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Lack of Diversification Amongst Employee Stock Owners: An Empirical Evaluation of Behavioral Explanations

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Abstract

The paper considers the reasons for employees holding large proportions of their financial savings and investments in company stock, drawing on explanations proposed in the Behavioral Finance literature. Utilizing data from a survey of employees participating in the UK Save As You Earn stock options and savings scheme, it is found that substantial proportions of stock-owners hold sizeable concentrations of employer stock. Several explanations for this risky behavior are tested, with familiarity, reciprocity, and inertia found to be associated with portfolio concentration. Organizational commitment and 'naïve extrapolation' from recent stock prices are not. The implications for theory and practice are considered.

Introduction

Employee ownership of their company's stock is a pervasive feature of large companies in many advanced industrial countries and there is now a large literature in Human Resource Management on the determinants, characteristics, and effects of this (see Kruse, Freeman & Blasi., 2010). A persistent criticism of employee stock ownership is that company plans encourage employees to hold excessive volumes of employer shares in their wealth portfolios, thereby exposing them to uninsured risk (Munnell & Sunden, 2004). Substantial stock ownership in any single company may violate standard investment principles relating to diversification and spreading of risk. Company stock plans go further by encouraging employees to concentrate their financial wealth and human capital, with returns to both co-varying with company performance. There is a clear danger to employees' wealth and pension security, as highlighted by corporate collapses such as Enron. Yet there is widespread evidence, especially from 401 (k) plans in the USA, that many employees continue to have large holdings of employer stock despite recent regulatory changes, moves by companies to reduce allocations to company stock, and greater opportunities to diversify out of employer stock (Walter & Corley, 2015). Nearly 10 per cent of new 401 (k) participants held more than 50 per cent of their account in company stock (VanDerhei, J., Holden, S., Alsonso, L. & Bass, S. (2016). Utkus & Young (2014) found that over 50 per cent of participants in companies where contribution matches are provided in company stock have over 20 per cent of their plan balance in company stock. Why do so many employees behave in this apparently irrational way?

Drawing on insights from Behavioral Economics, Finance scholars have put forward a range of explanations such as 'excessive extrapolation' from past stock prices (Benartzi, 2001), a preference for the 'familiar' (Huberman, 2001),

organizational commitment (Cohen, 2008), and inertia (Madrian & Shea, 2001: Agnew, Balduzzi & Sunden, 2003). This literature provides suggestive and illuminating explanations for stock-holding behavior. However, much of it identifies these explanatory factors from patterns of stock transactions, often without direct observation of employees, their motives, or attitudes. As a result, the posited reasons for holding large concentrations of employer stock tend to be based on interpretative conjecture rather than definitive empirical evidence drawn from those undertaking the offending behavior.

This paper provides new evidence on the extent and antecedents of portfolio concentration in employee stock plans drawing on extensive attitudinal and behavioral data collected directly from employees. Our data source is a unique data-set constructed from responses to a questionnaire distributed to current participants in the UK Save As You Earn share option scheme. This tax advantaged all-employee scheme grants options to employees (who opt-in) to acquire shares in three or five years, usually at a discount on grant price, whilst providing a mechanism for them to accumulate savings to exercise the options. We focus on a sub-set of the data where employees have had at least one maturity, and have exercised and retained company stock.

As in previous studies, the problem is not trivial: our evidence indicates nearly a quarter of employee shareholders have most of their financial savings and investments in company shares. Those with the highest proportions of company shares also have the highest ratios of company stock-based wealth to annual income. The key contribution of the paper is a comparative assessment of various 'behavioral' explanations for company stock concentration. Our results show that familiarity and inertia, but neither organizational commitment nor excessive extrapolation, are

associated with a lack of diversification. We also assess a new candidate for lack of diversification – a sense of reciprocity to the company arising from provision of the stock ownership scheme – and find that it has significant effects on the odds of having large concentrations of employer stock.

We proceed by outlining the nature of the share concentration problem, prior to considering various explanations for this found in the 401 (k) literature. We then outline our data source, our research approach, and the measures and variables used in the research. We present our results, and then consider the implications of our findings for theory and practice.

Contexts and theory

Employee stock ownership plans assist employees to acquire company stock. In the US employees can acquire company stock in Employee Stock Ownership Plans (held indirectly in an ESOP Trust), Employee Stock Purchase Plans, and 401 (k) pension plans, where opportunities to acquire company stock may take the form of an employee-selected investment option or a company match. A primary justification in public policy is that stock ownership creates an identity of interests between employees and their employer, potentially leading to enhanced company performance via the medium of attitudinal and behavioral change (Pendleton, Wilson & Wright, 1998). There is now quite a large volume of evidence that stock plans – 'shared capitalism' – have these intermediate and final outcomes (see Kruse, Freeman & Blasi, 2010). A recent meta-analysis of over 100 studies has found a small but positive effect (around 4 per cent on average) of employee ownership irrespective of study design (O'Boyle, Patel & Gonzalez-Mule, 2016).

However, these plans are not without their critics. Much of the critique has focused on company stock ownership within 401 (k) pension plans because of the potential impact on retirement income. It has been argued that company stock is not an optimal choice amongst undiversified, risk-averse employees, and that better investment returns will on average be secured from holding a market index of shares (Meulbroek, 2005). One study shows that holdings of company stock costs employees around 20 per cent of their potential pension benefits (Cohen, 2008). A further problem is company stock plans conjoin financial and human capital risk, with the value of both investments co-varying with company performance. As Enron and other high profile corporate collapses show, the consequences for employees can be disastrous. High levels of employee ownership may even be especially prevalent in firms that are more prone to fail: managers in poorly-performing firms may encourage employees to hold company stock as a means of warding-off takeovers, thereby entrenching their position (Duan, Hotchkiss & Jiao, 2015).

The danger varies with the extent of the holding in company stock. Holding company shares alongside a basket of other assets is clearly less risky than concentrating all or most wealth in a single, company-based asset. It has been demonstrated that the optimal holding of company stock, when the remainder of the wealth portfolio is diversified, is around 8 per cent, though up to 15 per cent is not too imprudent (see Blasi, Kruse & Markowitz, 2010).

Yet, the evidence from 401 (k) plans shows that large numbers of employees are heavily invested in employer stock though, in the absence of data on wealth outside these plans, we are unable to fully assess the extent to which diversification standards are violated. Even after a series of post-Enron regulatory and judicial reforms to encourage employees to diversify and employers to limit allocations of

their stock to 401(k) accounts, some employees still hold large concentrations of employer stock. Nearly 10 per cent of new 401 (k) participants hold more than 50 per cent of their accounts in company stock (VanDerhei, Holden, Alonso & Bass, 2016). Just under 10 per cent of all 401(k) participants hold 20 per cent or more of their accounts in company stock (Utkus & Young, 2014). This rises to over 50 per cent of participants where companies provide matched contributions in their own stock.

