

Norms in Behavioral Interventions

Peer or Anchoring Effects?

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Abstract: Descriptive information of peers' behavior is often used to nudge individuals to behave according to a norm. We test whether effects found may be driven by anchoring or peer effects, and test boundary conditions in two mTurk-based experimental studies with a retirement saving contribution rate scenario. In study 1, we find a strong similarity between the anchoring and peer effect. In follow-up study 2, no anchoring effect is found when more extreme values (peer norms or anchors more distant from the control group behavior) are used, whereas the peer effect remains present. Furthermore, we find evidence that the informational component – as opposed to the normative component – of peer information plays a stronger role for peer effects. Lastly, we find that, when exposed to peer information, women consistently contribute more than the provided retirement contribution norm, whereas men do not.

JEL Classification D14, D91

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1 Introduction

Numerous interventions are initiated where peer information is provided to evoke changes in individuals' (undesirable) assessments and subsequent behavior across a multitude of contexts. Such interventions putatively alter, for example, alcohol consumption (Ridout & Campbell, 2014), recycling (Thomas & Sharp, 2013), voting (Panagopoulos, Larimer, & Condon, 2012), sustainability behaviors (Goldstein, Cialdini, & Griskevicius, 2008; Van Der Linden, 2015), academic performance (Azmat & Iriberry, 2010), tax compliance (Bobek, Hageman, & Kelliher, 2013), financial decisions (Beshears, Choi, Laibson, Madrian, & Milkman, 2015), and energy usage (Allcott, 2011). The success of these interventions is proclaimed to be caused by conformity to peers' behavior, as subjects are exposed to salient information about peers' behavior. However, as this peer information is often of a quantified nature – level of others, level of consumption – it is possible that subjects simply anchor (Tversky & Kahneman, 1974) to these levels subconsciously and change their behavior accordingly, without any normative or informational influence. In a matter of fact, Grinstein-Weiss et al. (2015) found that including recommended savings rates – theoretically a form of social norms – in a tax time saving program intervention leads to increased savings, which they attribute to the anchoring effect, due to the numeric nature of the information. Peer interventions come at a financial cost, and similar marketing-based interventions have been shown to be amongst the least cost-effective for reducing some undesirable behaviors, such as utilizing mass media to disseminate norms regarding drunk driving (e.g. Cobiac, Vos, Doran, & Wallace, 2009). It is therefore not only crucial that all such interventions function as intended, but to identify the most effective framing to nudge individuals.

To date, there has not been a study to empirically disentangle whether it is indeed an anchoring or peer effect that is driving this convergence to the presented numerical value. That is, the behavioral reactions may be triggered by information about what peers do, but also simply, or largely, by the numeric value that they are exposed to (hereafter anchoring effect). Utilizing mere anchors as opposed to peer information to nudge individuals could be less costly, requiring no research expense to identify specific behaviors of peers. Additionally, anchors could nudge where actual peer behavior is suboptimal (i.e., most others conduct undesired behavior). In this paper, we compare the anchoring effect against a peer effect intervention. We provide empirical evidence to advance the notion that peer effects are present and superior to the anchoring effect in the tested context of savings.

The peer effect is one of Cialdini's (2001) identified channels of persuasion, inducing changes in behavior by providing behavioral information about peers, that is, individuals sharing one or more characteristics. When behavior of peers is made salient (Cialdini, Reno, & Kallgren, 1990), individuals are driven to social conformity, to conform to what others do, or what others approve or disapprove of doing,

through their informational goal of accuracy and/or their normative goal of affiliation (Cialdini & Goldstein, 2004; Schultz, 1999). The peer effect is strongest under conditions of ambiguity and uncertainty with regard to the optimal choice (Cialdini & Trost, 1998).

The anchoring effect is conceptualized as a decision shortcut occurring when an individual has to make an estimate after exposure to a provided or self-generated initial value – an anchor – thereafter insufficiently adjusting away from this anchor (Tversky & Kahneman, 1974). According to Epley and Gilovich (2006), this insufficient adjustment away from the anchor occurs as adjustment stops when the first plausible value is encountered in the adjustment process. The anchoring effect has been identified not only for values relevant to the estimation task, but also for irrelevant, but salient values (Wansink, Kent, & Hoch, 1998), as well as irrelevant and subliminal values (Mussweiler & Englich, 2005), demonstrating the sheer strength of this effect. Moreover, Epley and Gilovich (2001) found that the adjustment away from the anchor was less pronounced, that is, a stronger anchoring effect, for externally provided values than for self-generated values. Like the peer effect, the anchoring effect is a judgment heuristic that is strongest under conditions of uncertainty with regard to the optimal choice (Festinger, 1954; Goldstein et al., 2008).

Recent studies have shown that individuals anchor towards salient numeric values in financial decision-making contexts. In 2003, the United Kingdom Treasury Select Committee's report forced lenders to collect minimum repayment amounts on, for example, credit card debt. In an experiment, subjects significantly anchored towards these disclosed minimum repayment amounts, and would repay larger amounts of debt, if minimum repayment amounts were higher or not present (Stewart, 2009). The minimum repayment amount may simply act as an irrelevant anchor, but it may also be perceived as an injunctive norm, and convergence towards this amount may therefore be driven by both the anchor and peer effect. Navarro-Martinez et al. (2011) replicate these findings with U.S. subjects, yet found no anchoring effects (in an experimental setting) for the inclusion of supplementary numerical information required by the 2009 U.S. Credit Card Accountability, Responsibility and Disclosure (CARD) Act (i.e., future interest cost and time required to pay off debt with minimum repayments). However, when supplementary information on an alternative course of action is presented, such as the monthly payment required to pay off the credit card debt within 3 years, Salisbury (2014) found convergence to the 3-year payback option. Hershfield and Roesse (2015) highlight the same finding, but additionally found that emphasizing the full payback option after exposure to the partial payback options negated this effect. Moreover, Jones, Loibl, and Tennyson (2015) found that attentiveness drives the positive repayment response to CARD Act disclosures. These studies highlight that in financial decision-making contexts anchors are a strong and significant decision heuristic, especially when salient and close to the decision point. Providing an individual with descriptive information on a peer group's behavior (e.g. level of

consumption of a good) prior to a decision point can thus not only prompt social conformity, but also fixate an anchor.

