Employees' investment behaviors in a company based savings plan

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Abstract

This paper investigates the investment behaviors of 44,649 employees working in a CAC 40 index listed company. The company savings plan offers its employees a choice among various asset categories generally listed by financial institutions. We first describe employees' saving behaviors for each asset category offered within the company savings plan. We then focus on the individual determinants of employees' participation in each asset category and the total amount invested in each asset category. We finally investigate the individual determinants of portfolio breadth in terms of number of funds selected and number of asset categories selected. We document extreme saving strategies such as high investment in company stocks. We find the existence of a positive association between the number of funds offered, and the number of funds chosen within the plan. Our results emphasize how several proxies of human capital are associated with company-based investment strategies.

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1. Introduction

Historically, company based savings plans have been developed to increase employees' savings. These plans allow employees to invest in several asset categories – non employer's stocks, company stocks, bonds assets, monetary assets, and diversified assets[3] – and several funds. These plans are distinctive in offering the company's own stocks among the various choices available. Investors have to balance the advantage to have insiders' information on company stocks, with the increased risk induced by a covariance between their human capital and their portfolio. Also, employers intend to influence employees' decisions through stockholders' programs using special offers when employees choose to own company stocks.

Company-based investments have specific risks and incentives. Consequently, the association between employees' characteristics and their investment behaviors could be specific. As shown in the ENRON experience, company-based investment bundles human capital risks and financial risks into a common risk category: when the company goes bankrupt, employees lose both their jobs and savings. Investors have to balance risks of losing their income and savings, and expected benefits of having insiders' information on the company. This specific configuration is not taken into account in standard portfolio theories, where human capital and portfolio risks are assumed independent (Bodie et al., 1992; Heaton and Lucas, 1997). However, results from standard theoretical models can be compared to empirical evidence, and tested empirically: several studies have listed instances of cognitive biases in which investors were victims during the present decade with this risk-benefit calculation (Benartzi and Thaler, 2001; Liang and Weisbenner, 2002 and Benartzi and Thaler, 2007).

Using an original cross-sectional dataset from a French listed firm, this paper addresses the central question of the association between employees' characteristics and their investment behaviors in company-based savings plans. We focus on the French context, where company based savings

[3] According to the French Market Authority, diversified designates all the funds that do not belong to another category namely stocks, bonds or monetary funds (http://www.amf-france.org/affiche.asp?id=6350).

plans are specific financial products. Employees who have been with the firm for more than three months are eligible to specific investment options, such as payments into a company's checking account, or investment in stocks (both the company's and others). Sums invested are held in escrow for a fixed duration. Voluntary payments can benefit from matching contributions paid by the employer, and are tax deductible. Social security taxes only apply to capital gains. According to the French Law, yearly voluntary contributions by each eligible employee may not exceed one fourth of the employee's annual salary. Furthermore, French companies must offer employees at least one investment option in addition to company stocks.

In France, few studies have documented risk exposure within company-based savings plans, and explored its association with employees' human capital. Degeorge et al. (2004) show that company stocks investment behavior in these French company-based plans are specific, as they differ from the recommendations of neoclassical theoretical models, based upon full rationality and complete information. Balligand and Foucault (2000) show wide disparities in investment behaviors in company savings plans according to the place of residence.

This study explores determinants of employees' investment behaviors in company-based savings plan following three main objectives:

- Objective 1 is to describe employees' saving behaviors for each asset category offered within the plan. This objective emphasizes the distribution of employee savers by asset category, and presents statistics for different groups composing the sample. A comparable descriptive method is used by Agnew et al. (2003) with panel data and allows authors identifying extreme saving behaviors. Our cross-sectional analyses show the presence of (i) large investments in company stocks, (ii) large investments in diversified assets, and (iii) low investments in bonds. Stockholding is uniformly spread across the population studied.

- Objective 2 is to study how investments are influenced by different human capital measures. This objective focuses on (i) the determinants of participation, and (ii) amounts invested in each asset

category among investors. Age, time with the company, salary, education, and financial expertise are significantly associated with investment strategies.

- Objective 3 is to estimate which factors influence the number of asset categories and the number of funds selected by employees. In particular, we test the null hypothesis that the employer does not influence employees' choices through the number of investment choices offered and the plan's investment options. We find that the number of funds offered has a small but significant influence on the number of funds chosen.

The remainder of the paper is organized as follows: section 2 presents the methods, section 3 presents the results obtained for each objective, section 4 provides a discussion, and section 5 concludes.

2. Methods

Data source

We analyze a cross-sectional dataset, collected in 2005 from a French CAC 40 listed bank whose employees are eligible to a company savings plan. Our sample is a cohort of 44,649 employees who invest (or not) in the company savings plan. Information is captured at the employee level. We only observe employees' investment in the company based plan. Our data provides information dealing with the composition of employees' company savings: stocks, bonds, and monetary assets, as well as diversified funds comprising a variable proportion of these three latter categories. In our sample, the number of investment options varies from 2 to 27 across the 84 firm's subsidiaries. Each subsidiary belongs to one of the bank's five business lines: retail banking; specialized financial services; asset management/insurance/private banking; corporate banking and investment banking. Despite differences across business lines, the company's policy is homogenous

and only differs regarding to the plan menu offered. One subsidiary is in charge of payments, buybacks, transfers and information associated with the plan.

Our data source is noteworthy for several reasons. Most publications rely on questionnaires (Bergstresser and Poterba, 2004; Bertaut and Starr-McCluer, 2002; Heaton and Lucas, 2000; Poterba and Samwick, 2003; Tracy et al., 1999). Yet, data collection by questionnaire can be accompanied by selection bias, with respondents liable to form a specific sub-category of the population whose characteristics one wishes to measure (Kennickell, 1998). In France, there is little data on the distribution and the total amount of company based savings. This lack of availability of empirical data is a major obstacle to studying company based savings (Balligand and Foucault, 2000). This explains why most empirical studies took place in the United States where administrative data are available to researchers through 401(k) investments. Since administrative data are not systematically collected by foreign public authorities, empirical studies rely more on one-company case studies. Degeorge et al. (2004) investigate the determinants of investments in France Telecom's stocks by its employees, and focus on a very specific context: the partial privatization of the company in 1997. Our study takes place in a more general context, and is not restricted to company stocks investments. We also explore employees' investment in several other asset categories.

