

IMPROVING RETIREMENT SAVINGS THROUGH ANCHORING

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ABSTRACT

Some have argued that there is a “retirement savings crisis” (Munnell, Webb, & Golub-Sass, 2007). Accordingly, a number of approaches have been attempted to increase savings in defined contribution plans, the most common type of retirement savings plan. One approach that has shown promise is using behavioral economics principles to influence savings behaviors. Realizing that we are not purely rational consumers who make sound financial decisions based solely on numbers, behavioral economics focuses on the ways that internal and external factors influence human decisions. However, current approaches have been only moderately successful in increasing savings, with that success coming at a great expense to the employer.

There is a need for simple, inexpensive approaches to getting people to save more for retirement. One potential behavioral economics focused approach that has not been attempted is to use the phenomenon of anchoring and adjustment to influence savings decisions. Anchoring refers to the way people make judgments of amount. They anchor on some initial value, an internal or external cue, and then adjust from it.

Three experiments explore how anchoring can be used to influence retirement savings decisions. The first shows that the match threshold of a savings plan influences the amount people contribute to their savings. The second shows that, keeping plan attributes constant, the presentation of a high anchor value induces people to save more. The last explores some potentially fruitful uses of anchoring and adjustment theory that can be exploited when using an electronic enrollment form.

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CHAPTER 1

INTRODUCTION

There has recently been a movement toward using knowledge of behavioral economics principles in ways that help direct decision-makers toward choices that are better for them. Thaler and Sunstein (2003) call this approach “Libertarian Paternalism”. Paternalism because it involves designing the choice environment to push people toward what is good for them; libertarian because the idea is to do so in a way that does not prevent people from exercising their free will. If they do not want what the designer thinks is good for them, no one forces them to accept it. There is no punishment for non-compliance, nor is there necessarily any explicit incentive if the person does what the designer thinks is best for them. In their book, *Nudge*, Thaler and Sunstein (2008) coin the term “choice architecture”, to describe the process of consciously designing the environment in which a decision is made in order to influence choices. This includes, but is not limited to, changing how questions are asked and how choices are presented. The appeal of such an approach is that subtle design changes can have a big impact.

Ethical Considerations

Some may question whether it is acceptable to purposefully influence decision makers. They might prefer that any decision be presented as neutrally as possible so as not to sway choices. However, it may not be possible to present choices without influencing the decision-maker. For example, consider the classic demonstration of framing effects, the Asian disease problem (Tversky & Kahneman, 1981). Participants were presented with a choice between two programs to combat an unusual Asian disease. The first option will save 200 people. The second

option has a $1/3$ probability of saving 600 and a $2/3$ probability of saving no one. Participants prefer the first option, the less risky option. However, when the option is framed in terms of losses, one program will let 400 people die with certainty and the other program has a $1/3$ probability of no one dying and a $2/3$ probability that 600 people will die, participants prefer the riskier option. Notice that the actual outcomes of these two pairings are identical. Still there is a preference reversal due to the framing of the choices, in terms of lives saved or lost.

Choices can also be influenced by how questions are worded. For example, Shafir, Simonson, and Tversky (1993) presented participants with a hypothetical custody hearing to determine which parent would receive full custody. One parent was described in fairly neutral terms (average health, income, working hours, etc). The other was described as having several positive (above-average income, e.g.) and negative (lots of work-related travel, e.g.) qualities. When asked who they would award full custody, participants preferred this second parent, the one with the more positive qualities. When asked who they would deny full custody, again, participants indicated the second one with the more negative qualities. It is contradictory that a parent should be preferred to be both awarded and denied full custody. The way the question was worded influenced the information that participants used to justify their response which ultimately flipped the choice they would make had the question been asked differently. The way in which questions are asked, and the way in which choices are framed, influence the decisions that people make; there is no neutral phrasing.

Another ethical consideration is whether or not we should make choices about what is best for people. Just because we think people should save more for retirement, or eat better, or stop smoking, or wear seatbelts, or turn off their cell-phones while they drive, do we have

any right to attempt to influence those decisions toward what a majority (maybe even including the individual being influenced) thinks is a better choice? If we have no right, we do it surprisingly frequently. Almost all legislation is designed to influence behavior. Those in power make choices about what is best for the entire community and they have a number of tools to enforce it. We incentivize certain acts while punishing others. Choice architecture is just one more way to shape behavior; and, in reality, employing choice architecture is a less overt way of doing so than other options. If we are willing to mandate certain choices then it is hard to argue that we should not also design choices in a way that makes the better choice easier, simpler, or more likely. Behavioral economics principles are just one more tool that can be used to shape behavior and this tool is a very non-coercive option.

Part of the reason some may have a negative reaction to this approach is that people do not want to be manipulated. This comes down to primarily two objections, one of freedom of choice and one of underhandedness. On the first objection, any person opposed to choice architecture designed to influence their choice would likely be similarly opposed to any attempt to control or modify their behavior. Consider two systems designed to get people to save for retirement: a system set up so that saving money is easier and follows naturally from the structure of the plan, or a system set up where a particular minimum savings is mandatory and punishable with fines for noncompliance. Both have the same goal of getting people to save money, but the first option provides more freedom.

The second objection is the sneakiness of the approach. Choice architecture can be perceived as tricking people into doing something they would not otherwise do, even if it is better for them. It is a matter of distrust and might result in feeling one's free will was violated.

However, true choice architecture need not be secretive. For example, some cafeterias have experimented with removing trays from lunch rooms which reduces the amount of food that gets purchased (reducing calories) and thrown out (reducing waste) (Foderaro, 2009). This change also reduces water usage because trays do not have to be washed. There is no reason that the motivation behind this change needs to be kept secret. The cafeterias may explicitly advertise why they do so (reduce consumption and waste and improve health). They may even post how it is likely to affect behaviors. One can use choice architecture and be open and honest about it at the same time.

Additionally, those who would object to choice architecture are already subjected to it in negative ways without realizing it. All businesses that sell a product have techniques to get consumers to do what they might not otherwise. Prices typically end in \$.99, for example. Businesses use this pricing approach because it increases sales and the impression that one is getting a deal (e.g., Schindler & Kibarian, 1996, 2001). Human perceptions are faulty; we ignore the cents and focus on the dollar amount even though the next dollar up is the nearer price. Other examples of familiar techniques include foot-in the door (Freedman & Fraser, 1966), in which a target is more likely to agree to a larger request after agreeing to a smaller request, and low-balling (Cialdini, Cacioppo, Bassett, & Miller, 1978), or getting another to agree to a good deal and later upping the terms of the arrangement. These sorts of tricks that are geared toward parting people with their money are ubiquitous. It is time that behavioral economics principles be used for the benefit of consumers rather than to their detriment.

In fact, the approach of using behavioral economics principles is gaining momentum. The ideas have reached the public eye with books like Thaler and Sunstein's *Nudge: Improving*

Decisions About Health Wealth and Happiness (2008), and Ariely's *Predictably Irrational: The Hidden Forces That Shape Our Decisions* (2008) and *The Upside of Irrationality: The Unexpected Benefits of Defying Logic at Work and Home* (2010). It is also gaining traction in government. The Prime Minister of the United Kingdom, David Cameron, has implemented a "nudge unit" tasked with determining how behavioral economics can be used to improve behaviors for the benefit of society (Wintour, 2010). President Barack Obama nominated Cass Sunstein (co-author of *Nudge*) the Administrator of the Office of Information and Regulatory Affairs.

This embrace of behavioral economics as a tool for improving human behaviors makes sense when looking at some of the demonstrated benefits of the approach for encouraging socially responsible decisions. For example, organ donor enrollment doubles when the option is changed from opt-in to opt-out (Johnson & Goldstein, 2003). People are not averse to donating their organs but they tend to not change default options which are seen as recommendations (McKenzie, Liersch, & Finkelstein, 2006). Similarly, people generally want to conserve energy, but they may not do so for a variety of factors, including the difficulty of keeping track of progress on a daily basis. Installation of computer software that allowed users to track and visualize energy usage has been demonstrated to reduce energy consumption (Brandon & Lewis, 1999). Along these lines, behavioral economics has also been used to improve recycling behaviors. Again, people want to do the right thing, but they need cues in their environment to remind them of their intention. Putting a recycle sign near trash receptacles at the point of disposal, but not four meters away, increased recycling (Austin, Hatfield, Grindle, & Bailey, 1993). These examples illustrate a variety of ways in which decisions have been shaped in

socially desirable directions through an understanding and exploitation of human tendencies, limitations, and cognitions.

Ultimately, policy makers must make conscious choices about how to structure important decisions. They should not stand by, letting people make bad choices for themselves when 1) they want better for themselves, 2) they have the power to influence them, and 3) there are serious consequences for the individual or for all of society for sub-optimal decisions. Subtle changes in the way a choice is phrased, or options presented, or the structure of the problem can impact decisions. We cannot avoid influencing decision makers. Knowing this and knowing how those decisions can be influenced makes it imperative that it be used for good.

Research Goal

This dissertation applies the philosophy of choice architecture to the problem of low retirement savings. In the following literature review, the problem of low savings is discussed, followed by an assessment of recent attempts to mitigate it. Next, it explores the anchoring and adjustment literature leading to ways it can be applied to the problem of low retirement savings. Three experiments then explore whether small changes to the way that employer-sponsored retirement savings plans are presented to employees can impact savings in a meaningful way. The first experiment tests straight forward plan design changes, the second tests easily implemented enrollment form modifications, and the final experiment tests a tailored, electronic enrollment form approach.

