

# **Risk Compensation in Employee 401(K) Investment Behavior**

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Abstract: We experimentally examined the effects of risk compensation on simulated 401(k) retirement plan contribution and allocation decisions. Risk compensation is a modification of individual behavior, in response to a safety improvement mechanism, such that one actually mitigates much of the potentially risk-minimizing benefit. While risk compensation effects have been demonstrated in many activities involving risk, the effects have not previously been investigated in retirement-related decisions. In recent years, however, 401(k) plan participants, administrators, sponsoring companies, and government officials have shown an increasing interest in improving retirement plan decision-making. The results suggest significant risk compensation effects for both contribution level and allocation decisions. When participants were presented with information about apparent risk-reducing safety mechanisms associated with the inherently riskier stock investments, they indicated that they would contribute more to their retirement accounts and would allocate more of their contributions to the riskier stock investment alternative. We discuss the implications of these findings for employee 401(k) decision-making behavior. We also suggest directions for future research that can further examine risk compensation effects in employee 401(k) decision-making.

**Key words:** risk compensation; defined contribution; retirement decision-making **JEL codes:** D140, G11

### **1. Introduction**

Over the past twenty years there has been a dramatic shift in the major form of retirement plans being initiated by businesses. Whereas retirement plans used to be concentrated in defined *benefit* plans, today there are more assets in defined *contribution* plans. The decline in the popularity of defined benefits plan was documented by Butrica, Iams, Smith, and Toder (2009), who reported that from 1980 through 2008, the proportion of private wage and salary workers participating in defined benefits plan fell from 38% to 20%. Recently, the Employee Benefit Retirement Institute reports that "… in 2013, 33 percent of all private sector workers participated only in a defined contribution plan (DC) and 2 percent participated only in a defined benefit (DB) pension plan … Including those who participated in *both* a DB and DC plan, 44 percent of all private sector wage and salary

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workers participated in a DC plan, and 13 percent participated in a DB plan."<sup>1</sup>

Under a defined benefits plan, employees made few decisions about their retirement funds. Defined benefit plans were professionally operated and managed by the companies sponsoring them and by professional investment analysts. Under defined contribution plans, the employers specify an amount, if any, they will contribute to an employee's retirement account. Employees then make important decisions about how much to contribute and how to allocate "their funds" within the larger plan in which they are participating. The larger plan is, of course, still managed professionally.

Defined contribution plans, on the other hand, the individual employee has the opportunity/responsibility to decide how much to contribute and how to allocate their funds, both of which have a big impact on their retirement income level. This is creating a situation where there is increasing retirement investment autonomy. Employees have been given control over the management of their own retirement savings, and they now bear the responsibility for their own financial security. This has occurred due to the evolving nature of employee retirement plans from defined benefits plans to defined contribution plans.

In 1993, 401(k) contributions were already valued at about \$69 billion and exceeded defined benefit contributions (Bassett, Fleming, & Rodrigues, 1998). More recently, in 2001, there were approximately 42 million American workers with 401(k) accounts valued at nearly \$1.8 trillion (Holden & Van Derhei, 2001a). The shift to defined contribution retirement plans does provide many benefits for employees (e.g., portability, control in allocation of one's retirement resources, etc.). \$1.8 trillion in 401(k) accounts is not a trivial amount of investment. An underlying assumption in this shift towards more autonomy is that employees make good choices regarding these retirement investments. However, many employees actually make poor decisions concerning contribution levels and allocations. Plan participants, plan administrators, sponsoring companies, and government officials have all shown a great interest in improving employee retirement plan decision-making. This begins with improving our understanding of such decision behavior.