Measures

We have four dependent variables of interest: (i) the participation in each asset category; (ii) the amount invested in each asset category; (iii) the number of asset categories selected; and (iv) the number of funds selected. Participation is measured using six dichotomous variables measuring investment in the following asset categories: stocks overall, non employer's stocks, company stocks, bonds assets, monetary assets and diversified assets. Continuous variables measure conditional amounts invested in each asset category. The number of asset categories and funds selected are count variables.

We control for several socio-demographic variables (age, gender, Paris region residency) and human capital characteristics (salary, time with company, financial expertise, and education). Age and time with the company are measured in years. Salary is the gross annual fixed wage in Euros. Education is a dichotomous variable measuring whether the employee holds a Master's Degree or higher[4]. In order to control for disparities in saving behaviors according to geographic location, a dichotomous variable measures if the employee lives in the Paris region. Since our sample comes from a bank, we are able to estimate financial expertise. Financial expertise is assessed using a dichotomous variable measuring if employees hold a job requiring knowledge of portfolio management (asset management, finance and investment banking, private equity, financial services and risk support function). To measure how the number of funds offered by a given subsidiary affects employees' behaviors, we create three groups: 1-5 funds, 6-10 funds, and >10 funds.

Statistical analysis

Objective 1 is to describe employees' saving behaviors for each asset category offered within the plan. We first compare investors' characteristics to non-investors' characteristics, using Chi-squared tests (Table 1). We then compute the distribution of employee savers by asset category, to identify the number of employees (and associated percentage of the population) investing in a given asset category. We use two different distributions: the percentage represented by each asset category in the company savings plan (see Table 2A), and the value (in Euros) of investments in each asset category (see Table 2B). We also study these distributions across employees' demographic characteristics: gender, salary, age, time with company and residence (see Tables 3A and 3B). We run means comparison tests to control whether investment patterns significantly differ between groups.

[4] The Master's Degree was chosen as the reference category of the dummy variable after having tested other prospects (Secondary school certificate, High school certificate, associate Degree and bachelor Degree). The Master's Degree dummy gives the best results.

Objective 2 is to examine how human capital variables influence amounts invested and participation in each asset category. We use Heckman's two-step regressions to study which factors are related to the amount invested in each asset category, conditional on the decision to invest in this category (see Table 4A). The Heckman's two-step statistical approach offers a means of correcting for non-randomly selected samples and selection bias. Indeed, company based plans investors may be less risk averse than non-investors, and therefore choose to invest larger amounts. The first stage models the probability of investing in each asset category, e.g. stocks overall, non employer's stocks, company stocks, bonds, monetary and diversified assets. The second stage models how much is invested in each asset category conditional on the probability of investing. We test for the presence of selection bias in that process controlling for the inverse Mills' ratio statistic in the second equation. This parameter is defined as the product of the cross-equation correlation and the standard error of the residuals from the outcome equation. Both steps (investment, conditional amount invested) control for age, time with company, salary, financial expertise, Paris region residency, education, and gender.

Objective 3 is to estimate to what extent investment options offered by the employer are associated with employees' portfolio breadth. Portfolio breadth is measured by the number of asset categories selected (Table 5A, first column), and the number of funds selected (Table 5A, second column). We use count dependent variables and Poisson regressions. To account for the employer's influence on employees' investment choices, we control for three dummy variables measuring the number of funds offered. We control for the same independent variables as before: age, time with company, salary, financial expertise, Paris region residency, education, and gender. In sensitivity analysis, we use the ratio of the number of funds selected over the number of funds offered as an additional dependent variable consistently with Huberman and Jiang (2006).

To demonstrate the magnitude of obtained effects for objectives 2 and 3, we compute marginal effects (see Tables 4B, 5B).

3. Results

Table 1 provides descriptive statistics. In our sample, 40,955 (91.73%) employees participate in the offer. The average employee is 45 years old, has spent 16 years with the company, receives a €34,537 annual salary, and holds the secondary school certificate (*French Brevet des collèges*). Seventy percent of employees live outside of the Paris region, 58% are women, and 12% have financial expertise. These characteristics do not significantly differ from the French working population. In 2005, the average French employee is 40 years old and has an annual salary of €31,420. 43% of the working population has spent more than 10 years with the same company, 81% live outside the Paris region, 47% are women, and 72% hold a degree higher than the secondary school certificate[5]. Bivariable analyses (Table 1) show that investors are more likely to live in the Paris region, to be men, to have high education level (≥ Masters' Degree), to have financial expertise, and to have a greater number of funds offered by the company.

Objective 1

Table 2A shows the distribution of employees according to the proportion of company savings invested in each asset category. Large proportions (between 28% and 91%) of employees do not hold each of the asset categories (x=0). Monetary assets and company stocks appeal respectively 5% and 4% of employees to invest 100% of their savings. A large proportion of savers do not invest in bonds funds (91%). The most popular asset category is the diversified funds category (18% for 80 $\leq x \leq 100$).

Table 2B displays the distribution of employees according to the value (in Euros) of company savings invested in the asset category. Diversified assets, monetary assets and company stocks are

[5] According to the French National Statistics Institute (INSEE Enquête Emploi, 2005).

the most widespread assets within lower ranges (0 – 5,000 Euros and 5,000 – 10,000 Euros). Few employees (4%) are holding more than 50,000 Euros in company stocks.