CHAPTER 2

LITERATURE REVIEW

Retirement Savings

The U.S. has seen a steady decline in average savings rates over the past few decades to nearly 0% (Guidolin & La Jeunesse, 2007), and, on average, U.S. citizens appear to save less compared to other countries (Leetmaa, Rennie, & Thiry, 2009). Additionally, Munnell, Webb, and Golub-Sass (2007) argue that there is a “retirement savings crisis”, particularly for baby boomers about to enter retirement. Consequently, there has been a recent push to find ways to get people to save more. One example of this is the TIAA-CREF sponsored “Raise the Rate” contest; an effort to generate ideas to combat this low savings phenomenon and to help increase U.S. savings behaviors and thereby improve the savings statistics.

Current estimates indicate that a significant portion of people are not saving enough for retirement to maintain their standard of living (e.g., Benartzi & Thaler, 2007; Olsen & Whitman, 2007). This contrasts with the aspirations of some future retirees who hope to travel and do all the other things that they did not have time for when they were focused on their career. These dreams are now viewed as unobtainable with only a few Americans (11%) expecting to engage in travel and hobbies when they are retired, and many more (34%) anticipating simply making ends meet (Perlman, Kenneally, & Boivie, 2011). Even with low expectations for retirement, people seem to know that they are not saving enough to reach their goal. For example, when asked about their current retirement contribution levels, about two thirds of employees at a midsized company indicated that their current savings rate was too low (Choi, Laibson, Madrian, & Metrick, 2002).

The problem of low savings is not one of intentions; people want to be saving more money. As evidence of this, for example, Madrian and Shea (2001) reported that, after going to an employer sponsored seminar on retirement planning, almost all of the employees who were not currently participating in their employer provided plan reported that they intended to join. Unfortunately, only 14% followed up on this intention. In the same survey, of those who were already participating in the plan, 28% reported intending to increase contributions, but only 8% did. Given these findings, it would appear likely that employees would welcome plan designs that help to nudge them toward participation or increased contribution rates.

Plan Design Problems

Many have argued that inadequacies in retirement savings are at least partially due to the recent cultural shift in the workforce from a focus on defined benefit plans to a focus on defined contribution plans (Benartzi & Thaler, 2007; Choi et al., 2002; Nyce, 2005; Thaler & Benartzi, 2004). Defined benefit plans include pensions where all contributions are provided by the employer. The employee is not required, or even expected, to contribute to receive the retirement benefit. It is simply a perk of working for the company. In contrast, defined contribution plans, including 401(k)s, 403(b)s, and 457 savings plans, require that the employee make contributions, often of pre-tax money, on their own behalf. The employer may match these contributions in some way. The proportion that the employer matches (e.g., dollar for dollar) is called the *match rate*. The maximum amount the employer will match is called the *match threshold*.

The way defined contribution plans are designed can negatively impact retirement preparedness. First, employees must elect to enroll. That is, in most cases, failure to act means

the employees simply miss out on this employment benefit. They can end up with nothing at retirement except for social security income. Benartzi and Thaler (2007) describe people as procrastinators who prefer to put off difficult decisions for later. In this case, putting the decision off until later, if it ever happens, means years of missed contributions. Even if employees later put in make-up contributions, they will have missed out on years of potential returns on their investment and they might not have the means to make up for the years of neglect to their savings.

Contributing money into savings can also be psychologically painful. The employee has many current needs and desires, so to put money away for some abstract future self can seem like a low priority. Thaler and Shefrin (1981) suggested that this is a problem of self-control in which the person is simultaneously a “planner” and a “doer”. The planner has long term goals and future needs in mind, but the doer has current needs and desires that compete with these long term goals. Still, one day that future self will be realized and without proper planning retirement may not be a possibility. Therefore, it is important to find ways to encourage better savings.

Tested Plan Design Changes

A number of approaches to altering retirement plan design have been tested with more or less success. One technique that has been demonstrated ineffective at increasing contribution rates is incentives programs. For example, Knoll, Shaffer, Hulsey, and Probst (2010) tested the impact of a rewards program compared to a more traditional plan. This was a hypothetical decision task where psychology undergraduates imagined being faced with the choice of how much to contribute to their retirement account. In the points reward system, the

employee would gain points that could be redeemed for merchandise. When compared to a traditional plan that matched employee contributions up to 5%, dollar for dollar, the rewards program decreased contribution levels. Coupling the same rewards program with an only slightly decreased match threshold (4%) was also not effective. Although the combination plan did not significantly lower average contributions, participants were less satisfied with it than they were with the simple matching plan. Based on this evidence, it would appear that plan designs that focus on traditional economic motivators, like merchandise or cash rewards are not only costly, but ineffective as well. Consequently, a focus, instead, on plan designs that exploit naturally occurring human tendencies, rather than economic incentives, may prove more successful. In order to accomplish this, behavioral economics principles need to be applied to this problem.

As previously discussed, one major problem that prevents people from saving enough is their tendency toward inaction. This basic phenomenon has been referred to by a number of names: the status quo bias (Samuelson & Zeckhauser, 1988), choice deferral (Dhar & Nowlis, 1999), and decision avoidance (Anderson, 2003). In the retirement behaviors literature it is most commonly referred to as “inertia”. All these terms simply mean that whatever their situation, people’s tendency is to do nothing to change it. This bias toward inertia is particularly likely to occur when the stakes are perceived low (Arkes, 1991), or when the choice is more difficult (Dhar & Nowlis, 1999). Retirement savings decisions are for a distant future, so the saver may not feel like the immediate stakes are very high as there is still plenty of time to save. Also, the choice is likely difficult because to project all of the possible factors that might affect financial needs in the future and then save accordingly is complicated.

As might be expected given the phenomenon of inertia, many employees never enroll in their company's defined contribution plan. Fewer than half (45%) of those with access to an employer sponsored plan participate (Copeland, 2009). Therefore, one behavioral economics approach to plan design is to make inaction work for the employee. This can be achieved by changing the default, or what happens when an employee fails to complete the enrollment paperwork. Specifically, if employees do not act then they automatically get enrolled; they have to deliberately opt out to avoid participating. The default is a simple, but powerful tool for influencing decision outcomes when inaction is likely. It has also been shown to be successful in other areas including improving organ donation rates (Johnson & Goldstein, 2003) and acceptance of email marketing (Bellman, Johnson, & Lohse, 2001).

When the default has been shifted from nonparticipation to participation, a dramatic improvement in enrollment levels has been found (Choi, Laibson, Madrian, & Metrick, 2001; Madrian & Shea, 2001). For example, Choi and colleagues looked at data from three companies that implemented automatic enrollment into a 401(k) plan for employees who did not actively complete enrollment. The greatest benefit of automatic enrollment was the dramatic increase in the proportion of those participating, up to 90%. It capitalized on people's tendency to remain at the status quo. Those who would not have enrolled due to inaction were instead enrolled due to inaction. Some problems, however, did result from the necessary structure of such auto-enrollment plans. If a company is going to take an employee's money without their action, it generally should not be a large amount. Choi and colleagues reported that one company in this study set initial contributions at 2% and the other two companies at 3%. A further negative side effect of introducing default plans, however, is that people seem to find

the default contribution rate to be a suggestion rather than a fall-back. Consequently, more people contributed at or below the (low) default level than would otherwise occur in plans with no default (Choi, Laibson, & Madrian, 2004; Choi et al., 2002). In addition, if a company only has passive consent, any automatic deductions should not be put into risky investments. Therefore the default fund allocation for each company was always conservative, meaning reduced exposure to potential losses, but also reduced potential gains. As predicted by the behavioral principle of inertia, employees did not do anything when their money was initially invested in this manner, but they also did not manage their funds in any way in the subsequent years; few increased their contributions and few changed fund allocation.

In an attempt to prevent years of unchanged contributions, Thaler and Benartzi (2004) also sought to capitalize on the tendency of people to remain at the status quo with their Save More Tomorrow™ (SMarT) plan. In this plan, participants were not automatically enrolled but, instead, met with a financial advisor. If they did not accept his advice (71%), they were offered the SMarT plan. Those in this plan did not need to immediately change their contribution levels; rather, they agreed to have their contributions increased every year when they received their annual pay raise. In one implementation, about 80% of employees who were offered this plan enrolled and 80% of those stuck with it for four years. Contribution levels went from an average of 6% to an average of 13% and very few dropped out of the plan. Implementation of the SMarT program at two other companies had lower uptake rates and more modest gains in average employee contribution levels (Thaler & Benartzi, 2004).

Both auto-enrollment and the SMarT plan exploited people's tendency to leave their plans alone, but at two different parts of the plan – initial enrollment and contribution changes.

Choi and colleagues (2001) showed that initial contribution levels stagnate when left to the individual to manage. SMarT was successful in increasing contributions over time, but required that each employee receive individual consultation with a financial advisor to achieve a high level of participation (Thaler & Benartzi, 2004). Such a resource is very costly to a company, but because the average contribution level improved so dramatically, one might argue that the cost of a financial advisor is warranted. Ultimately, however, only about 45% received and stuck with the plan over 4 years and this was all due to self-selection.

An approach that combines aspects of both auto enrollment and the SMarT program may prove even more effective. Such an approach has been endorsed by the Associate Director of TIAA-CREF (Lord, 2006) but would still have a number of limitations. First, employees would miss out on several years of early potential contributions – money that would have more time to accrue returns in a compounding fashion. Also, if initial contribution levels are low, then the employee may not be taking full advantage of any available employer match, essentially leaving money on the table. Participants never have to make any decisions under a combination plan, so they would have little idea how their money was performing or if they were on target. They lose much of their incentive to make active planning decisions and might end up with a complacent attitude. The default takes away the only hands-on role these employees may engage in with regard to their retirement, and may lead them to feel that their retirement is out of their control and blame the company for any financial missteps along the way. Finally, there is an additional burden on plan administrators who have to track pay raises to modify contribution levels for the employees. Consequently, companies may be reluctant to implement such plans.