In consequence, we empirically investigate whether the anchoring-and-adjustment heuristic may be a driver of putative peer effects in peer effect interventions, by employing financial decision-making experiments. Financial decision-making experiments are ideal since they employ – like many peer effect interventions – numerical values, known to evoke anchors (e.g. Smith & Windschitl, 2011), and take place in a context characterized by high uncertainty about the optimal decision. Moreover, in financial decision contexts, such as retirement savings, most individuals save too little (Martin, 2017), providing limited opportunity to utilize social norms in practice without deceiving individuals. This lack of a proper social norm also highlights ample opportunity to increase retirement savings by identifying superior mechanisms to increase savings rates. While automatic enrollment into retirement plans has become popular to increase enrollment (e.g. in the United States), it can lead to overall reduced contribution rates (The Vanguard Group, 2016). There is thus room for utilizing peer or anchoring effects to improve contribution rates, thereby addressing a topic of high societal relevance in times of population aging and widespread saving inadequacy. Research has shown that 39 percent of the American working population is not confident that they will be able to live comfortably after retirement (Greenwald, Copeland, & VanDerhei, 2017).

In this paper we report results from two experimental studies. In both experiments, subjects were first provided either information on peers' behavior or an irrelevant anchor, and subsequently asked to choose a contribution rate to a retirement savings plan.

We find indicative evidence in study 1 that the anchoring effect and peer effect may induce similar behavior, both by reducing the variance across different subjects' behaviors, and by pulling behavior towards the presented anchor and peer behavior value. However, the control group's average behavior highlights that the chosen anchor and peer behavior value was similar to the average behavior without intervention. As such, to test whether the anchoring effect is indeed as strong as the peer effect for more extreme values, we conducted study 2, where treatment groups were exposed to more extreme anchor and peer behavior values, both below and above the control group behavior. Study 2 reveals that the anchoring effect no longer holds when more extreme values (more distant from the control group behavior) are used. Peer effects, on the other hand, remain strong even at more extreme values.

Furthermore, we measured subjects' consumer susceptibility to interpersonal influence (CSII) (Bearden, Netemeyer, & Teel, 1989, 1990), which estimates subjects' susceptibility to two components, normative influence and informational influence from others. These measured characteristics are in line with subjects' goals of affiliation and accuracy, respectively. A higher CSII score of a subject should

theoretically drive convergence to only the presented peer information, and not the anchor value, thereby confirming the the peer effect channel. Moreover, susceptibility to *normative* influence has been linked to changes in behavior when socially visible benefits are present (Batra, Homer, & Kahle, 2001). As long-term financial decisions are often conducted privately and not used to signal affiliation through socially visible outcomes, we predict that primarily a subject's susceptibility to *informational* influence, and not *normative* influence, moderates convergence to a provided norm. Hoffmann and Broekhuizen's (2009) findings in the investment context are in line with this prediction, yet they attribute the lack of significant susceptibility to *normative* influence moderation to small cell sizes. We therefore utilize a measure of CSII to confirm this hypothesis, and add to the currently limited body of knowledge on measured traits that moderate peer effect strength. It further allows us to measure whether a peer effect is indeed moderated by these traits, or, if peer effects from numeric interventions are merely anchoring effects, these traits have no effect. Indeed we find evidence that a subject's susceptibility to interpersonal, in particular *informational*, influence plays a role in explaining the peer effect in the hypothetical retirement scenario.

Lastly, we compare the behavioral effects between genders, as males are known to be more risk-taking (e.g. Borghans, Heckman, Golsteyn, & Meijers, 2009; Charness & Gneezy, 2012; Laasch & Conaway, 2009; Sapienza, Zingales, & Maestripieri, 2009), also in retirement savings context (Gerrans & Clark-Murphy, 2004; Speelman, Clark-Murphy, & Gerrans, 2013), and show less self-control (e.g. Nakhaie, Silverman, & LaGrange, 2000) than females, variables known to align with preferences for behaviors favoring short-term gains at the expense of long-term gains. Peer information that aligns with such preferences should therefore demonstrate a stronger congruence than peer information that does not. We indeed find that, for the peer effect, females consistently outperform a provided savings norm, whereas males do not. Furthermore, we find that the peer effect is strongest for males when the displayed peer behavior aligns with short term, as opposed to long-term, benefits (low savings norm).

Overall, our experimental tests of peer effects against anchoring effects provide evidence of the former across small and large values, but not of the latter. Thus, in our design, only norms, and not anchors, drive behavior towards the presented values.

