	0.0104	-0.0725***	-0.2022***	-0.0292***	1		
19. Administrative staff	0.0467***	0.0680***	0.1914***	0.1556***	-0.2387***	-0.6686***	-0.0966***	-0.1209***	1	
20. Other staff	-0.0077	0.0176***	0.1587***	-0.0970***	-0.0197***	-0.4059***	-0.0587***	-0.0734***	-0.2426***	1

Table 7: All savings plan offered by the bank

	Probit		OLS			
	with outliers	without outliers	Sharpe ratio	Portfolio return	Portfolio volatility	Information ratio
Age	-0.0264***	-0.0300***	-0.00688***	0.00433***	0.00656***	0.0608***
	(0.00955)	(0.00943)	(0.00261)	(0.000488)	(0.000760)	(0.00858)
Age^2	0.000269**	0.000309***	5.18e-05*	-4.87e-05***	-7.30e-05***	-0.000688***
	(0.000106)	(0.000108)	(2.89e-05)	(5.21e-06)	(8.23e-06)	(9.51e-05)
Gender	0.153***	0.152***	0.0567***	-0.0115***	-0.0190***	-0.179***
	(0.0222)	(0.0239)	(0.00677)	(0.00136)	(0.00186)	(0.0223)
Place of residence	0.00653	0.00433	-0.0112	0.00336**	0.00520**	0.0479*
	(0.0328)	(0.0329)	(0.00859)	(0.00155)	(0.00257)	(0.0283)
Education level	0.0484***	0.0499***	0.0132***	-0.00384***	-0.00627***	-0.0607***
	(0.0180)	(0.0171)	(0.00437)	(0.000576)	(0.00107)	(0.0144)
Wealth	1.54e-06	1.66e-06	-1.83e-07	-5.64e-08	-5.34e-08	-5.60e-07
	(1.27e-06)	(1.39e-06)	(3.37e-07)	(6.68e-08)	(9.24e-08)	(1.11e-06)
Salary	1.54e-05***	1.58e-05***	5.30e-07	-1.07e-07	-1.48e-07	-1.19e-06
	(3.28e-06)	(3.20e-06)	(5.69e-07)	(9.79e-08)	(1.57e-07)	(1.87e-06)
Bonus	4.13e-05***	4.11e-05***	-3.83e-07	3.58e-08	7.24e-08	1.78e-08
	(1.11e-05)	(1.28e-05)	(7.13e-07)	(1.24e-07)	(1.71e-07)	(2.35e-06)
Permanent contract	-0.377**	-0.391***	-0.0240	0.0122**	0.0181**	0.155
	(0.148)	(0.150)	(0.0380)	(0.00542)	(0.00784)	(0.125)
Years employed	0.000358	-0.000121	0.00242***	-0.000241*	-0.000570***	-0.00541**
	(0.00274)	(0.00288)	(0.000708)	(0.000144)	(0.000216)	(0.00233)
Hierarchical rank	-0.00697	-0.00807	-0.0311***	0.00286***	0.00617***	0.0465**
	(0.0238)	(0.0250)	(0.00640)	(0.000926)	(0.00148)	(0.0211)
Finance expert	0.157***	0.158***	-0.0178*	0.000244	7.83e-05	0.00828
	(0.0362)	(0.0441)	(0.00962)	(0.00161)	(0.00301)	(0.0317)
Commercial staff	0.194***	0.193***	0.00157	-0.00345*	-0.00398*	-0.0526*
	(0.0323)	(0.0346)	(0.00966)	(0.00195)	(0.00225)	(0.0318)
HRM staff	0.185**	0.188**	0.0178	0.00132	0.00230	0.0278
	(0.0801)	(0.0795)	(0.0203)	(0.00353)	(0.00625)	(0.0667)
Logistics staff	0.0609	0.0592	0.0279	-0.00199	-0.00383	-0.0344
	(0.0604)	(0.0665)	(0.0171)	(0.00355)	(0.00436)	(0.0563)
Administrative staff	0.213***	0.213***	0.00547	-0.00560**	-0.00705**	-0.0848**
	(0.0341)	(0.0394)	(0.0106)	(0.00227)	(0.00282)	(0.0350)
Average amount invested	1.43e-05***	1.39e-05***	-	-	-	-
per job category	(2.06e-06)	(2.67e-06)	-	-	-	-
Constant	1.071***	1.177***	0.994***	0.0476***	0.0195	1.071***
	(0.230)	(0.211)	(0.0602)	(0.0108)	(0.0131)	(0.230)
Inverse Mills ratio			0.443***	-0.095-***	-0.141***	-1.458***
			(0.0776)	(0.0125)	(0.0232)	(0.255)
Observations			29,432	29,432	29,432	29,432
Censored			3,409	3,409	3,409	3,409
Uncensored			26,023	26,023	26,023	26,023