Many high profile corporate debacles have created financial troubles for institutional and individual investors alike, not to mention the damage to the markets indirectly attributable to them. Many of these companies had 401(k) retirement plans in which their employees had participated. Enron, for example, had a 401(k) plan that offered 18 different choices for the participants. That is, the employees could choose how to allocate their retirement funds across 18 investment alternatives. They could put as much or as little of their vested funds into any of the choices. Surprisingly, 62% of the assets were invested in the company's stock. When Enron's stock price fell 99% in a matter of months, employees lost more than \$1 billion in retirement funds (Costello, 2002). Charles Prestwood, a long time Enron employee, saw his 401(k) retirement plan assets fall from \$1.3 million in value to nothing (Sloan, 2002).

While Enron provides a rare example of extremely detrimental effects of poor 401(k) investment choices, the problems associated with poor retirement investment decisions loom large, especially in times of increased market volatility (Buser, Robbins, & King, 2015). Many employees are not adequately diversified, not participating at substantial levels, and in other ways not engaged in successfully managing their funds. Hence, the larger challenge of effective employee retirement plan decision making provides the general backdrop to the specific research problem addressed by this research.

<sup>&</sup>lt;sup>1</sup> "Employee benefit research institute retirement question 14 'What are the trends in U.S. retirement plans?", available online at: https://www.ebri.org/publications/benfaq/index.cfm?fa=retfaq14.

Given the problems associated with employee decision making behavior relevant to retirement investments, there is a great deal of interest in better understanding the decision making process in this domain. Working towards the goal of improving employee decision making, many interested parties have been concerned with better understanding of decision making in this context. The underlying principle of this approach is that to manage something we must first understand it. One of the basic questions being asked is "What influences an employee's 401(k) contribution and allocation decisions?"

## 2. Theoretical Background and Hypotheses

There are many influences on an employee's 401(k) contribution and allocation decisions. Bailey, Nofsinger, and O'Neill (2003b) find that retirement decisions are influenced to a great extent by factors falling into one of the following four categories: plan characteristics, employee characteristics, social influences, and psychological biases. Plan characteristics that influence participation include employer matching (Hansen, 1999; Andrews, 1992; Papke, 1995; Papke & Poterba, 1995), automatic enrollment (Madrian & Shea, 2000), account flexibility (Holden & Van Derhei, 2001b; Gunderson & Luchak, 2001), investment choices (Benartzi & Thaler, 2001), and others. Employee demographic characteristics that influence decisions relevant to 401(k) plans include age (Bassett, et al., 1998; Holden & Van Derhei, 2001b), income (Bassett, et. al., 1998; Hubbard & Skinner, 1996), job tenure (Bassett, et. al., 1998), and others.

An additional employee characteristic that may influence the contribution level and the allocations made by a given employee is his or her tolerance for risk exposure. Social influences represent the effects of others' behaviors and suggestions on employee retirement investment decision-making. Many Enron employees report having felt social pressure to allocate retirement funds to company stock (even though there were 17 fund choices available in addition to the stock choice). Bailey, Nofsinger, and O'Neill (2003a) and Duflo and Saez (2002, 2003) find experimental evidence of social influences. Bailey et al. (2003a), find that social norms can play a significant role in the amounts that the people say they will contribute to a 401(k) plan. Psychological biases that can influence retirement investment decisions include framing (Bernartzi, 2001; Benartzi & Thaler, 2002; Benartzi & Thaler, 2001), familiarity bias (Coval & Moskowitz, 1999; Huberman, 2001), representativeness bias (Dhar & Kumar, 2001; Shefrin, 2000), status quo bias (Madrian & Shea, 2001; Samuelson & Zeckhauser, 1998; Tversky & Shafir, 1992), and others.

An additional psychological bias, or behavioral tendency, that has not been investigated is the risk compensation phenomenon. There have been limited applications of the risk compensation findings to employee decisions in financial matters. Recall that risk compensation is a modification of individual behavior, in response to an improved safety mechanism, such that a person actually loses much of the potentially risk-minimizing benefit (Evans, 1985; O'Neill, 1977; Stetzer & Hofmann, 1996; Taylor, 1964; Wilde, 1982) in return for some other benefit, such as driving faster so as to arrive at one's destination sooner (Peltzman, 1975).