If plans based on taking advantage of “inertia” appear to fail to accomplish goals or require too great of a time and financial commitment from companies to implement, then other behavioral heuristics besides inertia could be tested as bases for plan design. One such behavioral heuristic, and the focus of the remainder of this dissertation, is anchoring and adjustment.

Anchoring and Adjustment

Anchoring and adjustment was first described by Tversky and Kahneman (1974). They demonstrated that when people are asked to make judgments of amount they tend to anchor on some initial value and then adjust up or down from it. These anchor values can be self-generated, but the presentation of an external value can also set this anchoring point from which a person will then adjust. In the classic example, participants were given the task of estimating what percent of the United Nations were African countries. Participants spun a wheel with values between 0 and 100. They then considered whether the true value was lower or higher and then gave an estimate. Those who spun higher values gave higher estimates even though it was known to be random irrelevant information (Tversky & Kahneman, 1974).

Anchoring is sometimes thought of as problematic because the adjustments that people make from an anchor are often insufficient (Epley & Gilovich, 2004, 2006) such that responses are generally biased toward the anchor. However, the issue of accuracy is only important when there is a correct value that a person is trying to estimate. The true value of the anchoring and adjustment phenomenon is the glimpse it gives us into how people make decisions when they are choosing on a continuum (how much) rather than from a choice set (which one).

Anchoring is considered a very robust phenomenon and has been consistently demonstrated for a wide variety of tasks (Furnham & Boo, 2011; Wilson, Houston, Etling, & Brekke, 1996). For example, anchoring has been shown for: estimates of house prices (Northcraft & Neale, 1987), price negotiations (Whyte & Sebenius, 1997), predictions of work output (Switzer & Sniezek, 1991), damage awards in legal proceedings (Chapman & Bornstein, 1996), estimates of health risk made by both patients and physicians (Brewer, Chapman, Schwartz, & Bergus, 2007), job performance ratings (Thorsteinson, Breier, Atwell, Hamilton, & Privette, 2008), and even mathematical calculations (Smith & Windschitl, 2011).

Traditional anchoring testing paradigms explicitly encourage the participant to first consider the proposed anchor as a possible value before making a judgment, but the effect has been demonstrated even without such a manipulation (Wilson et al., 1996). Anchoring can even result from numbers that naturally occur in the environment, like those on a sports jersey or in the name of a restaurant (Critcher & Gilovich, 2008). Anchoring effects have even been observed for subliminal (around 15ms) presentations of anchors (Mussweiler & Englich, 2005; Reitsma-van Rooijen & L. Daamen, 2006). It appears that people anchor naturally and automatically. Some researchers have suggested that the match threshold in a retirement plan may act as an anchor (e.g., Choi et al., 2002; Madrian & Shea, 2001). It is therefore a potentially fruitful target for influencing savings.

Countering the Anchor Effect

If the match threshold in a retirement plan acts as an anchor, then simply raising it might have a positive impact on contribution levels. Choi and colleagues (2004) followed a company that increased the match threshold by 2% while keeping the match rate constant. On

average, employees contributed more. The authors attributed this mostly to the large portion of participants who adhered to the match threshold, as it was the most popular contribution level before and after the change. The biggest obstacle in changing this particular anchor, though, is that it costs money to raise it. If match rates remain the same, an increase in the match threshold would mean that the employer would have to contribute more to the plan. This increase in cost could be avoided by simultaneously adjusting the match rate downward while adjusting the match threshold upward. Benartzi and Thaler (2007) predict that raising the match threshold while decreasing the match rate would improve contribution levels, though no empirical testing of this idea was discovered in the literature.

Based on models of retirement savings behaviors, however, Nyce (2005) predicts that the two changes would be in opposition and effectively cancel each other out. That is, raising the match threshold might increase contributions, but decreasing the match rate would decrease contributions. There is evidence, though, that when the match threshold is held constant, changes to the match rate ranging from 0% to 150% have little impact on plan participation levels or employee contribution rates (Kusko, Poterba, & Wilcox, 1994). Choi and colleagues (2002) also observed little impact from changes in the match rate on contribution levels. Therefore, increasing the match threshold while simultaneously decreasing the match rate in a manner that does not increase the fiduciary burden to the employer might prove useful. It is important to consider, however, that this evidence indicating minimal impact of match rate changes was for employees who were already enrolled in the plan. This may just be another instance of inertia. Those already enrolled did not change their contribution levels when the match rate changed, but this is not surprising because employees rarely change their

contribution level once enrolled (Choi et al., 2001; Madrian & Shea, 2001). In order to be effective, then, an intervention may need to take place the first time the employee enrolls, before inertia can kick in. That is, the approach may be more effective for new employees choosing how much to contribute in the first place as compared to those who have previously made a decision on an earlier match rate/threshold choice environment. The goal of Experiment 1 was to systematically test the impact of various match rate/threshold pairings that maintain the same financial cost to the employer.

If, however, changing the anchor (match threshold) is costly or ineffective and therefore not advisable, then ways to de-bias the anchoring effect need to be explored. Some approaches that have been tested include: education, incentives, warnings, and consequences. Educating participants about the effects of an anchor and explicitly warning them not to let it influence their estimates has been demonstrated unsuccessful, even when the direction of the bias was specifically indicated to the participants (Wilson et al., 1996). Providing monetary incentives for the most accurate estimates has also been demonstrated ineffective (Wilson et al., 1996). Even explicit warnings in the form of a decision support system do not significantly decrease anchoring (George, Duffy, & Ahuja, 2000). Holding estimators accountable for their errors with the threat of professional scrutiny has also been demonstrated ineffective (Brewer et al., 2007).

In general, the anchoring effect is difficult to combat, though some success has been demonstrated. Chapman and Johnson (1999) showed that when multiple attributes are relevant to a judgment, having participants focus on non-anchored attributes can decrease the anchoring effect. That is, having people consider counter information that contradicts the anchor can be useful. In this sense, focusing an employee on future needs might seem like a

good approach, but as described before, people are not good at putting future needs ahead of present desires (Thaler & Shefrin, 1981). To combat this, researchers presented college-aged participants with an age-progressed digital avatar of themselves (Hershfield et al., 2011). Participants allocated more of a hypothetical \$1000 windfall to savings compared to participants who interacted with a non-aged avatar. This solution requires access to some sophisticated software and hardware so may not be very practical for influencing retirement savings decisions. Savings were also increased when participants viewed an age-progressed image online, but to a lesser degree. It is difficult to imagine either manipulation becoming widely adopted as a part of the retirement plan enrollment process. Because anchoring has proven difficult to de-bias, a better solution may be to simply counter-bias the effect.

Competing Anchors

One potential approach to decreasing the effect of an anchor is to fight fire with fire. That is, if the match threshold serves as a low anchor from which people adjust, then a higher anchor, presented concurrently, might counter this effect. Little research is available regarding the effect of multiple, competing anchors. Switzer and Sniesek (1991) used goals to anchor students participating in a sentence transcription task. They were presented with a high goal of 27 sentences or a low goal of nine. When the average performance of 18 sentences was provided in addition to one of the goals, the influence of the goal anchor was reduced. The average performance anchor effectively countered both high and low goal anchors. Whyte and Sebenius (1997) presented business students with a negotiation task in which they were to sell a product to a foreign company to make a profit. They had relevant information about what the part was currently being sold for in the US (\$20) and knew that any price above \$10 would be

profitable. (The \$20 figure is the anchor with the \$10 figure merely serving as a floor to bound acceptable prices.) Those in the anchoring conditions were told that during the meeting with representatives of the foreign company, they thought that the translator had given a price point that was lower than the US price (\$12) or higher (\$32), but then discovered that it had actually just been a bad translation and no price point had been mentioned. Even though the additional anchors were completely irrelevant, starting offers were influenced by them. Those under the high anchor started negotiations with the highest price point and those under the low anchor started with the lowest price point. Though not framed in terms of de-biasing or counter-biasing by the authors, the additional anchors countered the influence of the initial US price anchor. Experiment 2 tested the hypothesis that a high anchor would pull people away from the match threshold anchor and result in increased savings. Therefore, an appropriate high anchor that could be presented alongside the match threshold needed to be identified.

One naturally occurring high anchor is the maximum amount that an employee may contribute. However, arriving at this value is not a simple task for the employee. In the past there have been maximum contribution rates. When the maximum contribution level was at 16% in 2001, many more employees contributed at this high level than when the maximum percent limit was removed the following year, to be replaced solely with a dollar maximum (Benartzi & Thaler, 2007). It seems, though, that the effect of the maximum percent was mostly restricted to highly compensated employees (Huberman, Iyengar, & Jiang, 2007). Still, this showed that the maximum percentage one may contribute can have some power over participant choices.

Currently there is no maximum percentage of salary that one may contribute to a 401(k), but instead a maximum dollar amount. The current (2010-2011) maximum allowable contribution to a traditional 401(k) plan is \$16,500 (*401(k) Resource Guide - Plan Participants - Limitation on Elective Deferrals*). Contributions are generally indicated by the employee in percentage format so this value does not make a good anchor. Anchors need to be in the same scale as the judgment in order to have their effect (Chapman & Johnson, 1994). Therefore the dollar figure needs to be translated into a percent of the employee's annual income. This creates its own problem because that value will vary across different employee salaries. In a high-tech system that has access to employee salary levels this could be calculated and presented to the employee, or the employee could be encouraged to figure it for herself. In a low-tech environment, however, calculating this figure for each and every employee would place additional burden on the plan administrator.