There has been considerable interest as to why so many employees violate standard investment principles relating to risk and diversification. Holding large concentrations of risky assets, when most employees are thought to be risk averse, is viewed as irrational. Most of the research is found in Finance, with research in this discipline attempting to discern the reasons for this apparently strange behavior. The answers have been located in a set of 'behavioral biases', drawn from key findings from the Behavioral Economics literature. A primary concern of this literature has been identifying how decisions are made, with an emphasis on the heuristics that guide this decision-making. Drawing on bounded rationality, it emphasizes that individuals frequently make (incorrect) decisions based on limited information due to 'thinking fast' rather than 'thinking slow' (Kahneman, 2011) or using the 'automatic cognitive system' rather than the reflective one (Thaler & Sunstein, 2009). In so doing, they utilize decision heuristics that incorporate a range of biases (Tversky & Kahneman, 1974).

The biases identified by those investigating allocation decisions in 401(k) include the following:

Familiarity. The familiarity 'bias' involves individuals over-weighting the value of items that are closest to them or with which they are most familiar. In an

investment context, individuals prefer to invest in what is familiar, be it domestic shares in preference to those of international companies (the 'home bias'), or employer stock in preference to other, safer stocks and funds (Huberman, 2001). Familiarity can give rise to normative and perceptual biases, such as employee beliefs that company stock is preferable to other stocks per se, that it will deliver higher returns (Benartzi, 2001), or that it is less risky than other investments. Nearly 20 per cent of Kimball and Shunway's (2010) respondents believed that employees should hold the majority of their retirement funds in their own company's stock. Benartzi, Thaler, Utkus & Sunstein (2007) found that substantial proportions of employees perceive their company stock to be less risky than a diversified mutual fund.

It is also possible that the transaction costs of acquiring information about company stock are lower than for less familiar investments, particularly for less-knowledgeable investors. This is the basis of economist John Maynard Keynes view that

> "the right method in investment is to put fairly large sums into enterprises which one thinks one knows something about and in the management of which one thoroughly believes. It is a mistake to think that one limits one's risk by spreading too much between enterprises about which one knows little and has no reason for special confidence" (Keynes, 1983).

Elsewhere, he suggested that

> "to carry one's eggs in a great number of baskets, without having time or opportunity to discover how many (baskets) have holes in the bottom, is the surest way of increasing risk and loss" (quoted in Chua & Woodward, 1983).

On this basis, holding large fractions of wealth in own company stock makes sense. Employees know their company better than other potential investments and can

acquire relevant information at lower cost. However, at root the familiarity bias does not reflect the exploitation of informational advantage: in Huberman's words, "it reflects people's tendency to be optimistic about and charitable toward what they feel affinity with – the comfortable and the familiar" (2001: 676).

Excessive extrapolation. The role of the representativeness heuristic is a key insight from the Behavioral Economics literature. A key element of this is the inference from limited information that observed events are representative of a broader trend. As Thaler and Sunstein put it, "the representativeness heuristic can cause people to confuse random fluctuations with causal patterns" (2009: 34).

In an investment context, the representativeness heuristic may lead investors to expect that recent share price movements will continue in the same trajectory without much evidence that this is a likely outcome. As a result, many investors 'buy high', only to be disappointed when stock prices do not continue to rise. Benartzi (2001) found that allocations to company stock in 401(k) plans were strongly influenced by positive share price movements during the preceding year but not with realized future returns. The correlation between past returns and allocations to company stock gets larger as the reference period increases. He also found a high correlation between past share price returns and individuals' predictions of future returns. Similarly, Huberman and Sengmueller (2004) showed that good current stock performance is associated with increased flows into company stock. Caramelli and Carberry (2014) found that past returns, as perceived by respondents, are associated with a preference for investing in employer stock

Commitment. The impact of employer stock ownership plans on organizational commitment has been a long-running focus of the literature on 'shared capitalism', with much of the literature suggesting a positive effect (Kaarsemaker, Pendleton & Poutsma, 2010). Given the cross-sectional character of much of the research, a reverse effect might also be anticipated: those with higher levels of commitment might be inclined to hold a greater proportion of company shares. This is consistent with the affect heuristic, whereby decisions are guided by feelings about a particular object. In particular, this heuristic may influence risk perceptions, with objects deemed to be good tending to be viewed as less risky (Slovic, Finucane, Peter & MacGregor, 2002).

Consistent with this, Cohen found that allocations to company stock are higher amongst employees in stand-alone companies than conglomerates, arguing that loyalty will be higher in the former (2008). This finding is mirrored using other measures of loyalty in the study, though none are measured directly at the employee level. Using employee-level data, Aspara and Tikkanen showed that a positive view of the company correlates with extra motivation to invest in company stock (2011). Similarly, Caramelli and Carberry (2014) found a significant positive relationship between organizational commitment and a preference for investing in employer stock, though no such relationship between turnover intention and stock preferences. Commitment to the company may also give rise to perceptual biases such as unfounded expectations that company stock will perform well, as well as under-estimation of the risks involved in holding company stock (Aspara and Tikkenen,2010).

Inertia and lack of planning. Recent work in Behavioral Economics highlights the role of status quo bias (Samuelson & Zeckhauser, 1988): the tendency to leave things as they are. This can arise from loss aversion and what Thaler and Sunstein call 'mindless choosing' – an inability to devote attention to often simple decisions (2009). Inertia and procrastination have been highlighted in the 401(k) literature, with Madrian and Shea (2001) finding that default contribution and investment allocations chosen by companies have a strong influence on the savings behavior of 401(k) participants. Most 401 (k) participants do not actively trade any component of their portfolios (Agnew, Balduzzi & Sunden, 2003), and fail to take the opportunities provided by plan rules to diversify at certain age and tenure thresholds (Choi, Laibson & Madrian, 2005). Huberman and Sengmuller (2004) find that poor current stock performance does not lead to subsequent transfers out of company stock: participants fail to be prompted by these adverse trends to review or change their portfolios.

If employers repeatedly offer new stock invitations, participating employees may come to build up large holdings of company stock. Inertia can mean that they fail to review their savings portfolios, and fail to take action to re-balance portfolios.