The risk compensation effect has been demonstrated in many activities involving risk, such as risk of accident or injury, including driving behaviors, boating behaviors, weight-training choices, machine operation, and others. The general idea is that when a person is presented with safety (risk-reducing) mechanisms he or she tends to decide to behave in a more risky manner because of the "safety" provided by risk reducing mechanism. For example, when presented with seat belts, anti-lock breaks, and four wheel drive, people would tend to choose to driver faster on snow covered roads than they would without the safety devices. The safety devices can reduce

risk — but people tend to compensate for that reduced risk by deciding to drive faster (thereby bringing the risk level back up again).

Surprisingly, this behavioral phenomenon that has been investigated in the domain of safety research has not been applied to other domains of risky decisions, in general, and specifically has not been applied to decisions under risk related to financial matters. There is a great deal of research on risk in the traditional financial literature, but there is not a great deal about the behavioral aspects of dealing with financial risk. Bolton, Cohen, and Bloom (2006) examined, among others, consumer reaction to debt consolidation loans as a function of credit card usage behavior. Here, debt consolidation loans offer remedy (safety mechanism) to excessive card usage behavior.<sup>2</sup>

Traditional financial literature does not address the individual behavioral level influences on decisions pertaining to retirement plan contributions and allocations. The emerging and rapidly growing field of behavioral finance has yet to see the application of risk compensation to examine individual investment decision-making. Management literature has reported investigations of risk compensation primarily within the domain of decisions regarding machine operation — such as behavioral intentions and subjective risk associated with various driving situations (e.g., Stetzer & Hofmann, 1996). For the current study, 401(k) contribution and allocation behavioral intentions in various situations were used to investigate if risk compensation influenced such decisions. The following hypotheses were developed:

Hypothesis 1: The addition of safety mechanisms for stocks funds (higher risk investment option) will result in participants responding with intentions to allocate a larger portion of their retirement funds to a stock fund (riskier behavior).

Hypothesis 2: The addition of safety mechanisms for stocks funds (higher risk investment option) will result in participants responding with intentions to contribute more to their retirement fund.

#### 3. Methods

Participants were 47 undergraduate, upper-division business students. Twenty-seven (57%) were female and the average age was 21.8 years. Most of the participants were graduating seniors, and many were in the job search process; hence, they had already experienced making decisions regarding retirement benefits, including asset allocation.

Subjects received a questionnaire during class time and were asked to read the scenario in which they had recently accepted a job offer and were asked to decide on 401(k) contributions and allocations. Next they decided how much they would contribute and amount to allocate to a safer bond fund alternative and amount to allocate to a stock fund alternative. Next, they were informed a safety mechanism (funds to be managed by a very good firm) and again made decisions about amount to contribute and how to allocate those contributions. Next, they were informed the stock fund alternative had the safety mechanism mentioned above and also had a computerized sell order when a stock dropped below 80% of the value for it was purchased — thus preventing losses greater than 20%. This provided information on three levels of safety devices, from none to some to even more. Subjects then completed a few demographic and related questions. Participation was voluntary. The participation rate was 85.4% (47 out of 55). After completing the questionnaire, they received information about 401(k) decision-making to aid them in such matters.

 $<sup>^{2}</sup>$  Lee, Liu, and Stebunovs (2015) study risk compensation in an environment of low interest rates. In their study, however, they do not employ a safety mechanism; instead, the study focuses on the impact of low interest rates on risk taking by lenders.

The dependent variable for hypothesis 1 was the percent of the contribution that was allocated to the stock fund investment. The dependent variable for hypothesis 2 was the total amount that the subject intended to contribute to his or her 401(k) account. Safety level served as the independent variable. The safety variable consisted of three different levels of "safety" as indicated previously. This is a one-way repeated measures design. This is appropriate because the analysis involves a single predictor variable (safety level) measured on a nominal scale (low, medium, high) and the criterion variable is on an interval scale. Each subject was exposed to each condition under the independent variable.