A useful alternative would be to calculate a percent that covers most employees. For example, the 90th percentile annual wage for full time workers in the U.S. is \$83,845 (Solis & Hall, 2010, author calculations from hourly wage). The maximum allowable contribution for a person at this salary comes out to be 19.7%. This figure would cover the vast majority (90%) of employees because those earning under the 90th percentile actually have a higher percent limit. It could simply be printed on employee enrollment forms using a phrase like, "Most employees can contribute up to 20% or more of their income each year." This creates almost no additional cost for implementation and employee contribution rates do not have to be tracked and adjusted for yearly increases. It provides a natural, relevant anchor to offset the match

threshold anchor and such a simple form change might have a meaningful impact on retirement plan contributions.

Resolution of the Scale of Adjustment

A potentially confounding phenomenon that might prevent the realization of a benefit from providing a general maximum anchor is the tendency of people to choose round amounts. Employees tend to choose contribution levels in increments of 5% (Benartzi & Thaler, 2007). About 83% of undergraduate students adhered to contributions in increments of 5% when choosing how much to contribute to a hypothetical 401(k) account (Knoll et al., 2010).

Even if a maximum anchor would otherwise be successful at counter-biasing the match threshold anchor, the effect may be insufficient for a participant to adjust their rate by 5%, say from 5% to 10%. This is a problem of the adjustment scale. For example, a person who might be swayed to choose 8% rather than 5%, but who is on an adjustment scale in increments of 5%, would not make the jump to 10% and therefore would fail to move at all. The scale of their “allowed” movement is too coarse. If their scale of adjustment was single percent increments, then they would make the adjustment to 8%. Consequently, it is important to determine ways to increase the resolution of the scale of adjustment.

Little literature is available on the notion of varied adjustment scales. Recent work has shown that more precise anchors (e.g., \$2998) compared to rounded anchors (e.g., \$3000) decreased adjustments from the anchor (Janiszewski & Uy, 2008). The researchers hypothesized that the more precise anchors increased the perceived “resolution of the subjective scale” and thereby the amount of adjustment from the anchor. More precise match

threshold anchors (e.g., 4% or 6.5% compared to 5%) or more precise maximum contribution anchors (21%, or 19.5% compared to 20%) may likewise decrease the scale of adjustment.

Perhaps this resolution of the scale of adjustment can be manipulated by the way in which the judgment is elicited, rather than by the precision of the anchor(s). If participants are required to specify their contribution level with a greater degree of exactness, this may put them on a finer scale of adjustment. One way to make responses more exact is to require participants to explicitly indicate a decimal (tenths digit) when entering how much they would like to contribute. This could have a positive or negative consequence. First, it may allow fine adjustments that would not happen on a coarser subjective scale to occur; or, secondly, it may reduce adjustments that otherwise would have been larger. Because each additional percentage point a person contributes to their savings means a loss to current expendable income, it was predicted that the former would occur.

Structuring the choice environment in a way that requires participants to explicitly designate the tenth's digit of the amount they would like to contribute has another potential benefit in addition to its potential effect on the scale of adjustment. It is probably more likely that a person will add a partial percent than that they will subtract a partial percent. This is because of the order in which numbers are written. If, for example, they mark "9" in the whole number field first, and then have to mark the decimal field, they might at that point decide to add an additional half percent. Although that may not seem like much, over the course of many years it will add up. Such an effect would be particularly useful to an employee who is under the match threshold as it would provide an immediate return on the additional investment of up to 100% under a dollar for dollar matching scheme. That is, an additional half percent

contribution on the part of the employee could mean a full percent going into the retirement account, depending on the match rate. Experiment 2 was designed to simultaneously test the impact of a high anchor and a required decimal field concurrently.

High-tech Versus Low-tech Implementation

The form modifications that have been discussed so far could be applied to both low-tech and high-tech enrollment processes. Specifically, a phrase that identifies the maximum percent that most participants can contribute and a tenth's digit form field could be implemented both on paper and online. There are some additional interesting possibilities for an electronic enrollment form. First, the maximum percent anchor could be automatically calculated for an employee based on stored wage data or after an approximate annual or hourly salary was entered by the employee. This maximum would be more precise and highly relevant to the employee. Second, this calculated value could be entered directly into the field that asks how much the employee would like to contribute, giving it additional weight. Third, employees could be required to literally adjust the value down, for example, by using arrow buttons. In this scenario, not only is there a cognitive bias created by the anchor, but a physical bias as well. The employee must go through more, though minimal, physical effort to decrease the amount of their contribution.

Many companies, however, need low-tech solutions for enrollment. They may not have the resources, or may just be unwilling, to offer the high-tech approach. These ideas of providing a high anchor and requiring participants to explicitly indicate a decimal percentage can be implemented at the pen and paper level with very minimal effort on the part of the plan administrator. The only costs would be time modifying the enrollment form to include one

additional phrase and one additional field to fill out, and the cost of reprinting the forms. The employer may have additional costs associated with more employees participating at higher contribution levels, which would then require more employer match dollars. Presumably, however, employers who are interested in helping their employees save more have planned their retirement benefit in a way that they could cover additional costs associated with increased participation. The costs of the proposed form changes are negligible.

CHAPTER 3

METHODOLOGY

Overall Design

Three experiments explored the influence of anchors on retirement savings in a hypothetical decision-making task. The same basic structure was used for each. To begin, participants completed a demographics survey (Appendix A). Then, participants were educated about 401(k) savings plans (Appendix B) with a subsequent knowledge quiz comprised of five True/False questions to gauge understanding (Appendix C). Participants then imagined themselves starting their first post-college job and needing to make a decision about how much to contribute toward their 401(k). The provided scenario (Appendix D) laid out a variety of expenses they currently had and listed things to consider when deciding how much to contribute, including reasons for and against contributing a higher percentage. Engagement with this scenario was measured with a five question multiple choice quiz (Appendix E). This was always followed with an anchoring manipulation and a subsequent decision on how much to contribute to the 401(k). All materials were presented online and were built using Mouselab WEB.

Experiment 1 – Match Threshold Adjustment

As previously discussed, some researchers have argued that the match threshold in a retirement plan may have an anchoring effect on employees (Choi et al., 2002; Madrian & Shea, 2001) and a small increase in the match threshold has been shown to increase contribution levels (Choi et al., 2002). The primary weakness of such an approach to improving retirement savings is that if the match rate is held constant then the employer takes on greater costs.

Benartzi and Thaler (2007) suggested that if the match threshold were to be increased with a commensurate decrease in the match rate (to keep plan costs the same for the employer) it might lead to increased contribution levels. Experiment 1 tested this idea.

Design

This experiment compared contribution rates of three match threshold/rate combinations. Each of these combinations maintained the cost of the plan to the employer and are presented in Table 1. This study employed a within subjects design in which participants saw every combination in succession with the order of presentation counter balanced. This design allowed for both within subjects analysis and between subjects analysis (on the first condition encountered). Between subjects analysis is important in anchoring studies because subsequent decisions are expected to be influenced by any anchors presented in previous decisions. However, the within subjects design allowed for a comparison if small effects were observed at the between subjects level. It was predicted that contributions would be higher when the match threshold was higher, despite the lower match rate.

TABLE 1.

EXPERIMENT 1 MATCH RATE/MATCH THRESHOLD COMBINATIONS

Match Threshold	Match Rate
3%	\$1 per \$1
6%	\$.50 per \$1
12%	\$.25 per \$1

Method

A Priori Power Analysis

In a previous study, undergraduate students presented with a 5% threshold, dollar for dollar matching plan contributed 7.9% ($SD = 5.4\%$) on average. As calculated by G*Power (Faul, Erdfelder, Lang, & Buchner, 2007), a difference in average contributions of 2% between groups (e.g. means of 4%, 6%, and 8% for the three conditions), assuming a standard deviation of 6%, corresponds to an effect size of $f = .27$ (medium). Therefore, for the between subjects ANOVA, approximately 138 individuals (46 per group) were needed to detect an effect size of $f = .27$ at .8 power.

Participants

Participants were 154 undergraduate psychology students. Of these, 152 indicated a contribution level for at least the first condition encountered, but only 107 scored high enough on the knowledge questions (3 out of 4 true/false) and on the scenario engagement questions (3 out of 5 multiple choice) to be included in analysis. The dependent variable was the percent of personal dollars the participant decided to contribute. Outliers were defined as three standard deviations above the mean; four people were removed from analysis, having elected to contribute 30% ($Z = 3.43, n = 2$) and 35% ($Z = 4.24, n = 2$) of their salary. Final analysis included a total of 103 participants who were 76.7% female. The mean age was 22.0 years ($SD = 5.78$). 16.5% indicated that they had a full-time job, 55.3% indicated having a part-time job, and 28.2% reported no job. The sample was 40.8% freshman, 21.4% sophomore, 15.5% junior, 22.3% senior. Only 7.8% of the sample reported currently participating in a retirement plan.

Procedure

All materials were presented online. After consent was obtained, participants completed the demographics survey. They then read information about what a 401(k) plan is and answered knowledge questions about it. Next, they read through the employment scenario and imagined needing to decide how much to contribute to a 401(k) plan. After the scenario-check, participants received each of the match rate/threshold combinations in one of the counter balanced orders. They indicated how much they wanted to contribute immediately after seeing each plan structure. Participants were granted SONA system credits for their participation.