Reciprocity. In addition to the explanations considered above, we propose reciprocity as a new explanation for high proportions of company stock. Since the seminal paper by Akerlof (1982) on gift exchange, there has been considerable interest in the role of reciprocity in influencing work behavior. Reciprocity is central to the idea of the 'psychological contract' in employment (Rousseau, 1995). Defined as a sentiment of obligation and acceptance of a norm that it is right to act in return to others' actions (Gouldner, 1960), reciprocity contrasts with economic models of

human behavior which emphasize 'self-interest with guile' (Williamson, 1985). The role of norms and obligation within a continuing pattern of exchange distinguishes reciprocity as a concept from commitment, which emphasizes individual feelings to some other entity without necessarily implying an exchange relationship. It is now widely accepted that reciprocity has a significant influence on the behavior of most people (Fehr & Gachter, 2000: 163). Quite a large body of experimental evidence has demonstrated the role of reciprocity in influencing behavior in quasi-work settings (eg. as an alternative to pay incentives), although there is also some counter-evidence that the effects can be weak or short-lived (Gneezy & List, 2006).

Attention has recently turned to reciprocity and company stock. On the basis that broad-based company stock schemes are unlikely to function as an effective incentive (because of the lack of a clear line of sight between option awards and company performance), Cappelli and Conyon (2011) argue that stock options function primarily as gifts. Where options pay-off to employees, employees reciprocate by working harder. In a similar vein, Bryson and Freeman (2014) show that workers reciprocate the gift of employer-subsidized share purchase plans by working harder, and by having lower quit and absenteeism rates. The same logic can be applied to holdings of employer stock in wealth portfolios. Employees may reciprocate the employer's gift (providing stock at a discount and with tax concessions) by holding large proportions of company stock in their wealth portfolios.

Evaluation of these explanations

Research into portfolio allocation within 401 (k) plans has generated rich and plausible explanations for the tendency of some employees to allocate large proportions of their savings to company stock. There are nevertheless some

limitations of this stream of research. One is that over-weighting is considered within the parameters of the 401 (k) plan rather than financial savings and investments as a whole (Campbell, 2006). Those employees with extensive portfolios outside their defined contribution plan are clearly not so much at risk as those who hold most of their long-term savings within the plan. But wealth outside the 401 (k) plan is not observed. Two, the behavioral biases identified in the literature are most often imputed from patterns in stock transactions /ownership data rather than from direct observations of employee behavior. In some instances, core demographic information such as gender, age, and salary are available and can be matched to these transactions to differentiate behavior between groups of employees. But the heuristics and biases that are imputed to individuals from patterns in the data are typically not directly observed. Three, previous studies have typically considered biases and heuristics in isolation from each other (an exception is Benartzi, 2001), even though their posited near universality means that all or most may well be present in a particular decision or set of decisions.

Methods

In common with the Finance literature, we predict that undiversified wealth portfolios with large holdings of company stock will be associated with sentiments, biases, and heuristics. Unlike most of this literature, we draw on extensive attitudinal and behavioral information obtained directly from employees. Our model observes the proportion of company stock within financial savings and investments, and tests for associations between this proportion and the constructs used to explain employee behavior in the literature. Using ordered logit, and the presentation of marginal

effects, we compare the relative importance of these various explanations for portfolio concentration. Since the paper compares several explanations for portfolio concentration developed largely independently of each other, we prefer not to express our approach in terms of hypotheses: at this stage we have no clear rationale for hypothesizing that any one explanation will be stronger than any of the others, or that explanations should be in a particular rank order.

Research site

The Save As You Earn (SAYE) plan in the UK provides the context for the research. This plan functions as a medium-term savings plan, rather than as a retirement plan. Typically open to all employees with a year's employment, options can be granted to employees choosing to participate for exercise in three or five years' time. A 20 per cent discount on market prices at grant is typically available. Participating employees subscribe to a savings plan with regular contributions of up to £500 (£250 at the time of the research) per month to provide the cash to exercise the options. At maturity, participants can either take the proceeds of the savings plan, exercise and immediately sell the shares, or exercise and hold the shares. There is no minimum holding period and shareholders are free to sell or retain the shares as they please. Currently, 440 companies, including ninety companies in the FTSE100, operate SAYE schemes (HM Revenue and Customs, 2015). In 2013-14, 450,000 employees enrolled in a SAYE scheme (around 1.5 per cent of the UK employed workforce).

There is an annual invitation in all companies operating SAYE in our sample. It is common for employees to save in more than one scheme, and over time they can participate in a large number of invitations (the mean amongst our respondents was 3.9). Since it is an options-based plan, serial participation does not necessarily lead to

large holdings of employer stock: participants can take the accumulated cash from the savings plan without exercising the options. In their most recent maturity, a third of participants chose to do this. Of the two-thirds exercising the options, 43 per cent sold their shares immediately or shortly afterwards (a comparable figure to that found in other studies – see Pendleton, 2005). If, however, participants choose to exercise and hold, and do so repeatedly, their company stock may come to form an increasing proportion of their total savings portfolio unless they also make corresponding increases in their other savings.

Data collection

Data were obtained from an employee-level survey of SAYE participants conducted amongst the clients of a major share plan administrator in autumn 2012 using a mixed-mode of a paper notification and a web-based survey questionnaire. Each year, the administrator sends a savings plan statement to each participant in a SAYE scheme. In the autumn 2012 statement, there was a short item announcing the research. Since statements were paper-based, potential respondents had to type-in the web link to a web browser or use a QR reader to access the survey. To encourage responses, those participating in the survey were entered into a prize draw for a tablet computer.

Altogether 4,669 SAYE participants undertook the survey out of a total population of 143,417, a response rate relative to the population of just over 3 per cent. We focus on employees in 53 companies where at least ten respondents had experienced a maturity. The rationale for this is that there is a pronounced imbalance in client numbers between companies. In some companies there are less than 5 participants in a plan whereas the largest schemes have several hundred. A potential problem where there are few participants is that the dependent variable will lack cases

in some categories. We then restricted our investigation to those employees who owned some stock arising from a maturity to provide a final working sample of 943.

Relative to the total population, the response rate is within the range of observed response rates for electronic surveys, albeit towards the bottom end (Baruch & Holtom, 2008). A key feature of our survey is the absence of a personalized invitation to complete the survey. As the contact with potential respondents was indirect, follow-up reminders were not feasible. Comparison of our final sample with demographic information on the stock plan population held by the plan administrator, suggests that men and higher earners are slightly over-represented.