#### 4. Results

Results for percentage allocation to stock across the three levels of safety mechanisms were analyzed using a one-way analysis of variance (ANOVA), repeated measures design. Results are presented in Table 1.

Source	df	SS	MS	F	
Between Subjects	46				
Within Subjects	94	2.62	0.71		
Safety Level	2	1.41	0.70	53.67*	
Residual	92	1.21	0.01		
Total	140				

Table 1 ANOVA Summary Table for Percentage of 401(k) Contribution Allocated to Stock Funds

Note: N = 47, p < 0.0001

The analysis revealed a significant effect for the safety measures, F(2,92) = 53.67, p < 0.0001. The mean percent allocation to the stock fund for the three safety levels of low, medium, high were 40.48, 56.59, and 64.47, respectively. The data suggest that the respondents chose to increase their allocation to the stock fund by 40% because of good fund management, and by an additional 14% because of the addition of algorithmic risk management strategy. Contrast analysis showed that the low safety level was significantly lower than medium safety level, F(1,46) = 48.26, p < 0.0001, and the high safety level, F(1,46) = 116.04, p < 0.0001.

Thus, for hypothesis 1, we reject the null hypothesis and conclude that these results tentatively suggest that safety mechanisms in a risky investment allocation option will result in significantly greater allocations to that riskier investment. Participants chose to behave in a more risky manner relating to 401(k) allocations when presented with safety mechanisms. The results suggest support for hypothesis 1 and for the risk compensation effect.

The results for the choice of overall amount to take out of one's pay and contribute to one's 401(k) were also analyzed using a one-way analysis of variance (ANOVA), repeated measures design. Results are presented in Table 2.

Table 2	ANOVA Summary	Table for Amount	Contributed to	401(K)

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Source	df	SS	MS	F
Between Subjects	46			
Within Subjects	94	26940000.00	4655522.66	
Safety Level	2	8919290.78	4459645.39	22.77*
Residual	92	18020709.22	195877.27	
Total	140			

Note: N = 47, p < 0.0001

This analysis revealed a significant effect for the safety measures, F(2,92) = 22.77, p < 0.0001. The mean contribution amounts for the three safety levels of low, medium, high were \$3161.70, \$3502.13, and \$3776.60, respectively. Contrast analysis showed that the low safety level was significantly lower than medium safety level, F(1,46) = 13.50, p < 0.001, and the high safety level, F(1,46) = 31.27, p < 0.0001. Thus, we reject the null hypothesis for hypothesis 2 and conclude that these results tentatively suggest that safety mechanisms in a risky investment allocation option will result in significantly greater overall contributions to a 401(k) retirement plan. In as much a dollar, in hand now, is safer than one invested into a 401(k) plan, participants chose to behave in a more risky manner relating to 401(k) contributions when presented with safety mechanisms. These results suggest support for hypothesis 2 and for the risk compensation effect.

#### 5. Discussion, Limitations, Conclusions

These results provide strong support for the existence of risk compensation effects in these reported behavioral intentions concerning 401(k) decisions. This conclusion of risk compensation effects is based on employing the criteria that they engage in more risky behavior after the introduction of safety mechanisms. As mentioned above, this effect has been seen in numerous investigations involving behaviors such as driving. What is less clear is why these results occur. Peltzman (1975) suggested an economic theory to explain such results. Basically, according to Peltzman's (1975) assertions, there are some benefits to be gained by engaging in the risky behavior of driving fast (e.g., get to one's destination sooner) and any safety mechanism acts to lower the costs of achieving those benefits. Therefore, safety devices are said to lower the cost of the risky behavior and thus increase the demand for the behavior. In the present study, this reasoning would suggest that there is a potential benefit to be gained by engaging in the risky behavior. Putting more money into the stock fund could result in better returns on one's retirement investment. When the safety mechanisms of expert, good trackrecord, managers are to manage the portfolio and when there is a stop-loss mechanism, the costs associated with the riskier behavior are reduced.