Results

A one-way between subjects ANOVA was conducted for the first match threshold/rate combination encountered to determine if personal contribution levels differed between conditions. As predicted, personal contributions were higher when the threshold was higher, $F(2, 100) = 16.26, p < .001, partial \eta^2 = .25$. All pair-wise comparisons were significant. Means are presented in Table 2.

TABLE 2.

MEAN (SD) PERSONAL AND TOTAL CONTRIBUTIONS BY CONDITION (BETWEEN SUBJECTS)

Condition	Personal Contribution		Total Contribution	
	Mean	(SD)	Mean	(SD)
\$1 for \$1 up to 3%	5.37	(3.64)	8.16	(3.94)
\$.50 per \$1 up to 6%	8.25	(3.65)	11.09	(3.88)
\$.25 per \$1 up to 12%	10.18	(3.36)	12.60	(3.95)

Analysis was also conducted on total contribution (personal contribution + match earned). Total contributions differed by condition, $F(2, 100) = 11.44, p < .001, \text{partial } \eta^2 = .19$. Total contributions in the 3% threshold condition were significantly lower than both the 6% ($p = .003$) and 12% ($p < .001$) conditions. However, mean total contribution was not significantly higher in the 12% condition compared to the 6% condition ($p = .11$). Means are presented in Table 2 above.

A two-way ANOVA indicated that there was no main effect of gender, $F(1,97) = .75, p = .39$, nor was there an interaction of gender with condition, $F(2,97) = .05, p = .96$. Similarly, there was no main effect of employment status, $F(2,94) = .70, p = .50$, nor any significant interaction of employment status with condition, $F(4,94) = .08, p = .99$. Participants also did not differ in their contributions by class status, $F(3,91) = 1.17, p = .32$, and there was no significant interaction of class status with condition, $F(6,91) = .53, p = .79$.

Discussion

Increases to the match threshold with commensurate decreases to the match rate led to a significant improvement in savings contribution levels. This is the case despite the fact that there is no financial benefit to the 6% or 12% plans. In fact, for all possible personal contribution levels, the 3%, \$1 for \$1 plan would maximize total contributions. Specifically, consider Figure 1 which shows three sloped lines each representing the amount of total compensation for all possible personal contribution levels. A plan with a reduced match rate will always be inferior until the match threshold is reached. In this sense, the 3% plan is a clear winner. However, although it maximizes total contribution for all personal contribution levels, it led to decreased total contributions. This is because people exhibited anchoring effects for the

other match thresholds. The three vertical lines in Figure 1 correspond to the mean contribution levels for each condition. Notice that for the average contribution level in the 3% plan, there would be a lower total contribution in the case of the other two plans. However, for plan B, the average contribution is above the match threshold of plan A, so total contributions are higher for it. The average contribution in plan C is not above the match threshold of plan B, but because its intersection with plan C is high enough compared to the average of Plan B intersected with the plan B line, it still results in larger total contributions. Recall, however, that this difference was not significant. This indicates some diminishing benefits for large match thresholds coupled with very small match rates—personal contributions may be higher, but total contributions will level off due to reduced levels of employer match. To highlight the point, imagine a \$.10 per dollar up to 30% plan. The participant would only receive a full match of 3% of income at a 30% contribution level. Although it might have high average personal contributions, it likely would not have the highest total contributions and lower savers would have been much better off in a smaller threshold, lower match plan. Maximizing personal contributions is not enough; it is important to keep in mind total contribution levels when selecting a plan for implementation.

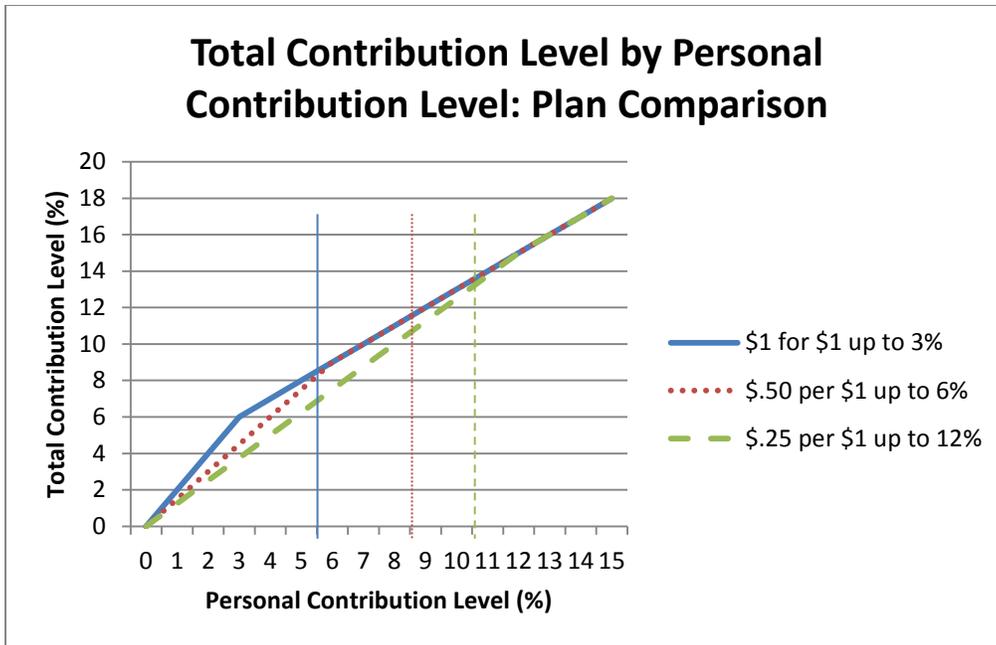


Figure 1. Relationship between personal and total contributions.
 Note: Vertical lines represent the mean personal contribution for each of the three plans

One important aspect of this experiment that should be considered is that the selected plans were constructed to keep the cost of the plan equal. More specifically, the plans were designed to keep the maximum employer cost equal. The total plan cost would only be equal if all employees maxed out their match. However, in the real world, employers will need to consider what portion of their employees will utilize what portion of their available match. For the higher threshold, lower match plans, fewer will take advantage of the entire match. Employers can use this knowledge to adjust the rate upward, thereby benefiting the employees at the lowest contribution levels. For example, instead of the \$.25 per \$1, up to 12% plan, an employer may be able to match \$.30 or \$.40 per dollar without total plan costs increasing because fewer employees max out their match compared to a higher match, lower threshold plan. There is still the high anchor and increased personal contributions, but those at the lowest rungs of personal contribution would not be hurt as much. That is, a person who would (could)

only contribute 2% regardless of the plan match wouldn't have to lose out on as much match just for the sake of anchoring the majority of employees.

Another interesting avenue for potentially increasing savings would be to utilize a no threshold, threshold, diminishing match plan structure. For example, imagine a plan where your employer will match the square root of the amount you contribute, so a small contribution of 1% gets a match of 1% (100% boost), a slightly larger contribution of 4% gets a match of 2% (50% boost), a contribution of 16% gets a match of 4% (25% boost). This matching plan is illustrated in

Figure 2. Such a plan may be overly confusing to enrollees, but the idea of diminished match may be communicated graphically or through a data table. A diminishing match structure has an advantage over match threshold plans in that there is no cut-off point at which there is no longer a return on additional personal contributions. In the plans studied, even the 12% plan had no match incentive to contribute above the 12%. In a graduated (curved) match plan, there need be no threshold at which increased contributions no longer get matched, but instead, only reduced. Future research should consider curved matching plans that reduce losses to small investors while maintaining an incentive for all levels of contributors to add more to their account. This would combat any tendency for savers to contribute at the match threshold. However, a side-effect would be that the match threshold would no longer exist and could therefore not be used as an anchor. However, Experiment 3 will explore alternative anchoring options that could be used in combination with a no-threshold plan.

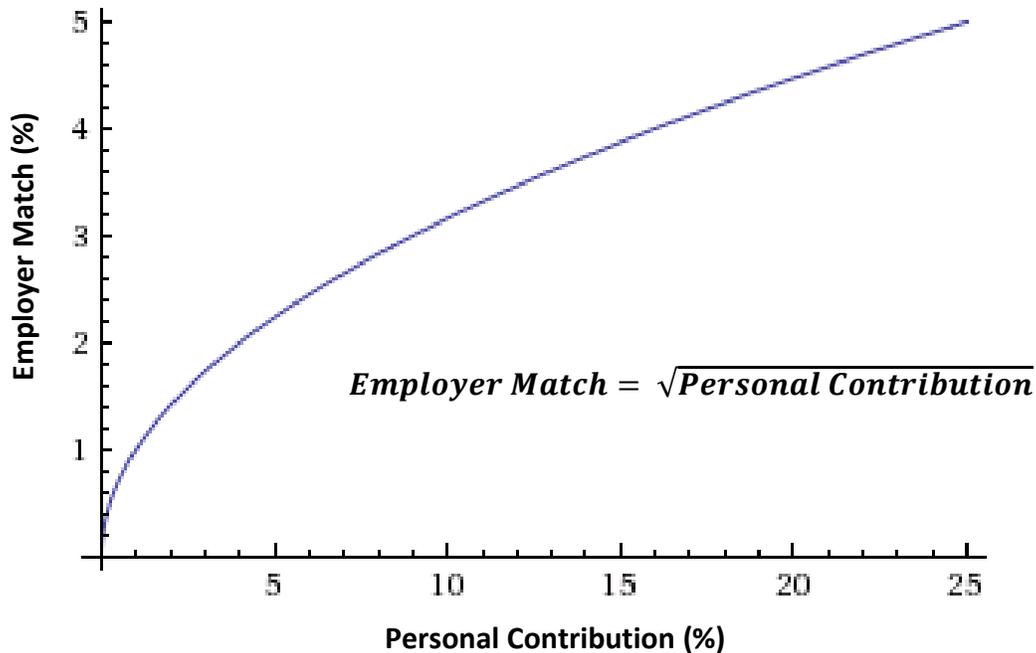


Figure 2. Hypothetical graduated matching scheme whereby personal contributions are matched with the square root of the contribution.