Table 3A shows proportions invested in each asset category for different groups of employees. All means comparison tests are significant, showing that the means of the groups are different. The low proportion of company savings hold in bonds assets is a characteristic of the entire sample, since this proportion never exceeds 4.48%. Diversified funds are popular among employees with lower income (37.21%) and senior employees (34.47%). The increase in the proportion of employee savings across age is curvilinear, and high annual salary levels are associated with larger rates of stockholding. Exposure of lower paid employees to investment in company stocks is high (30.31%) compared to other stocks holdings (0.5%). This trend is less pronounced for employees with higher income. Overall, the proportion of stockholding is uniformly distributed by age.

Table 3B displays value (in Euros) invested in each asset category across groups of employees. Male employees and those living in the Paris region hold significantly higher amounts of monetary assets. Differences in amount invested between men and women are much more pronounced for the most risky asset categories. Compared to women, men invest twice the amount in stocks. Overall, higher annual salary is associated with higher assets holding. Age and time with the company similarly affect the distribution of amounts invested in each asset category.

Objective 2

Results of Heckman's two-step regressions are reported in Tables 4A and 4B. Inverse Mills' ratios are significant for all models, revealing the presence of selection biases based upon the significant correlation between the error terms in the two stages. This suggests that the two equations measuring the probability of investing in each asset category and the conditional amounts invested cannot be modeled separately. We trace investment behaviors in the following asset categories: stocks, bonds, monetary assets, diversified funds, non employer's stocks and company stocks.

Stocks, non-employer's stocks, and company stocks are the most risky investment options whereas bonds, monetary, and diversified assets are the safest investment options.

The first stage of Heckman regressions models the probability of participating in each asset category. Age, salary and financial expertise are associated with a higher probability of risky asset investment. Men and employees with high education level (≥ Masters' Degree) have a lower probability of risky asset investment. Time with the company is not associated with a higher probability of investment in company stocks, but is associated with an increase in the probability of investment in stocks overall and non-employer's stocks. Living in the Paris region is associated with an increase in the probability of investment in non employer's stocks, but it is also associated with a decrease in the probability of company stocks investment. Though, Paris region residency is negatively associated with the probability of investment in risky assets. Other factors associated with the probability of investment in bonds and monetary assets are: increased age (+), increased time with company (-), increased salary (+), presence of financial expertise (+), and being a man (+). Determinants of investment behavior in diversified assets are specific. Salary and financial expertise are associated with a smaller probability of investment in diversified funds. On the contrary, education is positively related to diversified assets investment. For all other assets (risky and non risky), best educated employees have lower probability of investment, and financial expertise is associated with a higher probability of investment.

The second stage models amounts invested in each asset category, conditional on participation. Among employees who decide to invest in risky assets, increased age is positively associated with invested amounts. An increase in time with the company is associated with an increase in amounts invested in non employer's stocks, and a decrease in amounts invested in company stocks. Employees with high salary invest lower amounts in riskier assets. Conditional amounts invested in non-risky assets increase with age, time with company, salary, and education. Employees with financial expertise invest lower amounts in non-employer's stocks than employees

who work in areas not related to finance. Education is also positively linked to amounts invested in non employer's stocks. Financial expertise is not associated with amounts invested in bonds and diversified assets, but has a negative association with monetary assets investment. Again, education and financial expertise have asymmetric associations with investment behaviors. Men invest higher amounts in company stocks, bonds and monetary assets, when women are more likely to invest in diversified assets. Living in the Paris region is associated with larger amounts invested in stocks overall and company stocks, and lower amounts invested in non-employer's stocks.

Table 4B reports marginal effects computed after two-step models estimations. Financial expertise was associated with an incremental increase in 6.4% in the probability of investment in stock overall, 13.7% in the probability of investment in non employer's stocks, 2.7% in the probability of investment in company stocks, 7.1% in the probability of bonds investment, and 14.8% in the probability of monetary assets investment. Compared to other employees, those with financial expertise have 15.3% lower probability of investing in diversified assets. Employees have a higher probability of increasing their investment in riskier assets, e.g. stocks overall and company stocks.

Objective 3

Results of Poisson regressions on the portfolio breadth measures are displayed in Table 5A and 5B. In Table 5A (column 1), the association between the number of funds offered and the number of assets selected is not significant. In column 2, where the dependent variable is the number of funds selected, these coefficients are positive and significant at the 1% threshold. This indicates that the number of funds offered is associated with higher number of funds selected, but not with a greater number of assets selected. Living in the Paris region is associated with a larger number of funds selected, and a smaller number of assets selected. Portfolio breadth is more pronounced among older, better paid employees with greater financial expertise. Being a man and holding at least a

Master's Degree is associated with lower portfolio breadth within the company based savings plan. Results displayed in Table 5B confirm that the number of funds offered has a large influence on the number of funds categories chosen. Compared to employees who have less than 6 funds offered, employees who have between 6 and 10 investment choices have 6.43% more chance of investing into a larger number of funds.

In sensitivity analyses[6], we measure the utilization rate of funds offered by using the ratio of the number of selected funds over offered funds. This additional dependent variable is also used in Huberman and Jiang (2006) to investigate the number of funds chosen. Obtained coefficients have same sign and significance as those already reported in Table 5A. Age, salary and financial expertise are associated with increased utilization rates. Being a male, living in the Paris region, and holding a Masters' Degree are associated with a decrease in the ratio. The only variable that differs is time with the company, which has a positive association with the ratio, while the coefficient is negative in Poisson regressions.

4. Discussion

Findings

Our results show the need for modeling separately each step of employees' saving behavior, as investment steps (participate in offers, conditional amount invested) are correlated. We emphasize three main results: (i) presence of extreme strategies, (ii) positive influence of human capital, and (iii) influence of the plan menu on the number of funds selected by employees. In this section, we discuss to what extent these effects are expected and make sense, and if these results are surprising given predictions of saving theories.