2 Experiment 1 – Peer versus Anchoring Effect Treatments

2.1 Design

We conducted an internet experiment with Amazon's Mechanical Turk (mTurk) workers, obtaining 295 complete responses. 53.2% of subjects are female, and median age was 31 years ($M_{AGE} = 33.9$, $SD_{AGE} = 12.1$). Subjects were recruited exclusively from the United States, as U.S. citizens are particularly familiar with a defined-contribution retirement savings scenario (U.S. Department of Labor,

2014), as used in the experiment. Moreover, mTurk has become an accepted recruitment platform for obtaining subjects for experiments (e.g. Paolacci, Chandler, & Ipeirotis, 2010), especially when employing decision-making heuristics (Horton, Rand, & Zeckhauser, 2011).¹

Subjects were first placed into a hypothetical retirement savings scenario. Hypothetical surveys have been shown to have equal predictive power to non-hypothetical behavior observed in laboratory experiments (e.g. Shogren, Fox, Hayes, & Roosen, 1999), and were therefore utilized to be economically able to sample a distant population more familiar with defined-contribution retirement schemes. The scenario placed the subjects in the position of a fresh graduate from a fictional ABC College, accepting his or her first job and asked to contribute a percentage of his or her salary to a 401(k) retirement savings plan. Subjects were randomly assigned to either a control group ($n = 102$), a peer effect group ($n = 100$) or an anchoring effect group ($n = 93$). The peer effect group was primed with an additional, relevant sentence containing a descriptive social norm that similar graduates contribute 11 percent to their 401(k) (“Other recent ABC college graduates contribute 11% of their salary to their pension fund.”), whereas the anchoring effect group was primed with an irrelevant sentence containing the 11 percent anchor (“Among ABC college graduates, 11% have a similar job.”). The control group received no such additional information. Experimental instructions are shown in Table 4 in the Appendix. While there is a growing tendency to utilize dollar amounts in peer effect interventions to save for retirement as such values are generally easier to understand, we use percentages in our scenario for two reasons. Firstly, defined-contribution retirement plan contributions are typically determined using percentages, thus we mimic real-life settings. Secondly, prior seminal work on increasing retirement savings has utilized percentages (e.g. Thaler & Benartzi, 2004), and recent work on anchors in tax return saving deposits showed a stronger effect for percentages than cash amounts (Grinstein-Weiss et al., 2015).

Subjects were asked to submit their desired retirement savings contribution rate by the question: “what percentage of your salary would you contribute to your pension?” This was followed by a prompt to confirm why they chose to contribute this particular amount, to screen for typological errors: “could you please shortly explain why you selected to contribute [embedded percentage from prior question] percent to the retirement account?”

Next, subjects filled out the 12-item consumer susceptibility to interpersonal influence scale by Bearden and Netemeyer (1989, 1990). Finally, subjects were queried to provide their gender and age.

¹ 43% of behavioral studies reported in the Journal of Consumer Research between June, 2015, and April, 2016, were conducted on mTurk (Goodman & Paolacci, 2017). Despite some criticism, studies have shown that mTurk is suitable for experimental research where the focus is not on sample representativeness as such, but on treatment effects between groups.

2.2 Results

2.2.1 Effect on contribution rate

Table 1 shows descriptive statistics for the mean contribution rates of the control, anchoring effect, and peer effect groups.

-----Insert Table 1 here-----

The mean contribution rate was highest for the control group ($M_{RATE} = 12.41$, $SD = 8.93$), but with the largest variance, in line with the uncertainty in this decision context. The mean contribution rate for the anchoring effect group ($M_{RATE} = 10.26$, $SD = 5.41$) and peer effect group ($M_{RATE} = 12.05$, $SD = 5.22$) are both closer to the 11 percent value, but below and above it, respectively, with a reduced variance compared to the control group. This reduced variance was expected, as the peer and anchor value provides direction in this decision-making context with high uncertainty. The data was tested for normality (Daniel, 1990; Garson, 2012; Shapiro & Wilk, 1965) and failed both the Komolgorov-Smirnov and Shapiro-Wilk tests. Furthermore, Levene's test for homogeneity of variances (Levene, 1960) was violated ($F(2,292)=12.88$, $p = .001$). Nevertheless, given the large sample size, a one-way between subjects ANOVA is suitable and was conducted to compare the effect of the provided peer and anchoring stimuli on the contribution rate² (Glass, Peckham, & Sanders, 1972). The ANOVA shows a significant difference in chosen contribution rate between the groups, significant at the 10 percent level ($F(2,292)=2.74$, $p = .066$). As the peer and anchor value used was 11 percent, a single sample t-test was conducted for both treatment groups against a specified test value (mean) of the contribution rate at 11 percent. The results show that only the contribution rate of the peer effect group is significantly different from, and higher than the 11 percent norm ($t(99) = 2.01$, $p = .047$).

Moreover, we measured the number (and percent) of subjects that submitted a contribution rate equal to the exact value used in the anchoring effect and peer effect groups. This number was 1 (1%), 6 (6.5%), and 10 (10%), for the control group, anchoring effect group, and peer effect group, respectively.

2.2.2 Effect on absolute distance to provided peer contribution rate and anchor value (11%)

We additionally deducted the 11 percent value of the peer effect and anchoring effect conditions from the subjects' contribution rates, and took the absolute value of the outcomes, to measure the distance to the provided 11 percent value. This allowed us to avoid the negating effect of over- and underperformers relative to this value, as we are interested not only in the actual mean contribution rate

² The same results hold for more conservative non-parametric tests (e.g. Kruskal & Wallis, 1952; Mayers, 2013; Wilcoxon, 1945).

shift, but also the mean convergence (absolute distance) towards the contribution rate value provided. Table 1 shows descriptive statistics for the absolute distance to the provided contribution rate value between the groups. The absolute contribution rate distance was largest for the control group ($M_{DISTANCE} = 6.14, SD = 6.62$), and similar across the peer effect group ($M_{DISTANCE} = 3.73, SD = 3.78$) and anchoring effect group ($M_{DISTANCE} = 3.70, SD = 3.99$). The ANOVA and post-hoc tests show that both the peer effect and the anchoring effect groups had significantly lower absolute contribution rate distances than the control group ($p < .01$).

