JMR

The Illusion of Wealth and its Reversal

Journal:	*Journal of Marketing Research*
Manuscript ID:	Draft
Manuscript Type:	Special Issue New Submission
Topics and Methods:	Behavioral Economics < Theoretical Foundation, Soc/Cognitive Psychology < Theoretical Foundation, Consumer behavior < Theoretical Foundation, Lab experiments < Method of discovery, Field experiments < Method of discovery, Public policy, legal < Substantive area

SCHOLARONE™
Manuscripts

THE ILLUSION OF WEALTH AND ITS REVERSAL

ABSTRACT

Research on choice architecture is now shaping policy around the world, touching on areas ranging from retirement economics to environmental issues. Recently, researchers and policy makers have started to pay more attention not just to choice architecture but also to information architecture: the format in which information is presented to people. Here, we investigate information architecture as it applies to consumption in retirement. Specifically, in four experiments, we examine how people react to lump sums versus equivalent streams of monthly income. Our primary question of interest is whether people exhibit an "illusion of wealth" by which a lump sum at retirement age (e.g., $100,000) seems larger than its monthly equivalent (e.g., $500 per month for life). We predict and test whether people exhibit the illusion of wealth as well as the opposite effect, by which lump sums seem smaller than their monthly equivalents. We conclude by discussing how format-dependent perceptions of wealth might drive retirees to claim social security benefits too early, avoid purchasing an annuity, or to cash out their defined benefit pensions.

Key words: judgment and decision making, annuities, prospect theory, illusion of wealth

Research on choice architecture is now shaping policy around the world (Thaler & Sunstein 2008; Goldstein et al. 2008) touching on areas ranging from retirement economics (Benartzi & Thaler 2013), organ donation (Johnson & Goldstein 2003; Boseley 2013), end-of-life care (Halpern, Ubel, Asch 2007; Halpern et al. 2013), to environmental issues (Pichert & Katsikopoulos 2008). Recently, researchers and policy makers have started to pay more attention not just to choice architecture but also to information architecture: the format in which information is presented to people (Johnson et al. 2012). Research in information architecture has shown, for example, that the caloric content of food can be well appreciated in terms of the amount of exercise it would take to work calories off (Bleich & Rutkow 2013; Dowray et al. 2013), and the comprehension of cars' energy efficiency can be enhanced by presenting information in terms of gallons per 100 miles instead of miles per gallon (Larrick & Soll 2008). This paper investigates information architecture, though instead of addressing the consumption of calories or gasoline, we focus on economic consumption in retirement.

A timely policy debate concerns the information provided to the owners of approximately 80 million 401k retirement accounts. We focus on the Department of Labor (DOL) proposal that 401k statements display the money's worth of the account in terms of the projected lifetime *income* that the account can buy (Lifetime Income Disclosure Act 2011).

From a research perspective, our motivation is to investigate how people react to lump sums versus equivalent streams of monthly income. One question of interest is whether people exhibit an "illusion of wealth" by which a lump sum at retirement age (e.g., $100,000) seems larger than its monthly equivalent (e.g., $500 per month for life). We predict and test whether people exhibit the illusion of wealth as well as the opposite effect, by which lump sums seem smaller than their monthly equivalents. We also test for the illusion of wealth effect in a field

study. Observing the illusion of wealth and its reversal are not crucial for validating the hypothesis we shall present, they are simply side effects of the underlying cognitive process and will exist only in the right market conditions. Nonetheless, the illusion of wealth is of practical interest, as it should apply to the situation faced by many people saving for retirement.

From a policy perspective, our motivation is to inform policy makers about how different information architectures affect investor behavior. Does one form of disclosure result in an illusion of wealth for many people? And, does such an illusion of wealth result in people planning to save less?

The paper is organized as follows: We first motivate our hypotheses via a simple psychophysical account of how people make format-dependent judgments of adequacy of wealth in retirement, and present three empirical studies which lend support to the predictions. We then report on a field experiment in which we test for an illusion of wealth in employees saving for retirement. We conclude the paper by discussing how format-dependent perceptions of wealth might drive retirees to claim social security benefits too early, avoid purchasing an annuity, or to cash-out their defined benefit pensions.

WEALTH PERCEIVED AS A LUMP SUM OR A MONTHLY INCOME

It is common in behavioral-economic models that perceptions of monetary amounts are discounted by taking logs or powers, such as through the Weber-Fechner law (Fechner 1860) or Stevens' (1975) law from psychophysics. For example, in a host of models of intertemporal choice (see Doyle 2013) and risky choice (e.g., Prospect Theory, Kahneman and Tversky 1979), valuations of gains are convex functions of their monetary amounts. Following in this tradition,

if W is an amount of wealth, V is its perceived value, and c and k are free parameters, we assume

the descriptive V = c+ k log(W), in the Weber-Fechner spirit. We make use of the log

relationship for simplicity but a host of other functional forms (e.g., Steven's law) would serve

our purposes just as well. The parameter k in the log model reflects sensitivity to changes in log

wealth and might vary from domain to domain. In domains in which *k* is low, people are less

sensitive to changes in log wealth compared to domains in which *k* is higher.