[6]Results are available upon request to authors

In the context of an experimental setting, Benartzi and Thaler's (2001) find that employee savers seem to consider company stocks as a separate asset category. Our results are consistent with this finding. The distribution of employees by different stockholding proportions is homogeneous, but biased towards company stocks investments, which are distributed uniformly across employees. Our results show large investment in company stocks, and emphasize the existence of other extreme behaviors matching findings from Agnew et al. (2003). In our sample, significant proportions of employees do not invest in the company-based savings plan at all and do not hold any bonds at all.

This finding can be explained by several factors. First, it can be argued that matching contributions and discounts on the stocks' price may influence investment choices. However, we believe matching contributions have little influence on our results, since they are not only restricted to company stocks and apply to all other asset categories. Second, marketing efforts to promote company stocks investment may have introduced a bias towards this investment option. Marketing effort, which cannot be measured in our study, relied on several supports such as the intranet, stock price simulators, movies, posters, CD-ROMs and information meetings. However, the influence of marketing on our results may be reduced by the fact that all employees shared similar information. No sub-population was targeted by marketing campaigns. Third, high company stocks investments can be explained by the fact that investors face fixed costs due to the research of information about investment alternatives. Haliassos and Bertaut (1995) and Vissing-Jorgensen (2003) show that even moderate costs can discourage participation. Employees would choose to invest in their company stocks because they have "free information" about that investment category.

Our results confirm the presence of gender differences in investment strategies. Barber and Odean (2001) show that overconfidence can lead men to adopt different strategies than women, particularly by exposing themselves more to risk. Our results provide additional information, suggesting that women are more likely to invest in company based plans, while men are more likely to invest larger amounts.

Our analyses show that investment is associated with several measures of human capital: age, salary, education, time with company, and financial expertise. We find the presence of a positive effect of salary that can be seen as an implicit emolument of risk-free assets (Cocco et al., 2005). Following that theory, employees with high salaries would be more likely to invest in risky assets. To the extent that human and financial capital are correlated in the long-run (Benzoni et al., 2005), salary would have a negative effect on employees' risk exposure.

Our results confirm the importance of controlling for several proxies of human capital. We find that the effect of age, time with the company, education, and financial expertise, differ according to the asset category modeled. The negative effect of education falls within the discussion on rationality and savers' limited information. Degeorge et al. (2004) show that the current value of human capital is a function of the current salary amount, its rate of growth, and the temporal horizon during which it will be paid. According to Heaton and Lucas (2000) and Viceira (2001), human capital is associated with an increase in real risk aversion, and leads to rational savings behavior. Employees with higher education may prefer to invest outside the company-based plan, as they have more information than other employees. Conversely, less educated employees prefer contractual savings, for which information research costs are low. The freezing of sums invested and restriction on payments certainly influence employees' investment strategy. Company based savings can, from this standpoint, attract employees who encounter difficulties in keeping to the saving objectives they have set themselves (Thaler and Shefrin, 1981). Thaler and Benartzi (2004) show that restrictive measures on employees' choices may correct behaviors that the neo-classical theory would describe as irrational. Such behaviors often result in insufficiently diversified portfolio and inadequate saving rate. The reason for investing in a constraining company savings plan would be a search for rationality, and a desire to properly protect oneself against the risk of future impoverishment (Thaler and Sunstein, 2003; Madrian and Shea, 2001).

Results from Poisson regressions suggest that the number of funds offered by the plan is significantly associated with the number of funds used by plan participants. Although consistent with experiments of Benartzi and Thaler (2001), our findings differ from results obtained by Huberman and Jiang (2006). Huberman and Jiang (2006) find no significant relationship between the number of funds chosen and the number of funds offered. They explain that 401(k) plans participants first consider fund categories (stocks, bonds, diversified, monetary), and then choose individual funds within each category. We do not have the same pattern in the plan we study where funds appear directly.

Limitations

Our study is faced with several limitations. Focusing on one firm does not allow measurement of variables in relation to potentially significant characteristics of the company such as sector, size and risk. Studying a banking group may raise concerns about the generalizability of results, because employees probably have greater knowledge of financial products and easier access to information than other employees. Furthermore, the association obtained with the variable describing time spent with the company could be biased by the use of a cross-sectional dataset. This would explain the negative association obtained which conflicts with usual results. According to Ameriks and Zeldes (2005), studies using cross sectional data may not fully capture age effects. Our data does not provide information dealing with non-company based financial savings. As we only observe a part of employees' investment, it would be very difficult to extrapolate behaviors on their total investment allocations. Some employees may have optimal portfolio allocation, which cannot be included in our analysis.

Finally, our results and conclusions are limited to company-based savings only, and cannot be extended to other financial assets. When comparing our sample to the French population, we find differences in company-based savings levels. According to Rougerie (2006), the median French

employee holds 1,800 Euros in 2004 in his company-based savings plan, compared to 9,253 Euros in our sample. Rougerie (2006) also emphasizes that in 2004, the firt decile of the French employees hold less than 300 Euros, and the last decile of the same population holds at least 14,200 Euros in their company-based savings plan. In our sample, these amounts respectively are 149 Euros and 57,338 Euros. However, Rougerie (2006) concedes that amounts described in her study may be underestimated by the fact that they rely on self-reported information.

Implication for future research

Our results have several implications for policy and future research. "Libertarian paternalism" would recommend to monitor employees' investment choices to maximize their well-being without prejudice to their freedom of choice (Thaler and Sunstein, 2003; Thaler and Benartzi, 2004). This position has not, however, remained unchallenged (Mitchell, 2005). According to Campbell (2006), household finance involves wondering what financial instruments households use to achieve their goals. Households hold a large number of assets which are not tradable, such as their human capital, or illiquid, such as their residence, and their capacity to take on debt is limited. This complexity is more conducive to investment mistakes. It can be inferred from Campbell's comment that several variables determine individual savers' portfolio choices. In this paper, we attempt to take several of these determinants into account. According to Iyengar et al. (2004), increasing the number of funds can be pernicious. Because of a "choice overload" effect, an abundant offer would result in discouraging saving; thus increasing the number of choices available would have a counter-incentive effect. Benartzi and Thaler (2001) point out that company based plan savers make significantly different portfolio choices when company stocks are offered. Further research into the role of employer stock offer for company based plans beneficiaries will be important.