2.2.3 Correlation between treatment effects and consumer susceptibility to interpersonal influence

Consumer susceptibility to interpersonal influence (CSII) should correlate with differences in the contribution rate of subjects in the peer effect group, but not for subjects in the anchoring effect group. Pearson product-moment correlation coefficients (Howell, 2012; Pearson, 1895) show no significant correlations between the CSII score and the contribution rate for the peer effect group ($r = -.030, n = 100, p = .769$), anchoring effect group ($r = .073, n = 93, p = .490$), and control group ($r = -.000, n = 102, p = .997$). Also the correlations between the CSII score and the contribution rate distance from provided value for the peer group ($r = -.143, n = 100, p = .155$), anchoring effect group ($r = .065, n = 93, p = .538$), and control group ($r = -.032, n = 102, p = .748$), were not significant. The CSII score is a cumulative score, however, composed of two dimensions: an informational and a normative dimension. Pearson product-moment correlations show that the informational dimension of CSII significantly correlates with distance to the contribution rate norm for the peer effect group ($r = -.297, n = 100, p = .003$), but the normative dimension of CSII does not ($r = -.048, n = 100, p = .633$). For the anchoring effect and control groups, the correlation results are insignificant. This provides evidence that the informational component of peer information drives convergence towards this descriptive peer behavior more than the normative component of this information. Additionally, in line with Steinberg and Monahan (2007), we find a significant, inverse relationship between CSII scores and subjects' age.

2.2.4 Gender effect

An independent-sample t-test shows that there is a significant difference in the contribution rate for males ($M_{RATE} = 10.19$) and females ($M_{RATE} = 14.03$) in the control group ($t(100)=8.21, p = 0.031$), with females willing to contribute a significantly higher percentage. There was no significant gender effect in the anchoring effect or peer effect groups.

3 Experiment 2 – Extreme Values, Non-social Anchor

3.1 Design

Given the similarity between the peer and anchor value and the control group's average behavior in the first study, a follow-up study utilized more extreme values. We conducted an internet experiment again with mTurk workers, obtaining 663³ complete responses. 44.2% of those subjects reported being female, and median age was 32 years ($M_{AGE} = 35.2$, $SD_{AGE} = 11.3$).

The experiment followed the same procedure as study 1, with four added treatment groups to test more extreme values. Subjects were randomly assigned to either a control group ($n = 97$), low or high peer effect groups ($n = 93$ and $n = 92$, respectively), low or high original anchoring effect groups ($n = 98$ and $n = 91$, respectively), or low or high neutral anchoring groups ($n = 97$ and $n = 95$, respectively) (see Table 5 in Appendix). As the 11 percent value used in study 1 was close to the mean contribution rate in absence of nudges, 8 and 16 percent were chosen as more distal values, with a distance of approximately 4 percentage points below and above, respectively, the mean contribution rate of study 1's control group. The control group in study 2 again received no additional information. The peer effect group was primed with an additional, relevant sentence containing a descriptive social norm that similar graduates contribute 8 (low) or 16 (high) percent to their 401(k) ("Other recent ABC college graduates contribute 8/16% of their salary to their pension fund."). The first, original anchoring effect group was again primed with an irrelevant sentence containing an 8 or 16 percent anchor ("Among ABC college graduates, 8/16% have a similar job"). Since the effects in study 1 could potentially be explained by the formulation of the original anchor condition sentence, still providing a social context by referring to fellow college graduates, we also included a new, neutral anchor condition in study 2. This neutral anchor condition was primed with "You have completed 8/16% of the survey so far." Subjects were then asked to provide their desired retirement savings contribution rate, followed by a prompt to confirm why they chose to contribute this particular amount. Lastly, subjects were again asked to fill out the 12-item CSII scale, followed by socio-demographics.

³ Two subjects were removed as non-serious, due to both flatlining responses and exhibiting extreme outliers for the dependent variable.

3.2 Results

3.2.1 Effect on contribution rate

-----Insert Table 2 here-----

Table 2 shows descriptive statistics for the contribution rate of the seven groups. As expected, the mean contribution rate for the peer effect groups converges towards the provided norms of 8 and 16 percent ($M_{RATE} = 8.83$ and $M_{RATE} = 15.51$, respectively). However, the mean contribution rate for the low and high groups receiving the original anchor condition ($M_{RATE} = 10.73$ and $M_{RATE} = 11.35$, respectively), as well as the low and high groups receiving the new neutral anchor condition ($M_{RATE} = 10.60$ and $M = 11.54$, respectively), are similar, also to the control condition ($M_{RATE} = 11.67$). ANOVA and post hoc tests reveal that only the 16 percent peer effect group had a significantly different, higher contribution rate compared to all groups ($p < .000$).

Again, we also measured the number (and percent) of subjects that submitted a contribution rate equal to the exact value used in the anchoring effect and peer effect groups. For the *low* groups, this number was 1 (1%), 9 (9.2%), 1 (1.1%), and 20 (21.5%), for the control group, original anchor group, neutral anchor group, and peer effect group respectively. For the *high* groups, this number was 0 (0%), 5 (5.5%), 5 (5.2%), and 11 (12.1%), for the control group, original anchor group, neutral anchor group, and peer effect group, respectively.