Experiment 2 – Counter-Anchoring

Experiment 1 focused on the match threshold of a retirement plan showing that changes to it can result in anchoring effects that can be used for the benefit of the enrollee. The purpose of this experiment was to test two minor, easily implemented alterations to retirement plan enrollment forms that may also lead to increased savings without having to alter the plan attributes. Again, the proposed changes were informed by anchoring and adjustment theory and designed in the framework of choice architecture. This time, the plan match threshold and match rate were both held constant and a counter-anchor was tested. As previously discussed, the scale on which participants adjust was predicted to be coarse (increments of 5% for many participants), potentially limiting or masking the counter-anchor effect. Therefore, a manipulation to increase the resolution of this adjustment scale was tested concurrently.

Design

A 2x2 between subjects design was used. One factor, the counter-anchor, was the presence or absence of the phrase “Most employees may contribute 21% or more of their salary” on the enrollment form. The second factor, explicit decimal field, was whether or not participants had to explicitly indicate a tenths digit when entering their desired contribution level. See Appendix G for an example of the scenario and form under the counter-anchor, explicit decimal field condition. Those who received the counter-anchor were predicted to contribute more than those with no additional anchor, but it was anticipated that this might have been qualified by an interaction in which the effect would only be observed under the explicit decimal condition. The explicit decimal condition was predicted to lead to fewer round (multiples of 5%) contribution amounts.

Method

A Priori Power Analysis

As calculated by G*Power, approximately 128 individuals would be needed to detect an effect size of $f = .25$ (medium) at .8 power, for both main effects and the interaction.

Participants

Participants were 89 undergraduate psychology students. Of those, 87 indicated a contribution level, but only 64 had high enough scores on the knowledge and scenario-check quizzes to be included in analysis. One participant was removed as an outlier for indicating a contribution three standard deviations above the mean with a contribution of 30% ($z=3.34$).

This left a final count of 63 participants for analysis¹, 73.0% of which were female. The mean age was 23.5 years ($SD = 7.75$). Only 15.9% indicated that they had a full-time job, 54.0% indicated having a part-time job, and 30.2% reported no job. The sample was 39.7% freshman, 23.8% sophomore, 12.7% junior, and 23.8% senior. Only 14.3% of the sample reported currently participating in a retirement plan.

Procedure

Participants completed the same hypothetical decision making task online as in the first experiment. This time, however, the plan attributes were not manipulated. All participants were presented with a match threshold of 5% and a match rate of \$.50 per dollar. Participants were randomly assigned to receive one of four conditions (2 counter-anchor versions x 2 explicit decimal field versions). See Appendix G for the condition in which the counter-anchor and the decimal field are present. Participant viewing one of the explicit decimal field versions were required to enter a value into the tenths digit when filling out the survey. Participants indicated how much they would like to contribute to their account and were granted SONA system credit for their participation.

Results

A 2 x 2 between subjects ANOVA was conducted to assess the impact of the counter-anchor and the explicit decimal field requirement on savings contributions. There was a main effect of counter-anchor, $F(1,59) = 16.74$, $p < .001$, partial $\eta^2 = .22$. Those in the counter-anchor condition contributed a significantly higher percentage of their income to their 401(k) account,

¹ Although only half the target sample size, observed effect sizes for the explicit decimal main effect and the interaction indicated any effect would be too small to detect even with the full sample size, so it was decided to stop data collection on this experiment leaving a larger pool for the final experiment.

an increase of 5.09%, from 7.18% to 12.27%. However, there was no main effect of the explicit decimal field, $F(1,59) = .88, p = .352, \text{partial } \eta^2 = .015$, nor was there an interaction, $F(1,59) = .285, p = .596, \text{partial } \eta^2 = .005$. Mean personal contribution levels are presented in Table 3.

TABLE 3
MEAN (SD) CONTRIBUTIONS BY CONDITION

	Anchor Present	Anchor Absent
	Mean (SD)	Mean (SD)
Decimal Field	12.51 (6.80)	8.00 (4.92)
No Decimal Field	12.00 (4.51)	6.13 (3.04)

Counter to predictions, a chi-square test of independence indicated that having an explicit decimal field did not decrease the likelihood of contributing some multiple of 5%, $\chi^2(1, N=63) = .594, p = .441$. Frequencies are presented in Table 4. This indicates that the manipulation did not make the resolution of the scale of adjustment finer. Additionally, the vast majority of participants in the explicit decimal field condition (79.4%) entered “0” in the tenths digit; only 17.6% entered “5” and one person (2.9%) entered “7”.

TABLE 4

FREQUENCY CHOOSING A MULTIPLE OF 5% BY EXPLICIT DECIMAL FIELD CONDITION

	Contributed Multiple of 5%	Did Not Contribute Multiple of 5%
Explicit Decimal Field	22 (64.7%)	12 (35.3%)
No Explicit Decimal Field	16 (55.2%)	13 (44.8%)
Total	38 (60.3%)	25 (29.7%)

There was no effect of gender on contributions, $F(1,61) = .83, p = .37$ and no effect of employment status either, $F(2,60) = .57, p = .57$. Contributions did differ significantly by class status, however, $F(3,59) = 5.55, p = .002$. Pairwise comparisons indicated that sophomores contributed significantly more on average (14.0%) compared to both freshmen (7.9%) and seniors (7.6%), p 's < .001.

Discussion

Employers may not have to change the terms of their retirement plans to get employees to save more. Experiment 2 demonstrated that the addition of a simple sentence providing a generic upper limit of allowable contributions increased savings significantly. This maximum figure is not typically available in the real world. As previously discussed, if enrollees do know the maximum amount that they may contribute it is typically in a dollar amount. It is unlikely that employees will calculate the corresponding percentage for themselves. Therefore generic upper limit values should be provided in the scale on which the decision is made. Because participants decide what percentage to contribute, the counter anchor needs to be in percentages. There may be additional benefit to providing the exact upper limit for a plan

participant. Additionally, there may be other manipulations that can make the counter anchor more powerful. Experiment 3 was designed to explore this.

Surprisingly, there was no effect of the explicit decimal field including no interaction. It is difficult to tell what the scale of adjustment was for participants and how important it might have been in influencing the amounts that they elected to contribute, but the fact that 60% of the participants contributed a multiple of 5% indicates it to be a likely adjustment resolution. The fact that participants with and without the explicit decimal field were equally likely to indicate an amount in 5% increments suggests that inducing participants to consider partial percentages was not enough to alter the resolution of their scale. Future research on the resolution of adjustment may consider manipulations of the counter anchor (20% vs 21%, e.g.) as the use of 21% in the present study may have reduced tendencies to use values in multiples of 5%. Similarly, the use of a 5% match threshold may have increased tendencies to use a 5% adjustment scale.

Experiment 3 – High-tech Solution

Experiment 2 showed a simple, non-technical approach to getting participants to contribute more money to their savings by displaying a generic, typical maximum contribution level. An electronic system has a number of potential advantages over a simple form like that in Experiment 2. Firstly, the exact maximum contribution level can be presented to the employee. This value is more relevant to the employee than a generic maximum and would generally be much larger (unless the employee was making more than \$78,500) than the value presented in Experiment 2 (21%). Secondly, this counter-anchor value could also be automatically populated directly into the contribution field of the form, potentially giving it additional weight. It is also

possible to require more work, in the form of button clicks, in order for the employee to decrease the amount they will contribute. Specifically, a spin counter could be used to allow enrollees to adjust how much they want to contribute from some initial value. Such an enrollment process takes the anchoring and adjustment behavioral principle and applies it to the physical world. This fits in nicely with the choice architecture philosophy; employees can contribute any amount they want by simply doing just a little more work, but the path of least resistance is a higher contribution. Experiment 3 tested the power of the in-field anchor and the effect of a spinner control (physical adjustment).

Design

This study employed a between subjects design with four conditions: one control and three In-field Anchor conditions.

Method

A Priori Power Analysis

As calculated by G*Power, approximately 180 individuals would be needed to detect an effect size of $f = .25$ (medium) at .8 power for a one-way between subjects ANOVA with four groups.

Participants

Participants were undergraduate psychology students from the SONA system pool and students in sections of CESP 334 (Introduction to Diversity: Human Growth and Development) and CESP 433 (Learning Assessment and Evaluation Theory). Those in the CESP courses were offered extra credit for their participation rather than course credit. A total of 323 undergraduates participated with 82 (25.4%) coming from the CESP courses. Only 314

participants completed enough of the study to indicate a contribution level. 269 entered the correct salary and of these only 209 had high enough scores on the scenario engagement and knowledge check quizzes to be included in analysis. CESP participants were not more or less likely to have met these criteria, $\chi^2(1, N=314) = 1.93, p = .17$. Finally, one participant was removed from analysis for contributing more than the maximum allowed (38%), leaving 208 participants.

Participants were 66.3% female and had a mean age of 23.8 years ($SD = 7.5$). In total, 11.5% indicated full-time employment, 62.0% worked part-time, and 26.4% were unemployed. The sample was 26.0% freshman, 20.2% sophomore, 28.8% junior, and 25.0% senior. The final portion of the sample from CESP was 28.4%. Only 15.9% of the sample reported currently participating in a retirement plan.