Our results must be interpreted regarding to the increasing importance of company-based savings plans, which represent a growing and substantial part of French employees' financial

portfolio. Even if company-based savings plans success is recent (Rougerie, 2006), it is all the more noteworthy in that individual possession of other financial assets by French households is decreasing. While the proportion of French households holding securities decreased from 19.3% in 2006 to 18.6% in 2007, the growth of company savings has contributed to the stability of the proportion of French households holding securities (TNS-Sofres, 2007). This latter proportion was 23.8% in 2006 and became 23.6% in 2007 (TNS-Sofres, 2007). In 1998, only 9% of active workers over age 18 had company-based savings. In 2004, 11.5% of French employees (4.7 million people) held such savings, of whom 54% belonged to a company savings plan, and 12.7 billion Euros of employee savings bonuses had been distributed to them. Between December 2004 and December 2007, those participating in company savings plans rose to nearly 65%, increasing in value from 57 to 94 billion Euros. According to the French Financial Management Association, company stocks amounted to 48% of managed company savings assets (AFG, 2009).

5. Conclusion

Due to a lack of available data, little is known about investment behaviors in French company-based plans. This paper explores factors associated with investment behaviors within these plans using a unique French dataset. We test whether human capital, gender and place of residence have a comparable effect on the decision to invest in the plan, on the amount invested, and on total number of asset categories and investment funds chosen. Our research shows how company saving behavior varies according to employees' socio-demographic characteristics, and underlined the specificity of company based savings plan investment. We found that employees perceived company stocks as a separate asset category. We measure the effect of human capital on employees' participation in savings plans, and employees' choices of asset categories investments. We highlight

the specificity of each decision studied. We find the existence of a positive association between the number of funds offered, and the number of funds chosen within the plan. Our results emphasize how several proxies of human capital are associated with company-based investment strategies, but it is clear that unobserved factors also influenced employees' decisions.

This research provides three main results that can be compared to findings obtained outside the French context. First, we document the presence of extreme investment strategies within company-based plans, regarding the high concentration of the plan in company stocks. Indeed, 25% of employees invest more than 60% of their company based savings in company stocks. Second, our results highlight that employees with high level of human capital also adopt extreme investment strategies within company based plans. Third, we show that the plan menu also influences employees' investment choices controlling for human capital variables. As the plan menu is defined by the employer, extreme behaviors could be a consequence of the employer's marketing efforts.

To the extent that the employer may play an important role in the success of company savings and its investment process, risk exposure within company based saving plans may be problematic. It is clear that further research on the role of employers on investment behavior is needed, and that continuing effort to monitor risk exposure within these plans is essential.

Appendix

Table 1: Description of employees' demographic characteristics

	Overall			Participation					
				Yes			No		
Continuous variables	N	Mean	SD	N	Mean	SD	N	Mean	SD
Age	44,649	45	10.6	40,955	44.72***	10.65	3,694	46.47***	10.45
Time with company	44,649	16	13.6	40,955	15.82***	13.50	3,694	19.88***	13.82
Salary	44,649	34,537	169,259	40,955	35,193.39***	17,311.18	3,694	27,209.77***	8983.4

				Participation in the plan				
				Yes		No		
Dichotomous variables		N	%	N	%	N	%	p-value
Residence								<0.001
	Paris region	25,734	57.64%	23,501	91.32%	2,233	8.68%	
	Elsewhere	18,915	42.36%	17,479	92.41%	1,436	7.59%	
Gender								0.006
	Male	18,844	42.00%	17,375	92.20%	1,469	7.80%	
	Female	25,805	58.00%	23,605	91.47%	2,200	8.53%	
Education								<0.001
	≥ School Certificate	42,923	96.20%	39,445	91.90%	3,478	8.10%	
	Master's Degree≥	1,726	3.80%	1,535	88.93%	191	11.07%	
Financial expertise								<0.001
	No	39,257	88.00%	35,682	90.89%	3,575	9.11%	
	Yes	5,392	12.00%	5,298	98.26%	94	1.74%	
Funds offered								<0.001
	1-5 funds	1,408	92.09%	1,399	99.36%	9	0.64%	
	6-10 funds	2,124	3.15%	2,087	98.26%	37	1.74%	
	>10 funds	41,117	4.76%	37,494	91.19%	3,623	8.81%	

Note: Age and time with the company are specified in years. Salary is gross annual fixed remuneration. The Funds offered variable describes the number of funds offered to an employee in his subsidiary. Residence equals to 1 for savers living in the Paris region and 0 otherwise. Gender takes the value 1 for a man and 0 for a woman. Education

takes the value 1 for employees with a Master's Degree or higher and 0 otherwise. Financial expertise equals 1 when the employee's job requires financial expertise (asset management, finance and investment banking, private equity, financial services and support function risks), and 0 otherwise. For each continuous variable, we tested the null hypothesis of equality of the means between participants and non participants. * significant at 10%, ** significant at 5%, *** significant at 1%. P-values report the level of significance of the Chi-squared test.