Dependent variable

The dependent variable (STOCK PROPORTION) is the proportion of employer stock in the employee's total stock of savings and investments. The survey question asks "approximately, how much of your total savings and investments by value (excluding the value of your home and your company pension if you have them) are in shares of the company you work for?" This subjective measure of portfolio concentration invites employees to choose five categories of concentration: >0 - <5%, 5-24.99%, 25-49.99%, 50-74.99%, and 75-100%[i]. Use of subjective and categorical responses is not ideal but more precise questioning is likely to depress response rates and invite inaccurate responses (because most employees are unlikely to be able to provide precise answers) (Campbell, 2006)[ii]. As in some previous studies of portfolio choice (Guiso, Jappelli & Terlizzese, 1996; Cardak & Wilkins, 2009), company-provided pensions are excluded from the denominator. This is because information on the sum of individual contributions is not made available in schemes that base pension payments on final salary or career average salaries ('defined benefit' schemes). .

However, respondents were asked to include the value of any 'personal' pension[iii] wealth in their calculation because participants (27 per cent of our sample) receive regular statements of the value of their individual fund. We separately collect information on participation in company and personal pensions: as will be shown shortly, there is little difference in pension enrolments between the various categories of portfolio concentration.

Independent variables

Familiarity has not been operationalized in the finance literature to date, and tends to be imputed from the posited outcomes of familiarity. Here, FAMILIARITY is measured by a single item scale: 'I feel I know this company really well', taken from Aspara and Tikkanen (2011). They used a two-item scale with this item (slightly differently worded) and an item asking how well respondents knew the company's products. Since the reported reliability for the scale was not high (0.63), it was decided to adopt a single item version here. A possible reason for the low reliability in their work is that the question about the company picks-up sentiment whereas the question about the products invites a more considered answer about the respondent's state of knowledge of the company's products. In our study, the single item was entered in exploratory factor analysis (EFA), along with the items for the other main scales (see Table 1), and a separate factor clearly emerged (though with an eigenvalue of 0.75).

Excessive extrapolation refers to the tendency to impute future developments from events in the recent past. In this case this refers to an expectation that stock prices will behave in the future in the same was as in the past. EXTRAPOLATION is created

by comparing perceptions of stock performance in the last year with expectations for the coming year. Where employees perceive positive (ie. a rising price) performance last year and expect positive performance in the coming year, it is coded as 1 (0 otherwise). We believe this approach has greater validity and reliability than asking respondents to rate their agreement with statements about whether they base future predictions on past events.

Insert Table 1 about here

Organizational Commitment. Our primary concern is affective commitment, defined as identification with and involvement in the company. We draw on Cook and Wall's (1980) scale, widely used in the UK context, slightly revising the wording of the statements to replace 'organisation' with 'company'. Four of the six positively-worded items, referring to involvement and identity (see Table 1), are measured using a 1-5 scale (1 = strongly disagree and 5 = strongly agree), and are used to form COMMITMENT (mean = 3.91; SD = 0.68; alpha = 0.81).

Inertia This is based on a question asking respondents how often they review and consider changing their personal finances. The answers take the form of closed ordered categories, based on frequency of reviews (weekly, annually etc.). They are presented as a set of dummies with a quarterly frequency of reviews acting as the reference category. It was felt that this approach was more likely to ground respondents' answers in actual behavior than scales based on levels of agreement with statements about review activity. It is predicted that portfolio concentration will be

associated with a lower frequency of review, proxying employee's inability to 'get round to it'.

Reciprocity. Following Gouldner (1960: 170, 174), reciprocity is viewed as a sentiment of obligation involving mutually beneficial exchange and acceptance of a norm which engenders motives for returning benefits. Although there are established reciprocity scales in Child Psychology, the very recent emergence of the concept in pay studies means that there are no suitable validated scales. We therefore develop our own scale, composed of four items designed to capture both balanced (a concern to repay a provision of goods swiftly and proportionally) and generalized reciprocity (a more generalized and less precise sense of obligation) (Sahlins, 1965). Since the objective is to determine whether a sense of reciprocity affects employee stock behavior, the scale items make explicit reference to Sharesave. A further concern is to differentiate the RECIPROCITY scale from organizational commitment, given that the two concepts intuitively have some similarities. The reciprocity items load onto a single factor in EFA, distinct from the commitment items (see Table 1), and achieve an alpha of 0.81 (mean = 2.51; SD = 0.80)

Risk. Benartzi, Thaler, Utkus & Sunstein (2007) asked how 401(k) participants viewed the riskiness of company stock: more, less, or the same as a mutual fund, finding that substantial proportions mis-perceived company stock as less risky. Since this question has been widely used in the financial literacy literature, this question is replicated here, with responses here coded 1 if company stock is seen as less risky, 0 otherwise (RISK: PERCEPTION).

Other variables

Age. Age is recorded using a five-category ordinal question, and converted into four dummies (e.g AGE: 16-34[iv]). Earlier 401 (k) evidence indicates that portfolio concentration rises with age, though not strongly so (Holden & VanDerhei, 2001). Income is a powerful determinant of propensity to participate in employer stock plans (deGeorge, Jenter, Moel & Tufano, 2004; Pendleton, 2010), as well as saving more generally. However, income might be negatively associated with portfolio concentration on the grounds that higher income earners are more knowledgeable about personal finance (Lusardi & Mitchell, 2011). The survey records income using a multi-category question using income bands. To simplify presentation, we group income into three categories, with the middle category acting as the reference[v]. LOW PAY records annual salaries up to £40,000 whilst HIGH PAY records salaries above £50,000

Gender. A single dummy measure is used with MALE = 1. Earlier studies indicate that women are less likely to concentrate in employer stock (Pendleton, 2010), possibly due to higher risk aversion (Agnew, Balduzzi & Sunden, 2003) or a lower tendency to be over-confident (Barber & Odean, 2001).

Stock prices. Respondents were asked for their perception of stock price movements over the previous year, with closed categories ranging from increase of over 10 per cent to decrease of over 10 per cent, along with a 'don't know' category. 'No change' is the omitted category.

Company. Where there are more than twenty respondents per company, a company dummy is created to control for company fixed effects. Those respondents belonging to companies with less than twenty respondents are assigned to one of two dummies: one for companies with 10-19 respondents and another for those with less than ten.

This is to ensure that the full range of values for the dependent variable is available for each dummy. Altogether there are 15 company dummies.

Sample means and correlations are shown in Table 2.

Insert Table 2 about here

Analytical procedure

A set of descriptive statistics displays the magnitude of portfolio concentration (Table 3). Then, ordered logit regression is used to evaluate the role of the independent variables, controlling for personal characteristics (Table 4). We also generate an OLS model (Table 4, Model 4) to facilitate interpretation though, as the dependent variable comprises unequal categories, the results should be treated with caution. Since the coefficients in ordered logit provide limited information on the magnitude of effects, average marginal effects are computed for each of the independent variables, averaged across the values of all other variables, for each level of portfolio concentration (Table 5).