Wilde (1982) proposed the Risk Homeostasis Theory for the risk compensation effects seen in automobile driving. According to this theory, people have a certain target risk level for which they are comfortable and they seek to maintain that level (homeostasis). Wilde (1982) suggests the underlying psychological process of risk compensation includes a self-regulatory function such that one's experienced level of risk is compared with the level of risk one desires to take. Whenever these two are discrepant, people change their behavior to bring themselves back into equilibrium between target level and experienced level of risk. In the present study, this reasoning would suggest that the participants experienced less risk with the introduction of the safety mechanisms, creating disequilibrium with their target level of risk. To resolve this, they chose to put more of their money into a riskier investment.

These results may help to explain some employee 401(k) investment behavior. For example, it is a common finding that employees tend to favor investing in their company's stock as a component of their 401(k) holdings. Investors experience what is called a "familiarity bias" when choosing where to invest their money (Coval & Moskowitz, 1999; Huberman, 2001). Employees tend to favor investing in the company for which they work. In a study of 2.57 million participants in the 401(k) plans of 154 firms in the S&P 500 Index, Bernartzi (2001) found that in plans where the employee makes allocation decisions for funds contributed to their 401(k) (both company and personal contributions), company stock represented 25% of the assets. This is clearly a risky investment

strategy. Risk compensation effects may be occurring. If familiarity creates a perception of safety, then employees may choose to invest more into company stock. The consequences associated with concentrating a portfolio with one stock can be significant, as was the case for so many Enron employees.

There are several limitations to this study. First, it is intended to address an important issue of 401(k) decision-making behavior yet uses students to make the decisions. This is not the best possible sample. It would, however, be difficult to experiment with actual plan participants.

These students were all juniors and seniors so they could reasonably be expected to be close to making just such contribution and allocation decisions. Two students commented in the debriefing that they were considering exactly those questions (how much to contribute and how to allocate) for the job they were beginning after the semester was completed. Three things suggest that the participants were very involved in this simulated 401(k) decision-making. First, there was a high rate of participation even though there was no extra-credit involved. Next, every returned questionnaire had usable and complete data. Finally, there was a high level of interest during the debriefing discussions. So, the student sample is a limitation but there are some indicators that the students made good subjects.

This is initial research of risk compensation in employee financial decision-making so the design is appropriate. However, it is also a limitation in that it is looking generally for risk compensation effects and not addressing why there are such effects. Future research should address such topics as a participant's subjective risk perceptions and target risk levels. This is because Risk Homeostasis Theory suggests that individuals attempt to maintain a fairly constant level of risk exposure and to determine that one needs target risk levels and subjective risk perceptions. It is unclear whether or not this risk compensatory behavior should be avoided. In as much as it minimizes a benefit we would obtain from the added safety, it may be something to avoid. However, if investing in more risky investments is somehow made less risky through some safety mechanisms, perhaps it would be a good idea to invest more in these investments because we might reasonably expect better than average returns from them. If, however, risk compensation effects contribute to employees over-concentrating their portfolios on single stocks, such as the company's own stock, this is to be identified and mitigated.

There is an enormous effort being put forth to improve employee retirement investment decision-making. Moreover, there continues to be increasing numbers of employees who are participants in defined contribution retirement plans. Designing retirement plans and providing information to new and existing employees with the purposeful intent of minimizing the negative consequences of biases will continue to be a concern. The integration of risk compensation theory with the behavioral finance research should be very productive. The specific introduction of this effect into the 401(k) decision-making literature should be received well because of the direct implications for how we promote portfolio allocation to employees.

Clearly there is more to learn about risk compensation and 401(k) investing. What does seem clear is that there appear to be strong risk compensation effects in simulated 401(k) decision-making. This suggests that greater levels of safety mechanisms in such plans may be met with more risky allocations. How and why these occur are promising areas for future research. Risk compensation effect joins many other "behavioral" findings concerning how employees make financial decisions concerning retirement.

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