3.2.2 Effect on absolute distance to provided peer contribution rate and anchor value (8, 16%)

As in study 1, the absolute contribution rate distance from the provided value was measured. For the *low* groups, the absolute distance to the provided 8 percent value was lowest for the peer effect group ($M_{DISTANCE} = 2.91$, $SD = 3.06$), followed by the original anchor group ($M_{DISTANCE} = 4.59$, $SD = 5.77$), neutral anchor group ($M_{DISTANCE} = 5.24$, $SD = 5.85$), and control group ($M_{DISTANCE} = 5.90$, $SD = 6.92$). Similarly, for the *high* groups, the absolute distance to the provided 16 percent value was lowest for the peer effect group ($M_{DISTANCE} = 4.58$, $SD = 4.06$), followed by the original anchor group ($M_{DISTANCE} = 7.88$, $SD = 5.04$), control group ($M_{DISTANCE} = 7.90$, $SD = 5.03$), and neutral anchor group ($M_{DISTANCE} = 8.19$, $SD = 5.72$). ANOVAs and post hoc tests reveal that for the *low* groups, only the peer effect group had a significantly lower absolute contribution rate distance to the provided value compared to the neutral anchor group ($p < .004$) and control group ($p < .001$), and marginally significantly lower value compared to the original anchor group ($p < .072$). Similarly, for the *high* groups, only the peer effect group had a significantly lower absolute contribution rate distance to the provided value compared to the original anchor, neutral anchor, and control groups ($p < .000$).

3.2.3 Correlation between treatment effects and consumer susceptibility to interpersonal influence

As in study 1, Pearson product-moment correlation coefficients were computed for CSII and both the contribution rate as well as absolute distance to provided values for each group. As expected, there is no significant correlation between CSII and the contribution rate for any of the groups. However, there is a significant correlation between CSII and the absolute distance to provided value for only the *low* peer effect group ($r = -.321, n = 91, p = .002$). Splitting the CSII score into its informational and normative dimensions shows that, as in study 1, the CSII moderation is largely driven by the informational dimension. Again, only for the *low* peer effect group, there are significant correlations between the distance to the contribution rate norm and both the informational dimension ($r = -.406, n = 91, p = .000$) and normative dimension ($r = -.227, n = 91, p = .031$) of CSII. Additionally, as in study 1, and in line with prior research, we find a statistically significant inverse relationship between CSII scores and subjects' age.

3.2.3 Gender effect

-----Insert Table 3 here-----

An independent-samples t-test was again conducted to compare contribution rates of male and female subjects for each of the treatment groups. See Table 3 for descriptive statistics. Interestingly, there was a (marginally) significant difference in the contribution rate for males ($M_{MALE_LOW} = 8.10$ and $M_{MALE_HIGH} = 13.26$, respectively) and females ($M_{FEM_LOW} = 9.76$ and $M_{FEM_HIGH} = 17.76$, respectively) for the low ($t(91)=-1.94, p = .055$) and high norm groups ($t(90)=-3.78, p = .000$), respectively.

4 Summary and Discussion

We tested whether the anchoring effect could be a driver of putative peer effects in numerical peer effect experiments. Our findings demonstrate that peer effects work not only for proximal nudges, but also for more distal ones, whereas this is not the case for anchoring effects. Interestingly, in the peer effect groups, we find strong gender effects in that women consistently contribute more than the contribution norm, even at high norm values, whereas males do not. Lastly, we find evidence that the informational component – more so than the normative component – of peer information plays a stronger role in the peer effect within financial decision-making.

The findings from study 1 suggested that while providing numerical information about peers' behavior leads to convergence towards this behavior, an irrelevant numerical anchor has a very similar effect. Follow-up study 2, however, exposes that the similarity of the anchoring and peer effects in study 1 is largely driven by the proximal nature of the 11 percent peer and anchor value to the control group's

mean of the measured contribution rate ($M = 12.41$). For more distal values, only the peer effect remains robust. Moreover, the proportion of subjects selecting the exact anchor and peer value in this intervention was significantly higher for the peer effect groups in both studies. While the mean contribution rate in the control groups for both study 1 ($M = 12.41$) and 2 ($M = 11.67$) are higher than the national average employee deferral rate of 6.8 per cent (The Vanguard Group, 2016), they are close to the aggregate employee plus employer rate of 9.5 per cent. Moreover, we had included an explanatory question in our survey, fielding explanations for why subjects selected their chosen contribution rates. A frequent explanation, especially provided by those with high chosen contribution rates, which may account for the higher contribution rate, was that there are limited competing financial responsibilities when being a single college graduate with no children – the scenario given in the survey.

Additionally, our results show that males have a tendency to shift their behavior towards the salient norm, whereas females have a tendency to consistently save more than the norm. As higher contribution rates involve a tradeoff where short-term resources are depleted in favor of long-term resources, these differences may be driven by gender variations in risk aversion and self-control. Females have been found to be more risk-averse than males, and exhibit more self-control, which may explain the increased sensitivity to (peer) information favoring short- or long-term outcomes for males or females, respectively. Females' higher self-control may negate the cost of foregoing income today in favor of a long-term gain, in turn converting the social norm into a minimum as opposed to a target. This is an avenue that should be addressed in future research, by identifying and incorporating self-control (e.g. Baumeister, 2002) and risk aversion (e.g. Hartog, Ferrer-i-Carbonell, & Jonker, 2002).