Results

Portfolio concentration: incidence

Table 3 shows the proportion of employee shareholders in each portfolio category. The results give rise to concern over possible over-investment in employer stock. Twenty-two per cent of employee shareholders hold over 50 per cent of their stock of savings and investments in company stock. There are quite wide disparities in the average holdings of company stock by value: those with the lowest proportion of

company stock in their wealth portfolios hold on average just under £4,000 of shares compared with over £18,000 held by those with half or more of their savings and investments in company stock. If we calculate parameters of average savings and investments (not shown in the table) from the mean value of company stock and the proportion of stock in their savings portfolios, it can be readily appreciated that on average those with high concentrations of employer stock have much lower levels of total savings than those with very low concentrations. The latter typically have total savings and investments ranging from around £80,000 - £400,000 whereas those with the highest concentration have around £18000 – £23,000, using the mean values of company stock for each category. When we relate the value of company stock to levels of income, it can be seen that those with the highest concentration of stock in their portfolios have a high ratio of company stock wealth to income, suggesting that they are especially exposed to risk. Overall, the portfolio concentration problem seems to be concentrated amongst those least able to bear it.

The final two columns of Table 3 report the percentage of respondents in each portfolio category with no pension provision. Note that nearly one-fifth of those with the highest levels of stock concentration do not participate in their employer's pension scheme, with most of these not making alternative private pension arrangements. Extrapolating from these figures, 5.6 per cent of company stock-owners have 25 per cent or more of their portfolios in company stock and have no pension provision of any sort. Thus, for some, the dangers of over-investment in company stock are amplified by the absence of pension provision.

Table 3 about here

ii) Determinants of portfolio concentration

Table 4 shows the results of ordered logit analysis of the relationship between our variables of interest and the ordered categorical dependent variable for portfolio concentration. Model 1 includes only the personal control variables: income, age, and gender. Model 2 includes these controls and the independent variables of interest, whilst Model 3 controls for company fixed effects. Model 4 replicates Model 3 using OLS instead of ordered logit. As can be seen, the coefficients and their significance are qualitatively similar to the coefficients reported in Model 3. Table 5 reports the average marginal effects for each variable for each category of the dependent variable based on the output of Model 3. Caution should be exercised, however, when interpreting these effects because some relate to continuous variables whereas others relate to categorical or dummy variables. For binary variables the marginal effect shows the change in probability as the variable changes from 0 to 1, whereas for continuous variables it is the change in probability for an instantaneous change in the variable. Thus it is difficult to compare the magnitude of marginal effects across different types of variable.

Table 4 about here

Table 5 about here

In all models in Table 4, age, gender, and pay are insignificant, echoing similar findings for 401(k) plans reported by Utkus and Young (2014). Turning to the main variables of interest, FAMILIARITY is weakly significant in Model 2 but

when company fixed effects are added it becomes more significant at $p<0.05$ in Model 3. Table 5 shows that the marginal effects at each level of the dependent variable are significant. FAMILIARITY is negatively associated with holdings of under 25 per cent but becomes positive, and grows in magnitude, for concentrations above this.

By contrast, the findings for EXTRAPOLATION from past to future stock prices are uniformly insignificant. In conjunction with the largely insignificant coefficients for perceptions of STOCK PRICE changes in the last year, the implication is that beliefs about stock price movements do not have a strong influence on employees' stock-holding behavior. However, where share price gains are sizeable (10 per cent or more) there is some sense that this will induce greater stock holding behavior.

Contrary to predictions, COMMITMENT has insignificant coefficients in both models. The associated marginal effects for the fixed effects model are tiny and insignificant at all levels. An obvious issue is whether there is collinearity with between COMMITMENT and FAMILIARITY given the relatively large correlation coefficients shown in Table 2 ($r = 0.44$). To investigate this, we experiment (not shown here) with regression models that omit those variables with high correlations with COMMITMENT: the coefficient for COMMITMENT remains very small and insignificant. We also check for multi-collinearity by re-running the ordered logit as a linear model, finding that the Variance Inflation Factors for all variables are well within acceptable limits. Based on the findings and these robustness tests, we conclude that affective COMMITMENT does not affect the level of portfolio concentration.

The frequency with which employees review their savings and investments proxies for INERTIA. As this is a multi-category variable, each value is reported as a separate factor in the ordered logits and interpreted relative to the omitted group. As Table 4 shows, lower frequencies of review have significant positive associations with higher levels of portfolio concentration, with the coefficients in the logits somewhat higher when company fixed effects are included. The average marginal effects for the fixed effects model reported in Table 5 provide further details. Positive marginal effects come into play for stock concentrations of 25 per cent or more, with the magnitude increasing between each level of portfolio concentration. The marginal effects for the less frequent categories of review are quite sizeable for the most concentrated category of stock-holder in particular where individuals report that they never review their savings and investments.

RECIPROCITY has a significant effect on the odds of various levels of portfolio concentration, with the coefficients in Table 4 being significant in both models. The marginal effects reported in Table 5 show that the effects of reciprocity are negative for low levels of concentration, becoming positive once concentrations exceed 25 per cent of wealth portfolios. The magnitude of the marginal effect of reciprocity grows steadily peaking at the highest levels of portfolio concentration.

Finally, the model includes a variable for the perception of the risk of company stock relative to other types of investment. In Table 4, Model 2 the findings are broadly consistent with those reported earlier by Benartzi, Thaler, Utkus & Sunstein (2007): there is a positive relationship between a belief that company stock is safer than a diversified mutual fund and concentrated holdings of employer stock. Marginal effects are significant and positive for 25% and above categories of

concentration in employer stock with the effect nearly doubling between the 25-49 per cent and 75 per cent plus categories.

In order to check the robustness of our model we estimate a generalized order model using GOLOGIT2 (Williams, 2006). The initial stage of this approach calculates the Brandt test to verify whether each variable satisfies the 'parallel lines' assumption underpinning ordered logit models which requires the effects of each variable to be consistent across the values of the dependent variable. Where this does not hold, the parallel lines assumption is not imposed and the generalized model allows this variable to vary with potentially important effects changing key findings. In our generalized model all key behavioural variables satisfied the parallel lines assumption and only one of our control variables, the low pay category of pay, failed the Brandt test. All key effects reported in Table 4 were robust although low pay had a negative significant marginal effect with concentration levels between 5-24 per cent but a significant positive effect with the highest level of concentration.