Table 2A: Distribution of employee savers by asset category – Percentage of the company savings plan

Percentage of the plan	Stocks Overall		Non Employer's Stocks		Company Stocks		Bonds Assets		Monetary Assets		Diversified Assets	
	N	%	N	%	N	%	N	%	N	%	N	%
x=0	12,638	28%	38,905	87%	13,397	30%	40,526	91%	15,583	35%	16,190	36%
$0 \leq x \leq 20$	3,649	8%	2,922	7%	4,276	10%	2,671	6%	10,310	23%	9,662	22%
$20 \leq x \leq 40$	7,082	16%	1,380	3%	7,885	18%	816	2%	8,147	18%	6,663	15%
$40 \leq x \leq 60$	7,857	18%	746	2%	7,820	18%	304	1%	5,601	13%	4,032	9%
$60 \leq x \leq 80$	6,926	16%	423	1%	6,189	14%	135	0%	1,869	4%	135	0%
$80 \leq x \leq 100$	4,475	10%	156	0%	3,233	7%	93	0%	1,064	2%	7,967	18%
x=100	2,022	5%	117	0%	1,849	4%	104	0%	2,075	5%	0	0%
Total	44,649	100%	44,649	100%	44,649	100%	44,649	100%	44,649	100%	44,649	100%

Note: The table presents statistics for the several assets categories allocation. We consider the frequency distribution of the observations in the sample. For each range of percentage displayed (x=0, 0≤x≤20, 20≤x≤40, 40≤x≤60, 60≤x≤80, 80≤x≤100 and x=100), this table shows the number of employees (column N) and the corresponding percentage of the population (column %) for a given asset category. The asset categories are: Stocks overall, non employer's stocks, company stocks, bonds assets, monetary assets and diversified assets. For instance (see underlined numbers), 7,820 employees representing 18% of the population hold between 40% and 60% of their company savings plan in their company stocks.

Table 2B: Distribution of employee savers by asset category – Value in Euros

Euros	Stocks Overall		Non Employer's Stocks		Company Stocks		Bonds Assets		Monetary Assets		Diversified Assets	
	N	%	N	%	N	%	N	%	N	%	N	%
0	12,638	28%	38,905	87%	13,397	30%	40,526	91%	15,583	35%	16,190	36%
1 - 4,999	12,712	28%	2,663	6%	12,810	29%	2,615	6%	16,526	37%	18,148	41%
5,000 – 9,999	5,517	12%	1,068	2%	5,761	13%	781	2%	5,481	12%	5,815	13%
10,000 – 14,999	3,533	8%	532	1%	3,571	8%	286	1%	2,685	6%	1,983	4%
15,000 – 19,999	2,334	5%	375	1%	2,327	5%	171	0%	1,612	4%	829	2%
20,000 – 24,999	1,633	4%	241	1%	1,575	4%	87	0%	958	2%	475	1%
25,000 – 29,999	1,286	3%	172	0%	1,186	3%	54	0%	568	1%	331	1%
30,000 – 34,999	926	2%	140	0%	853	2%	31	0%	402	1%	241	1%
35,000 – 39,999	732	2%	97	0%	632	1%	25	0%	238	1%	152	0%
40,000 – 44,999	584	1%	85	0%	511	1%	20	0%	148	0%	117	0%
45,000 – 49,999	425	1%	64	0%	339	1%	15	0%	109	0%	82	0%
+ 50,000	2,329	5%	307	1%	1,687	4%	38	0%	339	1%	286	1%
Total	44,649	100%	44,649	100%	44,649	100%	44,649	100%	44,649	100%	44,649	100%

Note: The table presents statistics for the several assets categories allocation. We consider the frequency distribution of the observations in the sample. For each range of value in Euros displayed (1–4,999; 5,000–9,999; 10,000–14,999; 15,000–19,999; 20,000–24,999; 25,000–29,999; 30,000–34,999; 35,000–39,999; 40,000–44,999; 45,000–49,999 and + 50,000), this table shows the number of employees (column N) and the corresponding percentage of the population (column %) for a given asset category. The asset categories are: Stocks overall, non employer's stocks, company stocks, bonds assets, monetary assets and diversified assets. For instance (see underlined numbers), 2,327 employees representing 5% of the population hold between 15,000 and 19,999 Euros of their company savings plan in their company stocks.

Table 3A: Statistics by group – Percentage of the company savings plan

		Stocks Overall		Non Employer's Stocks		Company Stocks		Bonds Assets		Monetary Assets		Diversified Assets	
	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Gender													
Female	25,805	35.72***	33	2.9***	11.62	32.82***	31.63	2.08***	9.86	23***	28.24	30.44***	35.17
Male	18,844	42.93***	33	4.37***	14	38.56***	32.33	1.83***	8.74	24.28***	28.62	23.02***	31.48
Annual salary (Euros)													
-25,000	13,491	30.69***	33.62	0.5***	5.48	30.31***	33.51	0.7***	6.8	17.67***	26.66	37.21***	38.64
25,001 – 50,000	24,914	40.11***	32.68	3.74***	13.43	36.42***	31.56	2.21***	10.02	24.88***	28.52	25.57***	31.89
50,001 – 75,000	4,637	50.19***	30.72	8.46***	17.03	41.74***	29.08	3.83***	11.28	31.19***	29.3	12.99***	21.87
75,001 – 100,000	1,033	54.19***	30.14	10.91***	19.26	43.28***	28.83	3.93***	11.37	30.34***	28.37	10.08***	17.46
+100,000	574	49.98***	32.98	11.58***	20.63	38.4***	29.71	3.08***	9.74	29.06***	30.86	16.20***	28.06
Age													
Less than 35	9,359	36.62***	34.88	3.13***	11.77	33.53***	34.12	2.41***	11.06	29.66***	34.45	24.40***	34.41
35 - 44	10,263	41.92***	33.77	4.37***	13.72	37.65***	32.45	2.53***	10.5	25.71***	29.38	22.96***	31.61
45 - 54	15,105	38.7***	32.68	3.43***	12.59	35.34***	31.25	1.8***	8.64	20.98***	25.58	29.17***	34.03
55 - 64	9,912	37.64***	32.17	3.14***	12.58	34.55***	30.67	1.25***	7.38	19.42***	23.61	31.67***	34.56
65 and over	10	27.47***	33.02	6.88***	19.42	20.59***	27.78	0***	0	12.49***	16.65	50.023***	42.10
Time with company													
0-5 years	17,074	38.26***	33.89	4.15***	13.39	34.16***	32.67	2.69***	11.09	28.84***	32.26	23.54***	32.75
6-10 years	2,896	48.69***	33.86	9.35***	18.45	39.35***	31.72	4.48***	13.18	27.24***	30.49	15.09***	26.44
11-15 years	4,532	44.84***	34.14	5.06***	13.62	39.84***	32.26	4.27***	13.27	23.09***	27.47	21.09***	32.15
16-20 years	2,686	42.58***	33.2	4.03***	14.3	38.7***	32.12	1.29***	7.24	20.73***	25.28	28.33***	32.92
+20 years	17,461	35.45***	31.91	1.46***	9.49	34.08***	31.34	0.37***	4.22	18.29***	23.23	34.47***	35.11
Residence													
Outside Paris region	18,915	40.74***	32.35	0.95***	0.7	39.9***	32.11	0.39***	3.98	19.91***	24.41	31.17***	33.18
Paris region	25,234	37.31***	33.98	5.40***	15.34	31.94***	31.59	3.14***	11.78	26.20***	30.75	24.47***	34.07