Lastly, we find that the peer effect in our financial decision-making scenario is more strongly and significantly moderated by a subject's susceptibility to informational influence than their susceptibility to normative influence. As susceptibility to normative influence has been shown to change behavior when socially visible benefits are present (Batra et al., 2001), it may very well be the private nature of the financial decision context and near-term outcomes limiting its moderating effect. Managers and policymakers may thus consider making the actions themselves, and consequences thereof, more socially salient for financial decisions to strengthen peer effects when favorable. Additionally, as a subject's susceptibility to both informational and normative influence declines with age, peer information is best used to influence younger subjects.

In conclusion, our findings demonstrate that peer effects work not only for proximal nudges, but also for more distal ones, while we do not find such evidence for an anchoring effect. Thus, anchors do not provide a viable, more cost-effective and flexible alternative to using peer behavior as a nudge in,

particularly more extreme, behavioral interventions. Our results differ from the anchoring effects expected based on prior research, and this puzzle of conflicted findings needs to be addressed in future research. Moreover, the research design should be further validated in the field and in additional, non-monetary contexts. We find strong gender effects in that women contribute more than the provided norms, even at high norm values. Consequently, institutions should utilize peer information as a channel to induce favorable behaviors through social norm conformity, even with more extreme reference values, while remaining vigilant that females not simply converge towards the norm, but exceed it.

References

- Allcott, H. (2011). Social norms and energy conservation. *Journal of Public Economics*, 95(9), 1082-1095.
- Azmat, G., & Iriberry, N. (2010). The importance of relative performance feedback information: Evidence from a natural experiment using high school students. *Journal of Public Economics*, 94(7), 435-452.
- Batra, R., Homer, P. M., & Kahle, L. R. (2001). Values, susceptibility to normative influence, and attribute importance weights: A nomological analysis. *Journal of Consumer Psychology*, 11(2), 115-128.
- Baumeister, R. F. (2002). Yielding to temptation: Self-control failure, impulsive purchasing, and consumer behavior. *Journal of Consumer Research*, 28(4), 670-676.
- Bearden, W. O., Netemeyer, R. G., & Teel, J. E. (1989). Measurement of consumer susceptibility to interpersonal influence. *Journal of Consumer Research*, 473-481.
- Bearden, W. O., Netemeyer, R. G., & Teel, J. E. (1990). Further validation of the consumer susceptibility to interpersonal influence scale. *Advances in Consumer Research*, 17(1), 770-776.
- Beshears, J., Choi, J. J., Laibson, D., Madrian, B. C., & Milkman, K. L. (2015). The effect of providing peer information on retirement savings decisions. *The Journal of Finance*, 70(3), 1161-1201.
- Bobek, D. D., Hageman, A. M., & Kelliher, C. F. (2013). Analyzing the role of social norms in tax compliance behavior. *Journal of Business Ethics*, 1-18.
- Borghans, L., Heckman, J. J., Golsteyn, B. H., & Meijers, H. (2009). Gender differences in risk aversion and ambiguity aversion. *Journal of the European Economic Association*, 7(2- 3), 649-658.
- Charness, G., & Gneezy, U. (2012). Strong evidence for gender differences in risk taking. *Journal of Economic Behavior & Organization*, 83(1), 50-58.
- Cialdini, R. B. (2001). Harnessing the science of persuasion. *Harvard Business Review*, 79(9), 72-81.
- Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual Review of Psychology*, 55, 591-621.
- Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, 58(6), 1015.
- Cialdini, R. B., & Trost, M. R. (1998). Social influence: Social norms, conformity and compliance. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (pp. 151-192). New York: McGraw-Hill.
- Cobiac, L., Vos, T., Doran, C., & Wallace, A. (2009). Cost-effectiveness of interventions to prevent alcohol-related disease and injury in Australia. *Addiction*, 104(10), 1646-1655.
- Daniel, W. W. (1990). *Applied Nonparametric Statistics*, 2nd ed. Boston: PKS-.