Discussion

The findings in the paper confirm those reported elsewhere that a sizeable minority of employees hold substantial proportions of employer stock when they have the opportunity to acquire it via an employer scheme. The originality of the research resides in three main features. One, for the first time it evaluates the relative importance of a range of explanations advanced separately in the Finance literature, mainly derived from Behavioral Economics, to explain concentration in employer stock (in the context of 401 (k) plans). Two, as part of this it operationalizes and considers the role of reciprocity, now widely discussed in the Personnel Economics literature, as a factor influencing employee behavior. Three, unlike most of the

Finance literature on this topic, the research derives data directly from employees rather than stock transactions. As a result, it is able to observe and measure directly the posited 'behavioral' factors of interest. It does so using a combination of established and new scales and measures. The main contribution of the research therefore is that it provides empirical support for some theories of employee behavior that have lacked a clear empirical basis.

The findings show that personal and demographic characteristics have little association with the proportion of wealth held in company stock. Age and gender have insignificant effects across all models although low pay is a factor in our generalized regression models. The latter findings suggest that low-paid employees participating in company stock plans may come to hold high proportions of company stock because income constraints inhibit other forms of wealth accumulation.

More surprising perhaps is that stock price has largely insignificant associations with portfolio concentration. Whilst a substantial jump in a company's share price is associated with higher levels of concentration, other share price changes in the previous year reveal no significant concentration effect while our measure for excessive extrapolation (which measures the association between recent and expected stock prices) shows no effect. The insignificance of most of these may derive from buy/sell decisions cancelling each other out. Choi, Laibson, Madrian & Metrick (2004) found that recent increases in stock price led to both increased inflows to company stock within 401(k) plans (as did Benartzi, 2001) but also increased stock sales. Our focus on the stock of wealth, rather than transactions, may explain why our results for excessive extrapolation differ somewhat from those reported in earlier literature.

Equally, the unimportance of excessive extrapolation may be attributed to inertia. Stock price movements may be of little importance if individuals are not actively managing their wealth portfolios. Our results provide strong evidence of an association between portfolio concentration and less frequent reviews of personal finances, with especially large marginal effects found for the highest category of portfolio concentration. This mirrors the importance attributed to inertia in causing 'non-decisions' in the management of wealth portfolios in some of the literature (Agnew, Balduzzi & Sunden, 2003; Madrian & Shea, 2001). Inability to make decisions may be more important than the biases that come into play when decisions are actually made.

There is also evidence of a familiarity effect. These results are novel because previous work has tended to identify apparent outcomes of familiarity (eg. Investment in domestic rather than overseas stocks) and then attribute them back to a familiarity heuristic without actually observing familiarity itself. In contrast to familiarity, organizational commitment has a negligible relationship with portfolio concentration. Cohen previously found that commitment was associated with higher levels of company stock in 401 (k) plans but, in common with much of the literature, the key explanatory variable was not directly observed. In those studies where it has been included (Benartzi, 2001), it has been found to be non-significant. Nevertheless, it is arguably a surprising result especially as feelings of reciprocity are associated with portfolio concentration.

A further contribution relates to reciprocity. The stock plan literature has started to draw attention to the potential effects of reciprocity and gift exchange but so far they have been proposed as an explanation for observed behavior rather than directly observed themselves. We develop a new scale for measuring reciprocity in a

stock plan context, and find that its relationship to portfolio concentration is robust across a variety of model specifications. Our findings add to the growing view that reciprocity is an important influence on behavior in human resource and reward management contexts (Dodlova & Yudkevich, 2009).

Implications for practice

From a standard portfolio perspective, the findings that a sizeable minority of company stock plan participants hold large proportions of their financial savings and investments in company stock and that their reasons for doing so stem from sentiment or inaction rather than hard-headed investment calculation are a cause for concern. Legislative and/or regulatory action, along with changes to corporate practice, may well be desirable. This is certainly what happened in the US in the wake of Enron, where various actions were taken to limit employee exposure to company stock in 401 (k) plans. Some of the techniques explicitly recognize the power of decision-making biases, as considered in the paper, and recommend 'nudge' techniques to modify employee behavior (Thaler & Sunstein, 2009; Benartzi, 2012).

Our view is that participation in company stock plans is usually highly worthwhile because the discounts and tax breaks mitigate much of the risk. Nevertheless, some participants would benefit from greater diversification. Employees can be caught out by sudden corporate events and dramatic changes in stock price, especially in an era where high proportions of stock trading are automated and are triggered by algorithms rather than direct human action (Hendershott, Jones & Menkveld, 2011). The key issue is how to modify employee behavior to reduce

exposure whilst not sacrificing the positive sentiments lying behind portfolio concentration, such as reciprocity.

At a regulatory level, diversification might be encouraged by the creation of diversified savings plans operating under the aegis of the company and partially under the control of employees, as in France. Employees might be encouraged to 'roll-over' company stock into plans of this sort, which are akin to the arrangements for occupational pension schemes. Similarly, in the US employees aged 55 with 10 or more years participation in an ESOP can start to diversify into cash or other investments. Currently, in the UK employees can put their company stock into personal pensions, as a shelter from tax charges, but they nevertheless retain their exposure to concentration risk.

It is widely argued that improvements in financial literacy are necessary, and that this workplace financial education may achieve this. Employers are often reluctant to provide this on the grounds that they lack relevant expertise. But it is arguably an employer responsibility given that provision of a stock plan may function as 'implicit investment advice' (Liang & Wiesbenner, 2002). The solution may be third-party provision of financial education within the workplace, financed by employers. Although there is some evidence of the success of workplace financial education (Bayer, Bernheim, & Scholz, 2009; Clark, Morrill & Allen, 2012), some doubt the efficacy of generalised education programmes to modify behavior (Fernandes, Lynch & Netemeyer, 2014). More targeted interventions, timed to coincide with key events such as maturities may be the way forward.

Limitations

Mounting individual-level surveys into financial behavior is fraught with difficulties, because of fears about invasion of privacy and lack of precise knowledge of the worth of financial investments. Any survey of this kind inevitably has to make trade-offs between the capacity to acquire relevant information and the reliability of these data. This fundamental tension lies behind the main limitations of the research.

The response rate to the survey was not high, possibly due to the potential sensitivity of questions about personal finances, but this is offset by the sizeable number of respondents. A potentially more important limitation in our view is the representativeness of the respondents: we noted earlier that males and higher earners are slightly over-represented relative to the population. However, our assessment is that these do not introduce significant biases to the main results since both gender and income coefficients are insignificant. These results are also consistent with other research in the area, such as Utkus and Young (2014). Further, if it is assumed that higher earners are more financially literate, our results are more likely to under rather than over-state the scale of the concentration problem.