Notes: The "All Plans" table presents the results of the 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 ratios regressions of employees' characteristics. We have also provided the inverse Mills 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 8: Company savings plan

	Probit		OLS			
	with outliers	without outliers	Sharpe ratio	Portfolio return	Portfolio volatility	Information ratio
Age	-0.0316***	-0.0340***	-0.0110***	-0.000186	0.000525*	-0.0105**
	(0.00947)	(0.00901)	(0.00364)	(0.000197)	(0.000292)	(0.00442)
Age^2	0.000328***	0.000352***	9.39e-05**	4.53e-06**	-1.17e-06	0.000167***
	(0.000105)	(8.80e-05)	(4.03e-05)	(2.07e-06)	(3.27e-06)	(4.90e-05)
Gender	0.143***	0.141***	0.0685***	-0.00465***	-0.0110***	-0.127***
	(0.0220)	(0.0213)	(0.00933)	(0.000535)	(0.00113)	(0.0113)
Place of residence	-0.00582	-0.00745	-0.0146	0.000594	0.00170	0.0104
	(0.0323)	(0.0252)	(0.0118)	(0.000499)	(0.00129)	(0.0143)
Education level	0.0487***	0.0491***	0.0164***	0.000432	-0.000436	0.0115
	(0.0177)	(0.0188)	(0.00603)	(0.000316)	(0.000595)	(0.00725)
Wealth	2.21e-06*	2.36e-06*	-6.46e-08	-5.98e-09	1.62e-08	4.96e-07
	(1.26e-06)	(1.31e-06)	(4.66e-07)	(2.30e-08)	(3.46e-08)	(5.65e-07)
Salary	1.23e-05***	1.28e-05***	1.56e-07	-2.27e-07***	-2.90e-07***	-5.02e-06***
	(3.17e-06)	(3.68e-06)	(7.83e-07)	(4.42e-08)	(6.92e-08)	(9.30e-07)
Bonus	3.28e-05***	3.27e-05**	-2.40e-07	1.08e-07	1.83e-07*	2.10e-06*
	(1.05e-05)	(1.36e-05)	(9.74e-07)	(7.93e-08)	(1.11e-07)	(1.14e-06)
Permanent contract	-0.345**	-0.357**	-0.0261	0.00169	0.00410	-0.0166
	(0.145)	(0.165)	(0.0518)	(0.00256)	(0.00469)	(0.0623)
Years employed	0.00132	0.000860	0.00263***	-2.73e-05	-0.000211**	-0.00229*
	(0.00271)	(0.00310)	(0.000976)	(5.55e-05)	(8.62e-05)	(0.00119)
Hierarchical rank	0.00424	0.00426	-0.0314***	0.000633	0.00251***	0.0222**
	(0.0234)	(0.0210)	(0.00877)	(0.000403)	(0.000731)	(0.0107)
Finance expert	0.152***	0.153***	-0.0152	0.00275***	0.00411***	0.0798***
	(0.0358)	(0.0350)	(0.0133)	(0.000739)	(0.00124)	(0.0160)
Commercial staff	0.193***	0.192***	0.0128	0.000226	-0.000967	0.0121
	(0.0321)	(0.0297)	(0.0133)	(0.000723)	(0.00147)	(0.0162)
HRM staff	0.120	0.122	0.0178	-0.00152	-0.00341	-0.0361
	(0.0769)	(0.0803)	(0.0274)	(0.00127)	(0.00239)	(0.0331)
Logistics staff	0.0624	0.0628	0.0383	-0.00278**	-0.00642**	-0.0701**
	(0.0601)	(0.0670)	(0.0235)	(0.00110)	(0.00275)	(0.0287)
Administrative staff	0.205***	0.206***	0.0199	-0.000192	-0.00185	0.00507
	(0.0338)	(0.0310)	(0.0146)	(0.000725)	(0.00156)	(0.0178)
Average amount invested	1.52e-05***	1.47e-05***	-	-	-	-
per job category	(2.01e-06)	(2.76e-06)	-	-	-	-
Constant	1.136***	1.227***	1.011***	0.0910***	0.0821***	2.162***
	(0.226)	(0.246)	(0.0822)	(0.00476)	(0.00734)	(0.0993)
Inverse Mills ratio			0.604***	-0.00235	-0.0355***	-0.0113
			(0.110)	(0.00571)	(0.00966)	(0.134)
Observations			27,525	27,525	27,525	26,725
Censored			1,607	1,607	1,607	3,265
Uncensored			25,918	25,918	25,918	23,460