- Epley, N., & Gilovich, T. (2001). Putting adjustment back in the anchoring and adjustment heuristic: Differential processing of self-generated and experimenter-provided anchors. *Psychological Science*, 12(5), 391-396.
- Epley, N., & Gilovich, T. (2006). The anchoring-and-adjustment heuristic: Why the adjustments are insufficient. *Psychological Science*, 17(4), 311-318.
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, 7(2), 117-140.
- Garson, G. D. (2012). Testing statistical assumptions. *Asheboro, NC: Statistical Associates Publishing*.
- Gerrans, P., & Clark-Murphy, M. (2004). Gender differences in retirement savings decisions. *Journal of Pension Economics & Finance*, 3(2), 145-164.
- Glass, G. V., Peckham, P. D., & Sanders, J. R. (1972). Consequences of failure to meet assumptions underlying the fixed effects analyses of variance and covariance. *Review of Educational Research*, 42(3), 237-288.
- Goldstein, N. J., Cialdini, R. B., & Griskevicius, V. (2008). A room with a viewpoint: Using social norms to motivate environmental conservation in hotels. *Journal of Consumer Research*, 35(3), 472-482.
- Goodman, J. K., & Paolacci, G. (2017). Crowdsourcing consumer research. *Journal of Consumer Research*, 44(1), 196-210.
- Greenwald, L., Copeland, C., & VanDerhei, J. (2017). The 2017 Retirement Confidence Survey: Many Workers Lack Retirement Confidence and Feel Stressed About Retirement Preparations. EBRI Issue Brief, Number 431 (March 21, 2017). Available at SSRN: <https://ssrn.com/abstract=2941583>
- Grinstein-Weiss, M., Perantie, D. C., Russell, B. D., Comer, K., Taylor, S. H., Luo, L., . . . Ariely, D. (2015). Refund to Savings 2013: Comprehensive report on a large-scale tax-time saving program. *Brookings Institution, Washington, DC*. <http://www.brookings.edu/research/reports/2015/03/taxtime-savings-program>.
- Hartog, J., Ferrer-i Carbonell, A., & Jonker, N. (2002). Linking measured risk aversion to individual characteristics. *Kyklos*, 55(1), 3-26.
- Hershfield, H. E., & Roese, N. J. (2015). Dual payoff scenario warnings on credit card statements elicit suboptimal payoff decisions. *Journal of Consumer Psychology*, 25(1), 15-27.
- Hoffmann, A. O., & Broekhuizen, T. L. (2009). Susceptibility to and impact of interpersonal influence in an investment context. *Journal of the Academy of Marketing Science*, 37(4), 488-503.
- Horton, J. J., Rand, D. G., & Zeckhauser, R. J. (2011). The online laboratory: Conducting experiments in a real labor market. *Experimental Economics*, 14(3), 399-425.
- Howell, D. C. (2012). *Statistical methods for psychology*: Cengage Learning.
- Jones, L. E., Loibl, C., & Tennyson, S. (2015). Effects of informational nudges on consumer debt repayment behaviors. *Journal of Economic Psychology*, 51, 16-33.
- Kruskal, W. H., & Wallis, W. A. (1952). Use of ranks in one-criterion variance analysis. *Journal of the American Statistical Association*, 47(260), 583-621.
- Laasch, O., & Conaway, R. (2009). Gender differences in preferences. *Journal of Economic Literature*, 47(2), 448-474.
- Levene, H. (1960). Robust tests for equality of variances. *Contributions to Probability and Statistics: Essays in Honor of Harold Hotelling*, 2, 278-292.
- Martin, T. (2017). The Champions of the 401(k) Lament the Revolution They Started. *The Wall Street Journal*. Retrieved from <http://www.wsj.com/articles/the-champions-of-the-401-k-lament-the-revolution-they-started-1483382348>
- Mayers, A. (2013). *Introduction to statistics and SPSS in psychology*: Pearson.
- Mussweiler, T., & Englich, B. (2005). Subliminal anchoring: Judgmental consequences and underlying mechanisms. *Organizational Behavior and Human Decision Processes*, 98(2), 133-143.
- Nakhaie, M. R., Silverman, R. A., & LaGrange, T. C. (2000). Self-control and social control: An examination of gender, ethnicity, class and delinquency. *Canadian Journal of Sociology/Cahiers canadiens de sociologie*, 35-59.

- Navarro-Martinez, D., Salisbury, L. C., Lemon, K. N., Stewart, N., Matthews, W. J., & Harris, A. J. (2011). Minimum required payment and supplemental information disclosure effects on consumer debt repayment decisions. *Journal of Marketing Research*, 48(SPL), S60-S77.
- Panagopoulos, C., Larimer, C. W., & Condon, M. (2012). *Social pressure, descriptive norms, and voter mobilization*. Paper presented at the APSA 2012 Annual Meeting.
- Paolacci, G., Chandler, J., & Ipeirotis, P. G. (2010). Running experiments on Amazon Mechanical Turk. *Judgment and Decision Making*, 5(5), 411-419.
- Pearson, K. (1895). Note on regression and inheritance in the case of two parents. *Proceedings of the Royal Society of London*, 58, 240-242.
- Ridout, B., & Campbell, A. (2014). Using Facebook to deliver a social norm intervention to reduce problem drinking at university. *Drug and Alcohol Review*, 33(6), 667-673.
- Salisbury, L. C. (2014). Minimum payment warnings and information disclosure effects on consumer debt repayment decisions. *Journal of Public Policy & Marketing*, 33(1), 49-64.
- Sapienza, P., Zingales, L., & Maestripieri, D. (2009). Gender differences in financial risk aversion and career choices are affected by testosterone. *Proceedings of the National Academy of Sciences*, 106(36), 15268-15273.
- Schultz, P. W. (1999). Changing behavior with normative feedback interventions: A field experiment on curbside recycling. *Basic and Applied Social Psychology*, 21(1), 25-36.
- Shapiro, S. S., & Wilk, M. B. (1965). An analysis of variance test for normality (complete samples). *Biometrika*, 52(3/4), 591-611.
- Shogren, J. F., Fox, J. A., Hayes, D. J., & Roosen, J. (1999). Observed choices for food safety in retail, survey, and auction markets. *American Journal of Agricultural Economics*, 81(5), 1192-1199.
- Smith, A. R., & Windschitl, P. D. (2011). Biased calculations: Numeric anchors influence answers to math equations. *Judgment and Decision Making*, 6(2), 139.
- Speelman, C. P., Clark-Murphy, M., & Gerrans, P. (2013). Decision making clusters in retirement savings: Gender differences dominate. *Journal of Family and Economic Issues*, 1-11.
- Steinberg, L., & Monahan, K. C. (2007). Age differences in resistance to peer influence. *Developmental Psychology*, 43(6), 1531.
- Stewart, N. (2009). The cost of anchoring on credit-card minimum repayments. *Psychological Science*, 20(1), 39-41.
- Thaler, R. H., & Benartzi, S. (2004). Save more tomorrow™: Using behavioral economics to increase employee saving. *Journal of Political Economy*, 112(S1), S164-S187.
- The Vanguard Group. (2016). *How America saves 2016: Vanguard 2015 defined contribution plan data*. Retrieved from https://pressroom.vanguard.com/nonindexed/HAS2016_Final.pdf
- Thomas, C., & Sharp, V. (2013). Understanding the normalisation of recycling behaviour and its implications for other pro-environmental behaviours: A review of social norms and recycling. *Resources, Conservation and Recycling*, 79, 11-20.
- Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185(4157), 1124-1131.
- U.S. Department of Labor. (2014). *Private Pension Plan Bulletin*. Retrieved from <http://www.dol.gov/ebsa/pdf/2011pensionplanbulletin.pdf>.
- Van Der Linden, S. (2015). Exploring beliefs about bottled water and intentions to reduce consumption: The dual-effect of social norm activation and persuasive information. *Environment and Behavior*, 47(5), 526-550.
- Wansink, B., Kent, R. J., & Hoch, S. J. (1998). An anchoring and adjustment model of purchase quantity decisions. *Journal of Marketing Research*, 71-81.
- Wilcoxon, F. (1945). Individual comparisons by ranking methods. *Biometrics Bulletin*, 1(6), 80-83.