Some of our measures are not ideal though there were good reasons for their adoption. We measure the perceived riskiness of company stock with a dichotomous measure, derived from a four category question. We used this question rather than a continuous scale to maintain continuity and comparability with the existing literature (eg. Benartzi, Thaler, Utkus & Sunstein, 2007). This particular question, and slight modifications of it, has been widely used in assessments of financial knowledge and literacy. The results, which indicate an association between perceptions of low risk and high concentrations of company stock, suggest that this was a reasonable approach.

The paper has evaluated various behavioral explanations but we have not been able to assess other, more rational explanations for concentration in employer stock. One is that employees hold a lot of employer stock to signal commitment, or feigned commitment, to the company in the hope of favorable treatment in return. We are inclined to discount this possibility because the administration of the stock plan is out-sourced such that the employer does not have access to information about employee stock-holdings. Another possibility is that stock concentration is a sensible one from a Keynsian point of view especially as the evidence shows that firms with employee ownership perform better (O'Boyle, Patel & Gonzalex-Mules, 2016) and are less likely to shed labour in hard times (Kurtulus & Kruse, 2017). However, whilst it may be sensible practice, it seems unlikely that employees come to hold large amounts of employer stock because of an informed review of the evidence. And our findings indicate that stock price does not have a strong influence on employee behavior. Finally, it has been argued that holding employer stock reduces the riskiness of this stock. Bova, Kolev, Thomas & Zhang find a negative relationship between non-executive stock-holdings and corporate risk, which they attribute to employee capability and incentives to control risk. However, we are inclined to discount this as employess gain little decision-making power or influence in the type of stock plans under consideration here.

As ever, with cross-sectional studies we cannot rule out reverse causality. For instance, the association between inertia and high levels of concentration could derive from those with high levels of company stock ownership choosing not to review their portfolios regularly because they feel comfortable with their concentrated position.

The dependent variable has two main limitations which affects our estimation of the magnitude of concentration, though not the factors associated with it. One is

that the various levels of stock plan concentration are expressed as categories rather than as a more informative continuous measure. This approach was chosen because a requirement for more precise answers would have likely led to ad hoc guessing as a time-saving alternative. Experimentation in a later survey with a fully continuous measure generated results where individual respondent's answers peaked at deciles and the quartiles that broadly correspond to the categories used here. These answers might be the outcome of guess-work using 'round' numbers or the prior use of simple rules of thumb to make 'naïve allocation' decisions (whereby assets are distributed using simple ratios) (Benartzi & Thaler, 2001). Given this, we believe that our categorical variable is not far off the mark in capturing portfolio allocations.

The second limitation concerns the relation between stock wealth and retirement savings. Respondents were asked to exclude company-provided pensions from their calculation of wealth. The reason stems from the current complexity and variability of retirement fund provision in the UK, and employees' informational problems in valuing their pension pot: only defined contribution but not defined benefit schemes provide information on the current value of accumulated savings. Given the potential for unreliable answers, it was safer to exclude company pension savings (though not so-called 'personal pensions'). Exclusion of company-provided pensions will understate total wealth, and over-state the concentration problem in most cases. However, nearly a sixth (1 per cent) of our sample have no pension provision at all: the distribution of those without pensions it similar across the portfolio concentration categories. Clearly, the 15 per cent of those in the 75-100 per cent category with no pension provision at all are most highly exposed, especially if their company stock wealth is viewed as a 'nest egg' for retirement.

Whether or not retirement savings or housing wealth are included in portfolios, the findings nevertheless show that some of the posited explanations for portfolio concentration help to explain high proportions of employer stock in financial savings and investments. Our wider focus on all forms of savings provides a complement to the 401(k) literature which, in focusing solely on 401(k) funds, excludes other forms of wealth in the calculation of portfolio concentration. Whilst our findings are based on non-pension financial savings and investments rather than defined contribution pension funds, the degree of congruence with the predictions and evidence from the 401(k) literature suggests that they have a wider relevance.

Conclusions

Despite the limitations of the research, we believe the paper provides a potentially valuable evaluation of the role of various explanations for portfolio concentration in company stock ownership plans. Hitherto, these explanations, mainly advanced in Behavorial Finance, have tended to lack an employee-level dimension, often attributing employee motives on the basis of observed transaction behavior. The research here directly observes employee attitudes and characteristics, finding that a sense of reciprocity, inertia, and familiarity correlate with high proportions of company stock ownership. However, organizational commitment and 'naïve extrapolation from recent stock prices do not.

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Table 1 Scale construction: exploratory factor analysis and reliability analysis

Variable	Commitment	Reciprocity	Familiarity
I am proud to tell people which company I work for	**0.80**	0.12	0.09
I feel part of the company	**0.78**	0.09	0.25
I like to feel I am making some effort not just for myself but for the company as well	**0.72**	0.14	0.24
To know that my own work had made a contribution to the good of the company would please me	**0.69**	-0.00	0.35
Being in the Sharesave scheme makes me want to give something back to the company	0.33	**0.74**	-0.08
I feel I have an obligation to be helpful to the management of the company because it has provided the Sharesave opportunity	-0.06	**0.83**	0.10
Being in the Sharesave scheme makes me want to be more helpful to other employees	-0.01	**0.86**	0.11
The Sharesave scheme makes me feel part of a family at work	0.45	**0.68**	-0.10
I feel I know this company really well	0.24	0.05	**0.92**
Cumulative variance	0.29	0.57	0.70
Eigenvalue	3.54	1.96	0.75
Cronbach Alpha	0.81	0.81	-

Table 2 Descriptive statistics and correlation table

	Mean	S.D	1	2	3	4	5	6	7	8	9	10	11
1. EXTRAPOLATION	0.33	0.47	1										
2. RECIPROCITY	2.51	0.80	0.12	1									
3. COMMITMENT	3.91	0.68	0.07	0.32	1								
4. FAMILIARITY	3.94	0.82	0.04	0.12	0.44	1							
5. INERTIA	4.31	1.47	-0.03	-0.07	0.00	-0.04	1						
6. RISK PERCEPTION	0.31	0.46	0.13	0.04	0.08	0.11	0.09	1					
7. INCOME	1.94	0.92	0.02	-0.06	0.09	0.08	-0.17	-0.10	1				
8. AGE	2.58	0.88	-0.01	0.05	-0.00	-0.05	0.01	-0.05	0.09	1			
9. MALE	0.72	0.45	0.13	0.03	-0.02	-0.01	-0.09	-0.03	0.30	0.06	1		
10. STOCK PRICE	3.82	2.53	-0.67	-0.08	-0.06	-0.03	0.07	-0.11	-0.11	0.04	-0.19	1	
11. STOCK PROPORTION	2.40	1.30	0.05	0.07	0.04	0.07	0.10	0.08	0.03	-0.07	-0.04	-0.11	1

Notes
N = 943
All coefficients above 0.06 significant at 0.05 or better

Table 3 Holdings of company stock by employees

Proportion of company stock in total current stock of savings	**Percentage of respondents**	**Mean (Modal) value of company stock (£)**	**Mean value of company stock relative to income (%)**	**Percentage of group without a company pension**	**Percentage of group with no pension provision at all[1]**
<5%	30	4,061 (1800)	13	21	15
5-24%	31	14,069 (7500)	29	17	12
25-49%	17	21,810 (15000)	48	16	14
50-74%	12	18,139 (13000)	41	19	14
75-100%	10	18,175 (12000)	52	19	15
AVERAGE (all categories)		13,310 (6000)	31	19	14
Significance tests	-	F = 32.36***	F = 13.73***	X^2 = 2.52 n.s.	X^2 = 1.38 n.s.