Procedure

Participants completed an online hypothetical decision making task similar to Experiments 1 and 2. This time the plan was held constant at a \$.50 per dollar match up to 6%. Participants were asked to assume an income of \$48,000² and were given instructions to use an online form to indicate how much they would like to contribute. This required all participants to enter this income value and hit a calculate button. For all conditions, the phrase, “You may contribute up to 34% of your income”³ was then automatically generated (using JavaScript). Participants were then randomly assigned to one of four conditions, each asking “How much would you like to contribute?” In the control condition, the contribution field was one blank

² This value was selected as it was close to the median income of the city where the study took place.

³ This value was based on the actual legally allowed maximum, up to \$16,500. This gave a personalized, accurate indication of the maximum percentage based on the entered income. The form could use any value and could theoretically be tied to an employee salary database.

text box followed by a “%” symbol. In a second condition, In-field Anchor, the contribution field was automatically populated with the maximum of 34%. Participants could change this value to submit the amount they would like to contribute. In order to test the impact of physical adjustment from the anchor, two additional conditions were used. In both conditions, the 34% figure was again automatically populated into the field. In these conditions, however, participants were required to use spinner controls (up and down arrows) to physically adjust the value. The scale of adjustment was either a 1% or .5% increase/decrease per click with values capped at 34% and floored at 0%. A total of 34 clicks would be required to reach a 0% contribution in the 1% adjustment condition, and twice that many, 68, would be required in the .5% adjustment condition. For both of these adjustment conditions, the contribution field could not be directly edited as in the other two conditions. Participant could only adjust their contribution by using the spinner controls. The down and up spinner buttons did not support click and hold; that is, participants could not simply click and hold to adjust their contribution in a continuous fashion. Figure 3 shows the predicted order of mean contribution levels across the conditions. Appendix H provides an example of one of the spinner control conditions.



Figure 3. Predicted order of mean contribution levels by condition from lowest to highest.

Results

A one-way between subjects ANOVA indicated that there was at least one significant difference in personal contribution levels between conditions, $F(3, 204) = 3.53, p = .016, partial$

$\eta^2 = .05$. Although the mean contributions varied in the order predicted, the only significant difference was between the control condition and the .5% incrementing condition, $p = .002$. Counter to predictions, the control and In-Field mean contributions did not differ significantly, $p = .248$. Similarly, the 1% increment condition did not significantly increase contributions compared to the In-Field anchor, $p = .52$, nor did the .5% increments condition increase contributions relative to the 1% increment condition, $p = .207$, or even the In-Field Anchor, $p = .073$. Means are presented in Table 5.

TABLE 5

MEAN (SD) CONTRIBUTION LEVELS BY CONDITION

Condition	Mean	SD
Control	15.97	(9.51)
In-Field Anchor	18.21	(9.31)
1% Increments	19.48	(10.21)
.5% Increments	21.88	(9.58)

A total of 36 participants contributed the maximum value of 34%, but the proportion doing so did not differ significantly between conditions, $\chi^2(3, N=208) = 4.917$, $p = .18$. See Table 6 for frequencies.

TABLE 6

FREQUENCY OF PARTICIPANTS CONTRIBUTING THE MAXIMUM BY CONDITION

	Contributed at Maximum	Contributed Less than Maximum
Control	6 (9.8%)	55 (90.2%)
In-Field Anchor	6 (14.3%)	36 (85.7%)
1% Increments	13 (23.2%)	43 (76.8%)
.5% Increments	11 (22.4%)	38 (77.6%)
Total	36 (17.3%)	172 (82.7%)

A three-way ANOVA confirmed that contributions did not differ by gender, $F(1,184) = 2.13$, $p = .15$, employment status, $F(2,184) = .86$, $p = .43$, or class status, $F(3,184) = 1.54$, $p = .21$.

Discussion

Auto-populating the contribution field with the maximum, alone, did not lead to significantly higher contribution levels. It may just be that the difference was too small to detect with the given sample size, $t(101) = 1.19$, $p = .237$, *Cohen's d* = .24. The Cohen's d value of .24 is right at what is traditionally considered a small effect (.2). However, we are looking at an observed average increase in contribution of 2.24% of income from the control to the in-field anchor condition, a sizeable addition to a retirement account. The 95% confidence interval indicates the true difference between conditions is likely between a 1.5% smaller contribution and a 6.0% larger contribution. This small effect, though statistically non-significant, might be of practical importance and will deserve further research in the future.

Interestingly, the .5% incrementing condition did lead to significantly larger contributions compared to the control condition. This condition differed from the control condition in two ways: 1) the contribution field was anchored with the maximum value, and 2) the values could only be adjusted by using the spinner controls. This incrementing condition forced participants to be literally anchored at the maximum value and adjust their contribution downward. In the control condition, it is presumed that participants anchored on the match threshold and adjusted upward. This may at least partially explain the difference in average contributions. The effect on mean contributions, however, was not significantly different for those in the 1% incrementing condition. This suggests that the constricted scale of movement per button click (.5% per click versus 1% per click) combined with anchoring directly in the contributions field, resulted in increased contributions. The effect was not detected at a statistically significant level for either manipulation alone.

One particularly important reason for non-significant effects might have been the income selected. Experiments 1 and 2 did not have such high mean contributions rates. (This was not a result of CESP student participation in this particular study, as contribution rates did not differ between CESP and psychology students, $t(206) = .566, p = .572$.) Participants might have been freer with their imagined money than they would be in the real world, but that would have been an issue in the first two experiments as well. Instead, this study explicitly told participants that their income was \$48,000. This value may have seemed especially high to these students considering that only 11% were working full time. Additionally, this value may have been outside the expected entry-level income for these undergraduates which would thereby leave much more “disposable” income in this scenario to invest toward retirement.

Whatever the reason, it appears that a ceiling effect might have contributed to the failure to detect significant results between conditions. That is, all contributions were very high relative to the previous two experiments and this may have reduced the amount of variability that could result from the tested manipulations.

Two steps can be taken in future research to handle this. In hindsight, a smaller income value would be more appropriate. Something closer to \$36,000 may be closer to expectations and provide a tighter perceived budget. The associated maximum percent would be 46%. It would give a higher maximum anchor, but might get more realistic savings values. An anticipated salary survey would be useful to establish a good hypothetical salary to use across participants. Alternatively, the experiment can be replicated with participants inputting their true salary. If nothing else, Experiment 3 demonstrated only a modest difference in contribution levels between conditions, so there is little fear that any of these manipulations will be particularly harmful to retirement savings if applied in the field. Therefore, it should be safe to replicate the study with naturally varying, real incomes, and real decisions.

CHAPTER 3

OVERALL DISCUSSION AND CONCLUSION

Experiment 1 demonstrated a strong anchoring effect of retirement savings plan match thresholds on personal contribution levels. Although the total maximum cost per employee that the provider would incur was held constant across plans, personal contributions were higher for those contributing to a plan with a higher match threshold. This shows that contribution match structures can have a sizeable impact on employee savings decisions without increasing the cost of operating the plan. At the same time, however, a diminishing returns trend was observed whereby increases to mean total contributions due to higher match thresholds will likely asymptote as the match rate decreases toward 0. Future research should seek to discover these tradeoffs between match rate, match threshold, and the resulting personal contribution levels to strike a perfect balance of minimizing plan costs and maximizing employee savings.

Experiment 2 demonstrated that providing plan enrollees with a generalized maximum contribution level increased contribution levels relative to enrollees who were not provided that information. No additional impact on savings was observed when participants were required to enter a more precise value (forced inclusion of a decimal point). Based on this experiment, no conclusion can be drawn regarding the impact of the decimal on the participants' scale of adjustment, but it is clear that the maximum anchor manipulation was effective at increasing contributions, regardless. This showed that a simple enrollment form adjustment that leaves the plan matching specifics unaltered can significantly impact savings decisions. Future research should apply this maximum anchor manipulation in a real-world setting to confirm that new enrollees save more when presented with a high anchor.

Experiment 3 explored some possibilities for anchoring in an electronic form and the impact that anchor location may play. Placing the anchor inside the same field that the participant uses to indicate how much they would like to contribute was not shown to significantly increase contributions, except when it was combined with an incrementing spinner that adjusted values up and down by .5% increments. However, contributions across all conditions in this experiment were much higher than in the previous two experiments; this is likely due to the inclusion of a salary value that, in hindsight, may have been overly high for the population. This study should be replicated with a reduced salary provided in the scenario or, better yet, should use participants' actual salaries.

In all, this research provides clear evidence that anchoring can have a powerful effect on savings contributions. Because of the simple, inexpensive, and innocuous nature of the approach, plan providers should immediately apply anchoring to their retirement plan enrollment process. However, some implementations would be preferred over others. For example, Experiment 1 showed that raising the match threshold while simultaneously decreasing the match rate could increase savings, but that approach would hurt the lowest savers and therefore may not be the best approach for broadly increasing savings. However, Experiment 2 showed that just informing enrollees of a ballpark maximum amount increased savings by about 5%, a sizeable improvement. Experiment three had the highest of all contribution levels, likely resulting from the relatively high personalized anchor compared to the first two experiments. Furthermore, the smaller an employee's income is, the larger their personal maximum anchor would be. Personalizing anchors would mean that the lowest earners (and likely lowest savers) would receive a higher and therefore potentially more

influential anchor, where it would be needed most. Therefore, maximum anchors, whether generalized or personalized should be provided by retirement savings plan providers. This anchoring of retirement savings contributions is an opportunity to use behavioral economics principles to benefit people rather than hurt them and the approach holds true to the libertarian paternalistic philosophy of influencing behavior because it induces improved savings without constraining an individual's freedom to save as little as desired.