Note: For each distribution, we tested the null hypothesis of equality of the means. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 3B: Statistics by group – Value in Euros

		Stocks Overall		Non Employer's Stocks		Company Stock		Bonds Assets		Monetary Assets		Diversified Assets	
	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Gender													
Female	25,805	8,778***	16,663	1,249***	7,149	7,529***	13900	543***	3,242	4,243***	7,922	3,756***	7,609
Male	18,844	15,406***	25,176	2,263***	9,675	13,142***	21484	687***	3,878	6,209***	11,015	4,197***	9,340
Annual salary (Euros)													
-25,000	13,491	4,267***	9,006	73***	1,505	4,193***	8,845	52***	665	1,978***	4,612	2,905***	6,058
25,001 – 50,000	24,914	10,941***	17,980	1,361***	7,182	9,579***	15,924	560***	3,323	4,937***	7,945	4,090***	7,896
50,001 – 75,000	4,637	26,524***	31,447	5,285***	13,949	21,238***	26,375	1,773***	5,739	11,152***	14,377	5,275***	12,323
75,001 – 100,000	1,033	39,683***	39,566	9,119***	19,619	30,563***	32,134	2,517***	7,756	15,473***	18,220	6,906***	14,819
+100,000	574	39,530***	45,910	10,497***	22,087	29,033***	36,240	2,604***	8,605	15,880***	23,160	5,757***	14,843
Age													
Less than 35	9,359	5,032***	10,756	688***	3,185	4,343***	9,540	357***	1,806	3,187***	6,743	1,552***	3,935
35 - 44	10,263	12,756***	21,112	1,865***	7,603	10,890***	18,328	717***	3,300	5,797***	10,762	3,358***	7,530
45 – 54	15,105	12,551***	21,764	1,845***	8,830	10,705***	18,317	677***	3,971	5,000***	8,801	4,273***	8,266
55 – 64	9,912	15,045***	25,062	2,156***	11,071	12,889***	20,734	609***	4,186	6,216***	10,589	6,295***	11,301
65 and over	10	10,182***	16,285	3,329***	9,029	6,852***	12,580	0***	0	4,126***	6,892	7,621***	12,420
Time with company													
0-5 years	17,074	10,264***	19,821	1,631***	7,771	8,633***	16,790	605***	2,968	5,340***	9,995	3,331***	8,220
6-10 years	2,896	19,878***	29,074	5,025***	12,999	14,852***	22,265	1,781***	6,008	7,392***	12,255	3,577***	9,606
11-15 years	4,532	17,228***	28,522	3,044***	10,599	14,184***	23,532	1,772***	6,556	5,632***	9,837	2,677***	6,976
16-20 years	2,686	13,180***	21,591	2,165***	9,527	11,015***	18,270	492***	3,446	5,112***	10,033	4,598***	10,073
+20 years	17,461	9,766***	17,019	736***	6,614	9,029***	15,462	121***	1,837	4,275***	7,825	4,827***	8,280
Residence													
Outside Paris region	18,915	9,240***	15,571	382***	3,876	8,858***	14,778	102***	1,353	4,017***	7,286	4,449***	8,127
Paris region	25,234	13,291***	24,000	2,628***	10,346	10,662***	17,724	972***	4,460	5,848***	10,628	3,569***	8,551

Note: For each distribution, we tested the null hypothesis of equality of the means. * significant at 10%, ** significant at 5%, *** significant at 1%

Table 4A: Determinants of the amounts invested in the asset categories – Results of the Heckman's two-step regressions