Notes: *** = significant at 0.01

[1] = no company-provided pension or personal pension

Table 4 Influences on portfolio concentration

		Ordered logit		OLS
Control variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
LOW PAY	0.04 (0.17)	0.06 (0.18)	0.20 (0.18)	0.19 (0.12)
HIGH PAY	0.24 (0.17)	0.27 (0.18)	0.11 (0.18)	0.10 (0.13)
AGE: 16-34	0.28 (0.20)	0.33 (0.20)	0.18 (0.21)	0.13 (0.14)
AGE: 45-54	-0.07 (0.14)	-0.03 (0.14)	-0.00 (0.14)	0.00 (0.10)
AGE: 55-64	-0.25 (0.19)	-0.26 (0.19)	-0.10 (0.20)	-0.07 (0.13)
MALE	0.18 (0.14)	0.14 (0.14)	0.16 (0.15)	0.09 (0.10)
STOCKPRICE UP OVER 10%		0.29 (0.26)	0.62 (0.29)**	0.40 (0.20)**
STOCKPRICE UP 5-10%		0.24 (0.30)	0.33 (0.31)	0.23 (0.22)
STOCKPRICE UP TO 5%		-0.43 (0.29)	-0.26 (0.30)	-0.14 (0.21)
STOCKPRICE DOWN TO -5%		-0.24 (0.27)	-0.12 (0.27)	-0.04 (0.19)
STOCKPRICE DOWN 5-10%		0.09 (0.28)	0.33 (0.29)	0.20 (0.20)
STOCKPRICE DOWN 10%+		-0.24 (0.25)	0.27 (0.27)	0.17 (0.19)
STOCKPRICE: DON'T KNOW		-0.60 (0.29)**	-0.27 (0.32)	-0.12 (0.20)
Independent variables				
FAMILIARITY		0.14 (0.08)*	0.18 (0.09)**	0.10 (0.06)*
EXTRAPOLATION		-.28 (0.18)	-0.10 (0.19)	-0.05 (0.13)
COMMITMENT		-0.07 (0.10)	0.00 (0.11)	0.02 (0.07)
INERTIA: REVIEW WEEKLY		-0.07 (0.44)	-0.06 (0.42)	-0.02 (0.31)
INERTIA: REVIEW MONTHLY		-0.18 (0.22)	-0.26 (0.23)	-0.16 (0.15)
INERTIA: REVIEW TWICE YEARLY		0.36 (0.21)*	0.43 (0.21)**	0.29 (0.14)**
INERTIA: REVIEW YEARLY		0.28 (0.18)	0.35 (0.18)*	0.22 (0.12)*
INERTIA: REVIEW LESS THAN YEARLY		0.46 (0.21)**	0.54 (0.22)**	0.34 (0.15)**
INERTIA: REVIEW NEVER		0.67 (0.31)**	0.69 (0.32)**	0.49 (0.20)**
RECIPROCITY		0.19 (0.08)**	0.21 (0.08)***	0.15 (0.05)***
RISK: MIS-PERCEPTION		0.29 (0.13)**	0.27 (0.13)**	0.16 (0.09)*
COMPANY DUMMIES	No	No	Yes	Yes
Observations	943	943	943	943
LR chi2	11.08*	57.82***	162.44***	
Cut 1	-0.63 (0.20)	0.29 (0.53)	2.73 (0.65)	
Cut 2	0.69 (0.20)	1.65 (0.53)	4.22 (0.65)	
Cut 3	1.50 (0.21)	2.48 (0.53)	5.11 (0.66)	
Cut 4	2.42 (0.22)	3.43 (0.54)	6.10 (0.67)	
Adjusted R^2				0.10

Notes: * = significant at 0.10; ** = significant at 0.05; *** = significant at 0.01

Table 5 Influences on portfolio concentration: average marginal effects

Ordered logit with company fixed effects

	(1) <5%	(2) 5 - 24%	(3) 25 - 49%	(4) 50 – 74%	(5) 75 - 100%
Familiarity	-0.034**	-0.004*	0.010**	0.013**	0.016**
Extrapolation	0.019	0.002	-0.005	-0.007	-0.009
Commitment	0.000	0.000	-0.000	-0.000	-0.000
Inertia: Review Weekly	0.011	-0.000	-0.003	-0.004	-0.004
Review Monthly	0.055	-0.005	-0.017	-0.017	-0.017
[Review Quarterly]					
Review twice yearly	-0.082**	-0.008	0.024**	0.030**	0.035**
Review yearly	-0.067*	-0.005	0.020*	0.024*	0.028*
Review less than yearly	-0.100**	-0.012*	0.029**	0.038**	0.046**
Review never	-0.125**	-0.020	0.035**	0.049**	0.062*
Reciprocity	-0.039***	-0.005**	0.011**	0.015***	0.018**
Risk: Misperception	-0.049**	-0.007	0.014**	0.019**	0.024*

Notes: * = significant at 0.10; ** = significant at 0.05; *** = significant at 0.01

Based on Table 4, Model 3. N = 943

For binary variables the marginal effect shows the change in probability as the variable changes from 0 to 1, and for categorical variables the difference relative to the omitted category. For continuous variables it is the change in probability for an instantaneous change in the variable.

[i] We do not include those with no stock because the large numbers of these distort the regressions such that they highlight the factors associated with stock ownership per se not the factors associated with varying levels of stock ownership.
[ii] Benartzi, Thaler, Utkus & Sunstein (2007) attempted to gain more precise information on concentration but had to use categories as a fall-back position for around a quarter of respondents.
[iii] In the UK a personal pension is one arranged by an individual separately from their employer
[iv] The youngest category is merged with the next because of a small number of responses.
[v] We ran alternative models where all categories of income bar one were included but these results do not differ materially from those reported here.