Notes: The "CSP" table presents the results of the 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 ratios regressions of employees' characteristics. We have also provided the inverse Mills 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 9: Employee stock purchase plan

	Probit		OLS			
	with outliers	without outliers	Sharpe ratio	Portfolio return	Portfolio volatility	Information ratio
Age	0.119***	0.117***	0.0210***	0.00539***	0.00918**	0.107***
	(0.00910)	(0.00906)	(0.00523)	(0.00209)	(0.00379)	(0.0376)
Age^2	-0.00135***	-0.00130***	-0.000303***	-8.09e-05***	-0.000136***	-0.00156***
	(0.000100)	(0.000102)	(5.81e-05)	(2.26e-05)	(4.26e-05)	(0.000418)
Gender	-0.0817***	-0.0785***	-0.0190**	-0.00685**	-0.0122**	-0.131**
	(0.0195)	(0.0191)	(0.00778)	(0.00281)	(0.00565)	(0.0559)
Place of residence	0.115***	0.105***	0.0155	0.00615	0.0104	0.108
	(0.0274)	(0.0292)	(0.0104)	(0.00411)	(0.00647)	(0.0749)
Education level	-0.0691***	-0.0656***	-0.0217***	-0.00728***	-0.0121***	-0.124***
	(0.0141)	(0.0159)	(0.00517)	(0.00183)	(0.00381)	(0.0372)
Wealth	3.26e-06***	3.21e-06***	-1.09e-07	1.82e-08	4.85e-08	-3.24e-07
	(1.08e-06)	(9.74e-07)	(4.10e-07)	(1.67e-07)	(2.81e-07)	(2.94e-06)
Salary	1.79e-05***	1.65e-05***	2.50e-06***	9.03e-07***	1.55e-06***	1.69e-05***
	(1.72e-06)	(3.45e-06)	(7.78e-07)	(3.09e-07)	(5.68e-07)	(5.58e-06)
Bonus	-9.88e-06***	-9.46e-06	-1.66e-06*	-6.62e-07*	-1.19e-06*	-1.37e-05*
	(1.92e-06)	(1.52e-05)	(9.86e-07)	(3.51e-07)	(6.99e-07)	(7.08e-06)
Permanent contract	0.171	0.211	-0.0545	-0.0442	-0.0492	-0.600
	(0.223)	(0.215)	(0.116)	(0.101)	(0.166)	(0.839)
Years employed	0.000898	0.000456	-0.000234	-0.000397	-0.000689	-0.00604
	(0.00226)	(0.00195)	(0.000787)	(0.000322)	(0.000543)	(0.00565)
Hierarchical rank	0.189***	0.188***	0.0707***	0.0198***	0.0351***	0.342***
	(0.0199)	(0.0220)	(0.0118)	(0.00498)	(0.00830)	(0.0845)
Finance expert	0.127***	0.123***	0.0268**	0.00427	0.00595	0.0757
	(0.0281)	(0.0265)	(0.0110)	(0.00525)	(0.00817)	(0.0792)
Commercial staff	-0.00942	-0.0230	0.0153	0.0101**	0.0165**	0.179**
	(0.0298)	(0.0296)	(0.0112)	(0.00464)	(0.00646)	(0.0802)
HRM staff	0.222***	0.210***	0.0594***	0.0293***	0.0492***	0.546***
	(0.0597)	(0.0579)	(0.0213)	(0.00879)	(0.0160)	(0.153)
Logistics staff	-0.117**	-0.111**	0.0382*	0.0137*	0.0198**	0.253*
	(0.0567)	(0.0504)	(0.0208)	(0.00763)	(0.00966)	(0.149)
Administrative staff	-0.00451	-0.00291	0.0279**	0.00726	0.0120*	0.140*
	(0.0308)	(0.0304)	(0.0114)	(0.00470)	(0.00662)	(0.0822)
Average amount invested	1.20e-05***	1.28e-05***	-	-	-	-
per job category	(1.19e-06)	(1.28e-06)	-	-	-	-
Constant	-4.629***	-4.595***	-0.447*	-0.111	-0.230	-2.692
	(0.275)	(0.281)	(0.228)	(0.133)	(0.224)	(1.640)
Inverse Mills ratio			0.230***	0.0900***	0.156***	1.629***
			(0.0425)	(0.0183)	(0.0355)	(0.305)
Observations			27,525	27,525	27,525	26,888
Censored			20,727	20,727	20,727	21,085
Uncensored			6,798	6,798	6,798	5,803

Notes: The "ESPP" table presents the results of the 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 ratios regressions of employees' characteristics. We have also provided the inverse Mills 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%.