We next observe that a given amount of wealth at retirement age can be thought of as a

lump sum (e.g., $100,000) or an equivalent annuity payment (e.g., $500 per month for life). We

test whether the format of monetary information, monthly payment or lump sum, matters for

judgments of adequacy for retirement. Specifically, we test whether people are more sensitive

(higher k*)* to changes in wealth expressed as monthly amounts compared to when they are

expressed as lump sums as expressed in Figure 1. More wealth is more satisfactory regardless of

how it is expressed; however, people are more sensitive to changes in wealth when it is

expressed in monthly terms. This greater sensitivity is reflected in a steeper function of log

wealth (higher k) relative to the flatter response (lower k) for the lump sum.

While we find that logistic-response and concave-convex models like Prospect Theory do

fit the sigmoid nature of our data well, in what follows we make use of the log model for

simplicity and ease of interpretation.

We propose that the sensitivity k is greater for monthly amounts than lump sums. We

motivate this hypothesis using Decision by Sampling theory (Stewart, Chater, and Brown 2006),

a relative of Range-Frequency Theory (Parducci 1965), under which the subjective,

psychological value of a monetary amount is essentially its percentile rank within a sample. The

sample differs according to context. For judging the adequacy of a monthly income amount, the

relevant sample could be the distribution of monthly incomes in society. For judging the

adequacy of a lump sum amount, the relevant sample could be the distribution of net worths in

society. The idea that lump sums and monthly payments might be compared against different

reference distributions is supported by research on "pennies a day" framing in marketing, which

finds that people presented with small expenditures tend to retrieve other small expenditures

from memory, while people presented with large expenditures tend to retrieve other large

expenditures (Gourville 1998). Both real-world distributions are assumed to be reflected in a

respondent's memory. As shown in Figure 2, under Decision by Sampling, people should be

more sensitive to changes in annuity payments than to changes in corresponding lump sums

because the changes in annuity payments imply greater movement in the income distribution

than changes in lump sums imply in the net worth distribution.

Our primary prediction concerns the sensitivity (change in satisfaction) for lump sums as

compared to monthly amounts. The vertical positioning of the curves relative to each other

(including any crossing over to create an illusion of wealth, as in Figure 1) is of secondary

interest as it depends on the current price of annuities. Nonetheless, such crossing over could

exist in realistic settings, as we shall show, and could be consistent with observed patterns of

saving for retirement.

We note that we do not explicitly test whether Decision by Sampling theory is the best

fitting model to explain our results. Indeed, Decision by Sampling is not the only explanation for

the effects we examine, but it is certainly consistent with them. There are other lines of

explanation, not necessarily independent, that might account for heightened sensitivity to

monthly amounts. For instance, one might posit that monthly amounts evoke greater sensitivity

because they are easier to compare to reference expenditures (e.g., paying one's monthly rent,

car payments or bills), or because they are more elaborate, vivid representations that facilitate

simulating the future (Bartels & Rips 2010; Hershfield et al. 2011; Nenkov, Inman and Hulland

2008; Pronin, Olivola, and Kennedy 2008; Trope and Liberman 2003; Urban et al. 1997). Other

lines of explanation are possible, however, we will focus on a descriptive account, and

importantly, draw on Decision by Sampling theory to motivate our hypotheses.

In related work, Goda, Manchester, and Sojourner (2013), presented 17,000 employees

with projected effects of increasing savings rates, expressed either in terms of total accumulation

at retirement or total accumulation at retirement *in addition to* monthly income projections. They

found that the addition of projected monthly incomes increased saving rates relative to those who

only saw projected total accumulations. This study shows that projected monthly income may be

motivating for some employees. We build upon it by isolating the effects of lump sums and

monthly amounts, testing for differential sensitivity, as well as the reversal of the illusion of

wealth effect.

In what follows, we investigate empirically whether different presentation modes affect

perceived adequacy with retirement income and intentions to change saving behavior. We

examine the impact of presentation mode at a variety of income levels to determine whether the

illusion of wealth holds regardless of monetary amount, or whether it reverses at higher levels.

Finally, we conduct a field study to test whether information formats affect actual savings

decisions.

STUDY 1: WITHIN-PARTICIPANT PERCEPTIONS OF ADEQUACY

As an initial examination into format-dependent perceptions of wealth, we asked a

sample of adults how adequate they thought a series of increasing monetary amounts would be

for retirement. Crucially, one group of participants saw monetary amounts expressed as a lump

sum, and the other half saw these same monetary amounts expressed as monthly income that

they could receive in retirement.