	Stocks Overall		Non Employers' Stocks		Company Stocks		Bonds Assets		Monetary Assets		Diversified Assets	
	Probit	OLS	Probit	OLS	Probit	OLS	Probit	OLS	Probit	OLS	Probit	OLS
Age	0.007***	0.016***	0.014***	0.01	0.007***	0.014***	0.013***	-0.01	0.002***	0.024***	0.008***	0.041***
	(8.94)	(4.41)	(15.82)	(1.64)	(9.33)	(3.71)	(13.58)	(0.76)	(2.6)	(11.26)	(11.56)	(15.44)
Time with company	-0.001	-0.002	-0.023***	0.054***	2e-04	-0.003*	-0.026***	0.063**	-0.003***	0.004**	0.012***	0.008**
	(1.37)	(0.94)	(28.24)	(5.82)	(0.45)	(1.65)	(28.96)	(2.29)	(6.23)	(2.19)	(21.69)	(2.17)
Salary	2.25e-5***	-1.05e-5*	1.34e-5***	3.72e-6	2.04e-5***	-9.29e-6***	8.18e-6***	1.18e-6	2e-5***	-5e-6	-7.86e-7*	1.36e-5***
	(39.67)	(1.82)	(26.64)	(0.8)	(38.24)	(1.46)	(15.23)	(0.15)	(37.99)	(1.25)	(1.81)	(17.56)
Male	-0.052***	0.282***	0.022	0.073	-0.055***	0.31***	-0.174***	0.302*	-0.054***	0.083**	-0.122***	-0.098**
	(3.75)	(5.29)	(1.2)	(1.56)	(3.99)	(6.07)	(8.62)	(1.66)	(3.97)	(2.14)	(9.10)	(2.46)
Financial expertise	0.205***	-0.125	0.66***	-0.709***	0.083***	0.028	0.474***	-0.736	0.446***	-0.426***	-0.398***	-0.192
	(9.32)	(1.26)	(31.26)	(2.88)	(3.96)	(0.36)	(21.06)	(1.55)	(19.90)	(3.92)	(20.50)	(1.39)
Paris	-0.52***	1.155***	0.898***	-1.067***	-0.555***	1.142***	0.902***	-1.415	-0.072***	0.154***	-0.387***	-0.276**
	(23.36)	(6.93)	(30.07)	(2.86)	(25.33)	(5.67)	(26.93)	(1.46)	(3.43)	(2.82)	(18.90)	(2.46)
Master's Degree≥	-0.085***	0.164	-0.378***	0.446**	-0.054*	0.1	-0.429***	0.984**	-0.067**	0.157*	0.144***	0.066
	(2.62)	(1.25)	(6.35)	(2.00)	(1.65)	(0.83)	(6.29)	(1.98)	(2.13)	(1.65)	(4.32)	(1.09)
Constant	-0.14***	9.808***	-2.725***	10.7***	-0.119***	9.74***	-2.512***	12.494***	-0.28***	8.978***	0.159***	4.783***
	(4.22)	(18.46)	(59.16)	(7.46)	(3.64)	(16.16)	(51.81)	(3.53)	(8.74)	(21.32)	(5.14)	(12.52)
Inverse Mills' ratio		-4.77***		-1.67***		-4.41***		-2.19*		-3.39***		1.56***
		(7.24)		(3.32)		(5.96)		(1.71)		(7.20)		(2.91)
Observations	44,649	32,011	44,649	5,744	44,649	31,252	44,649	4,123	44,649	29,066	44,649	28,459

Note: The dependent variable for the first step (Probit) is a dummy variable which indicates whether the employee has invested or not in the asset category. The second step is an Ordinary Least Square (OLS) regression on the logarithm of the amount invested. Absolute value of z statistics are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4B: Determinants of the amounts invested in the asset categories – Marginal effects after the Heckman's two-step regressions

	Stocks Overall		Non Employers' Stocks		Company Stocks		Bonds Assets		Monetary Assets		Diversified Assets	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Age	0.002	0.031	0.002	0.03	0.002	0.028	0.001	0.013	6e-04	0.027	0.002	0.034
Time with company	-2e-04	-0.003	-0.003	0.021	8e-05	-0.002	-0.003	0.013	-0.001	-0.002	0.004	-0.002
Salary	7.42e-06	4e-05	2.02e-06	2e-05	6.98e-06	3e-05	9.35e-07	1e-05	7.30e-06	3e-05	-2.93e-07	1e-05
Male	-0.017	0.161	0.003	0.104	-0.018	0.189	-0.019	-0.024	-0.019	-0.014	-0.045	0.006
Financial expertise	0.064	0.325	0.137	0.194	0.027	0.208	0.071	0.138	0.148	0.313	-0.153	0.171
Paris	-0.171	-0.042	0.135	0.202	-0.189	-0.08	0.103	0.28	-0.026	0.023	-0.144	0.055
Master's Degree ≥	-0.028	-0.036	-0.044	-0.097	-0.018	-0.02	-0.035	0.163	-0.024	0.033	0.052	-0.054
Predicted Probability	0.730	8.752	0.081	8.386	0.710	8.668	0.056	7.935	0.664	8.156	0.645	7.901

Note: This table reports the marginal effects computed after each two-step regression. Column (1) represents the marginal effects for the probability of the investments in the asset category being observed, Pr(y observed). Column (2) represents the marginal effects for the expected value of the logarithm of amount invested in the asset category, conditional on a positive amount being observed, E(y/y observed). For the second step, y is log(y). For the variables Male, Financial expertise, Paris, Master's Degree ≥, marginal effect represents a discrete change of dummy variable from 0 to 1.

Table 5A: Determinants of portfolio breadth – Results of Poisson regressions

	Number of asset categories selected	Number of funds selected
Age	0.005***	0.010***
	(18.87)	(29.23)
Time with company	-0.001***	-0.003***
	(7.31)	(15.11)
Salary	6.68e-06***	9.35e-06***
	(43.52)	(43.82)
Male	-0.040***	-0,046***
	(7.77)	(6.65)
Financial expertise	0.134***	0.179***
	(18.51)	(17.21)
Paris	-0.026***	0.079***
	(3.81)	(7.43)
Master's Degree ≥	-0.034***	-0.066***
	(2.74)	(4.1)
Funds offered		
1-5 funds	Reference	Reference
6-10 funds	-0.005	0.186***
	(0.35)	(8.54)
>10 funds	0.008	0.142***
	(0.77)	(9.2)
Constant	0.358***	0.243***
	(26.62)	(13.02)
N	44,649	44,649

Note: The dependent variables of the Poisson models are count variables showing – the number of asset categories selected (column 1) – the number of funds selected (column 2). The Funds offered variable measures the number of funds available to employees. The absolute values of z-stats are shown in parentheses. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 5B: Determinants of portfolio breadth – Marginal effects after the Poisson regressions

	Number of asset categories selected	Number of funds selected
Age	0.011	0.032
Time with company	-0.003	-0.012
Salary	1.46e-05	2.96e-05
Male	-0.087	-0.146
Financial expertise	0.309	0.609
Paris	-0.058	0.252
Master's Degree ≥	-0.074	-0.204
Funds offered		
6-10 funds	-0.012	0.643
>10 funds	-0.018	0.424
Predicted number of events	2.187	3.164

Note: For the variables Male, Financial expertise, Paris, Master's Degree ≥ and Funds offered (*Between 6 and 10 funds, More than 10 funds*) marginal effect represents a discrete change of dummy variable from 0 to 1

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