Limitations

These three experiments suffered from two important weaknesses that should be discussed – the use of a hypothetical decision making task rather than a true decision task and the use of an undergraduate psychology student population. The use of a hypothetical decision making task calls into question of external validity of the experiments. Would people behave similarly in the real world and would they make the same decisions if they were saving real money, instead of imagined money? The use of undergraduates calls into question whether or not the results will extrapolate to people currently in the workforce, those who currently have access to retirement savings plans but who may not be fully utilizing them. The use of an undergraduate student population and a hypothetical decision making task were both conscious decisions that took a number of factors into account.

The first factor was market volatility. With the recent economic downswing, many retirement savings accounts took a hit. Many investments were not achieving significant returns or, worse, were losing money. These poor returns and volatility had two important ramifications. First, participants might have behaved differently. Specifically, they might have been less willing to save when there was such uncertainty in the market. Fears surrounding the

market may have kept contributions artificially low thereby masking any impact of the anchoring manipulations. Secondly, the state of the market upped the stakes of any impact on changed participant decisions. If they were induced to save more than they would otherwise they may have lost money if it was allocated to a bad investment. Although a 401(k) is generally a good investment (depending on fund allocation), these experiments were conceived in a time of economic uncertainty and it was an unacceptable risk to potentially negatively impact participants' nest eggs.

A second factor that led to the use of a hypothetical decision making task was the variety of manipulations that needed to be tested (i.e. match threshold adjustments, maximum anchors, scale resolution adjustments) and the uncertainty of their effects. Although all were hypothesized to positively impact savings rates, it was not certain at the onset of the study how the various anchors used might impact savings. Rather than testing all hypotheses at once with real people's savings, it was important to first get evidence for the most fruitful approach before targeting and applying a specific intervention in the real world. Influencing real-life savings decisions without first testing the hypothesized impact would have been irresponsible. Therefore, a hypothetical decision task was the first logical step.

The final factor taken into account was that while the use of undergraduate psychology students has some weaknesses it also has some benefits. First, it is unknown how similarly aged students from a different major might have behaved differently. For example, perhaps accounting majors would be more likely to "crunch the numbers" and would better understand the impact of savings as it relates to their personal budget, resulting in a more rationally derived contribution level. However, because the anchoring and adjustment phenomenon has

been demonstrated by the literature to be very robust, it seems unlikely that non-psychology undergraduates would behave much differently under the tested conditions. A second weakness of this population is that most undergraduates have not yet entered their careers, therefore, a retirement savings decision may not yet feel relevant. To them, the need to save may be a decision that feels too far off to take seriously. However, the tendency to put off thinking about retirement is not unique to those in their twenties; fully one third of adults over age 50 report that they have thought “hardly at all” about retirement (Lusardi, 2003). Finally, participant contributions may not have been realistic and may not reflect all of the bills that will come once these students are out of school and starting their career (although the scenario was designed to highlight some of the expenses to combat this). Despite these weaknesses, this population is about to graduate. Within a few years they will enter the workforce and at that time they will need to make these exact retirement savings decisions. A retirement account is something that needs to grow over time. Therefore, the best long-term interventions need to focus on influencing the young work force, where employees make decisions early in their careers. Recall the inertia argument from the introduction. Once people set up their retirement accounts they will be unlikely to make adjustments. Therefore, the sooner an effective intervention can be implemented, the easier it will be to prepare them for retirement. This made undergraduates an excellent choice for the population to study. If the impact to contributions observed in these experiments hold, it suggests that anchoring will be an effective tool for increasing retirement savings early in employees’ careers and will potentially result in a longstanding habit (inertia) of saving over their lifespan.

Conclusion

Taken all together, this dissertation confirmed empirically that savings contributions are influenced by retirement plan match thresholds and that something as simple as telling employees what their maximum allowed contribution is will increase savings. Additional research will be required to conclude what impact electronic form elements and placement of anchors can have, but ultimately, this research showed anchoring to be an elegant, inexpensive, and powerful tool for increasing retirement savings.

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APPENDICES

APPENDIX A

DEMOGRAPHICS SURVEY

What is your age?

Which is your gender?

- Female
- Male

Are you currently employed?

- Yes, Full-time
- Yes, Part-time
- No

Which is your class status?

- Freshman
- Sophomore
- Junior
- Senior
- Graduate

Are you Hispanic or Latino?

- Yes
- No

Which is your race? (You may select more than one if appropriate.)

- White
- Black or African American
- Asian
- American Indian or Alaska Native
- Native Hawaiian or other pacific islander
- Other:

What is your annual household income?

- Below \$20,000
- \$20,001-\$40,000
- \$40,001-\$60,000
- \$60,001-\$80,000
- \$80,001-\$100,000
- \$100,001-\$120,000
- Above \$120,000

APPENDIX B

401(K) TUTORIAL

This study is interested in how people make decisions when saving for retirement. This may seem like something you won't have to worry about for a long time, but when you graduate and land your first job after college you will likely be faced with just such a decision within your first few days. This is because employers often offer 401(k) retirement plans.

- In a 401(k), you contribute a certain portion of your income to the account and so does your employer.
- This money is invested to accrue interest over the years until you make withdrawals during retirement.
- A 401(k) comes with a tax benefit. You get to contribute money before it is taxed, which means you can add a larger amount to your retirement savings.
- All earned interest is reinvested also without being taxed.
- Because of compounding interest, the earlier and larger your contributions, the faster the account will grow.
- The money in the account is only taxed during retirement as you withdraw it.

One thing to keep in mind about a 401(k) is that it is not easy to get money out of the account before retirement. Any withdrawals taken before age 60 will not only be taxed as regular income, but you will also be charged a large early distribution penalty. Because of this, it is unwise to take money out of the account before retirement except in serious financial emergencies.

APPENDIX C

401(K) KNOWLEDGE QUESTIONS

Select true or false for each of the following statements about 401(k) accounts:

Contributions are withdrawn from an employee's salary before any taxes are taken out.

- True
- False

An individual may withdraw money from the 401(k) at any time without penalty.

- True
- False

When you withdraw money from a 401(k) at retirement you don't pay taxes on it.

- True
- False

A 401(k) is a checking account.

- True
- False

APPENDIX D

SCENARIO

Please imagine yourself in the following scenario.

You are starting your first post-college job and need to decide how much to contribute toward your 401(k). You're not getting paid quite what you had hoped, but you are mostly satisfied with your new income.

- You have all the regular expenses (rent, utilities, food, entertainment, insurance, healthcare, etc.).
- In a few months, you will have to start making payments on your consolidated student loans.
- It would be nice to upgrade to a newer vehicle, but the one you have now is pretty reliable.
- You'd also like to get a bigger apartment or maybe a house in the next few years.

Keep in mind that the more you contribute to your retirement account, the less take-home pay you will have to buy the things you want and need.

Although you have a lot of expenses and there are some things you'd like to buy, you also want to prepare for retirement. You want to be responsible and don't want to end up relying on your children or grandchildren to help you meet your expenses when you are older. There are a lot of things to consider when making decisions about how much to save:

- Would you like to retire early?
- Would you like to travel the world when you retire?
- What expenses will you have? (You've noticed your grandparents are struggling with health care costs that they didn't anticipate.)
- How much can you rely on Social Security?
- How long will you live after retirement?
- Will the money run out?

Keep in mind that compounding interest is a powerful tool for growing a retirement account -- the more you can save now, the more you will have to fund your retirement.

Please take a moment to really consider yourself in this situation. The following page will ask you some questions about this scenario and you will soon be making a decision about how much to contribute toward your retirement at this new job.

APPENDIX E

SCENARIO PARTICIPATION CHECK

In this scenario, what expense did your grandparents not anticipate?

- Healthcare costs
- Nursing Home fees
- Estate taxes
- Legal fees

In this scenario I am supposed to imagine that I am...

- a doctor
- a recent high school graduate
- a parent
- Myself

In this scenario, what is the status of your car?

- Brand New
- Pretty reliable
- A junker
- No car

What is your annual income in this scenario?

- \$37,000
- \$48,000
- \$62,000
- The scenario didn't say

What is one downside to contributing more money into a 401(k)?

- You have to pay more taxes
- Your take-home pay is reduced
- Compounded interest
- All of the above

APPENDIX F

EXPERIMENT 1 ANCHOR MANIPULATION

At orientation you learn that your employer will match some of your contributions. They will add \$1 (**\$0.50/\$0.25**) to your account for every dollar that you contribute, up to 3% (**6%/12%**) of your salary. You can contribute as much of your salary as you want.

How much of your salary would you like to contribute?

 %

APPENDIX G

EXPERIMENT 2 COUNTER-ANCHOR & EXPLICIT DECIMAL FIELD CONDITION

At orientation you learn that your employer will match some of your contributions. They will add 50 cents to your account for every dollar that you contribute, up to 5% of your salary. You can contribute as much of your salary as you want, but there are maximum annual contribution limits.

Most employees are legally allowed to contribute up to 21% or more of their annual salary to their retirement account.

How much would you like to contribute?

.%

[Next Page](#)

APPENDIX H

EXPERIMENT 3 ONLINE CONTRIBUTION FORM

(IN-FIELD ANCHOR, SPINNER CONTROL CONDITION)

Again, imagine your annual salary is \$48,000. At orientation you learn that your employer will match some of your contributions to your retirement account. They will add 50 cents to your account for every dollar that you contribute, up to 6% of your salary. You can contribute as much of your salary as you want, but there are maximum annual contribution limits.

The following calculator will give you a little more information before you indicate how much you want to save. You will have to enter your annual salary (48000) to use it.

What is your approximate annual salary?

\$

Based on your salary, you are allowed to contribute up to **34%**. How much would you like to contribute?

%