Tables

Table 1

Results study 1.

Treatment group	Numerical value provided	N	Mean contribution rate (S.D.)	Mean absolute distance to the 11% norm/anchor (S.D.)
Control	N/A	102	12.41 (8.93)	6.14 (6.62)
Anchor	11%	93	10.27 (5.41)	3.70 (3.00)
Peer	11%	100	12.05 (5.22)	4.55 (3.78)

Notes: This table shows the results from study 1, that is, the mean contributions rate and mean absolute distance to the norm/anchor.

Table 2

Results study 2.

Treatment group	Numerical value provided	N	Mean contribution rate (S.D.)	Mean absolute distance to the 8% norm/anchor (S.D.)	Mean absolute distance to the 16% norm/anchor (S.D.)
Control	N/A	97	11.67 (8.33)	5.90 (6.92)	7.90 (5.03)
Peer low	8%	93	8.83 (4.15)	2.91 (3.06)	N/A
Anchor low	8%	98	10.74 (6.86)	4.59 (5.77)	N/A
Non-social anchor low	8%	97	10.60 (7.42)	7.88 (4.68)	N/A
Peer high	16%	92	15.51 (6.12)	N/A	4.58 (4.06)
Anchor high	16%	91	11.35 (8.15)	N/A	7.88 (5.04)
Non-social anchor high	16%	95	11.54 (8.97)	N/A	5.97 (7.59)

Notes: This table shows the results from study 2, that is, the mean contributions rate and mean absolute distance to the norm/anchor for different numerical values provided to subjects.

Table 3

Mean male and female contribution rates in study 2.

Treatment group	Numerical value provided	N (N male, N female)	Mean contribution rate for males (S.D.)	Mean contribution rate for females (S.D.)
Control	N/A	97 (50, 47)	11.02 (7.91)	12.36 (8.79)
Peer low	8%	93 (52, 41)	8.10 (3.72)	9.76 (4.52)
Anchor low	8%	98 (54, 44)	10.17 (5.75)	11.43 (8.04)
Non-social anchor low	8%	97 (56, 41)	8.98 (5.75)	12.81 (8.84)
Peer high	16%	92 (46, 46)	13.26 (5.50)	17.76 (5.92)
Anchor high	16%	91 (52, 39)	10.54 (7.34)	12.44 (9.09)
Non-social anchor high	16%	95 (60, 35)	12.12 (9.89)	10.54 (7.13)

Notes: This table shows the results from study 2, that is, the mean contributions rate and mean absolute distance to the norm/anchor for different numerical values provided to subjects. *M designates male, F designates female subjects.

Appendix

Table 4

Study 1 hypothetical retirement savings scenario.

[control]

Please imagine the following:

You have just graduated from ABC college and have landed your first job, earning you an annual gross salary of USD 45,000. You are single and have no children, and are therefore able to allocate this salary as you wish.

The 401(k) pension scheme that you are enrolled in allows you to define your own contribution rate for your pension. The contribution rate is the percentage of your annual salary that you invest into your pension. Assume that your company does not provide any contribution to your pension.

[anchoring effect treatment]

Other recent ABC college graduates contribute 11% of their salary to their pension fund.

[peer effect treatment]

Among ABC college graduates, 11% have a similar job.

[dependent variable: contribution rate requested]

What percentage of your salary would you contribute to your pension?

Table 5

Study 2 hypothetical retirement savings scenario.

[control]

Please imagine the following:

You have just graduated from ABC college and have landed your first job, earning you an annual gross salary of USD 45,000. You are single and have no children, and are therefore able to allocate this salary as you wish.

The 401(k) pension scheme that you are enrolled in allows you to define your own contribution rate for your pension. The contribution rate is the percentage of your annual salary that you invest into your pension. Assume that your company does not provide any contribution to your pension.

[study 1 anchoring effect treatment low]

Other recent ABC college graduates contribute 8% of their salary to their pension fund.

[study 1 anchoring effect treatment high]

Other recent ABC college graduates contribute 16% of their salary to their pension fund.

[non-social anchoring effect treatment low]

You have completed 8% of the survey so far.

[non-social anchoring effect treatment high]

You have completed 16% of the survey so far.

[peer effect treatment low]

Among ABC college graduates, 8% have a similar job.

[peer effect treatment high]

Among ABC college graduates, 16% have a similar job.

[dependent variable: contribution rate requested]

What percentage of your salary would you contribute to your pension?