Method

A sample of 310 adults was recruited via Mechanical Turk (M_{age} = 28.37, SD = 10.21,

Range 18-68, 40.3% women). Participants were paid $.20 for completing the survey. We used a

2(Presentation: lump sum, annuity) x 7(Amount: $25,000, $50,000, $100,000, $200,000,

$400,000, $800,000, $1,600,000) mixed design, with presentation as the between-subjects factor

and amount as a within-subjects factor. All participants were asked to imagine that for each listed

amount of money, they had that amount – and only that amount – of money to spend during

retirement. They were also asked to assume that they did not own a house, and did not have any

money or assets to spend beyond what was listed. Participants were then shown a table with

seven monetary amounts (as noted above), and asked to rate how adequate each amount would

be on a seven-point scale (anchored at "totally inadequate" and "totally adequate").

In the lump sum condition, participants were asked to imagine that they would have a

total of $25k/ $50k/100k/$200k/$400k/$800k/$1.6m. In the annuity condition, however,

participants were asked to imagine that they would have

$160/$319/$639/$1,277/$2,554/$5,108/$10,217 per month in retirement. To calculate annuity

amounts, we used an online annuity calculator, which solves for monthly periodic payment with

a given premium amount (e.g., $25,000, $50,000, etc.) and a rate of annual income increase of

3%. Payments are assumed to be made until the death of the annuitant. For uniformity, we fixed

the age of the person receiving the annuity quote in all cases to be 68. From the 310 respondents, we eliminate 32 participants who provided ratings that were not monotonically increasing (e.g., rating $25,000 as more adequate than $50,000), leaving the sample of 278 we analyze.

Results and Discussion

Figure 3 depicts the means and standard errors at all 7 wealth levels and 2 presentation formats. In line with predictions, the response curve is flatter for lump sums and more responsive for annuities. At the lower wealth levels, there is a pronounced "illusion of wealth" with annuities associated with lower satisfaction. Also as predicted, this effect reverses at higher wealth levels, where annuities are perceived as more satisfactory. The steeper slope associated with annuities is apparent in a simple regression in which there is a positive interaction between wealth level and presentation format, as shown in Models 2 and 3 in Table 1. A further ANOVA model comparison shows that the Model 2 (and necessarily Model 3) fits significantly better than Model 1, which lacks a presentation format dummy ($p < 10^{-6}$); Model 2 also fits better than a model that does not interact presentation format and lump sum equivalent ($p < 10^{-6}$).

STUDY 2: BETWEEN-PARTICIPANT PERCEPTIONS OF ADEQUACY

In Study 2, we sought to replicate the findings of Study 1, but with four changes. First, the within-subjects nature of Study 1 could have caused participants to falsely report different levels of adequacy among monetary amounts. That is, having to make explicit comparisons among monetary amounts may have inflated any perceived differences in adequacy. Accordingly, Study 2 was conducted as a between-subjects experiment. Second, in Study 2 we sought to recruit participants who were close to retirement age, and for whom such decisions

were meaningful. Third, rather than excluding participants based on their responses, we instead

employed an instructional manipulation check to more objectively measure attention. Fourth, we

used a simple but accurate rule for converting between lump sum and annuity amounts that

presents both as round numbers (multiple of at least $500) to remove the confound between

presentation format and roundness of numerical figures, which could be problematic because

round numbers have been shown to appeal to investors (Bhattacharya, Holden and Jacobsen

2012).

Method

A sample of 960 middle-aged respondents was recruited via a national survey panel (M_{age}

= 53.70, SD = 5.28, Range 45-64, 52% women). Participants were paid $5 for completing the

study online. To be eligible for participation, participants needed to have an annual household

income between $40,000 and $150,000.

All participants first responded to demographic questions: gender, age, amount of

household income (16 categories: "$0-$9,999",…, "More than $160,000"). To minimize the

effects of careless responding, an attention filter (Oppenheimer, Meyvis, and Davidenko 2009)

was administered next. If participants were outside of the specified income or age range, or

failed the attention filter, they were not permitted to continue with the survey (and were paid

$.10 for their time). The 960 participants we analyze are those who were in the specified age

ranges and passed the attention filter.

Participants were then randomly assigned to one of eight conditions. We used a

2(Presentation: lump sum, annuity) x 4(Amount: $100,000, $200,000, $1,000,000, $2,000,000)

between-subjects factorial design. In all conditions, participants were asked to imagine that they

had saved enough money over time to have a specified amount to spend in retirement. Namely,

in the four lump sum conditions, participants were asked to imagine that they would have "a total

of $100k/$200k/$1m/$2m – and only this amount – to spend during your retirement." In the four

annuity conditions, however, participants were asked to imagine that they would have

"$500/$1k/$5k/$10k – and only this amount – to spend each month during your retirement." As

mentioned, we calculated annuity amounts using a simpler formula than we did in Study 1. We

divided each lump sum payment by 200, a well-fitting approximation ($R^2 = .99$) based on quotes

we collected from 5 online annuity calculators, including one from the U.S. Government's Thrift

Savings Plan. To allay concerns that quoted annuity rates may reflect considerable fees on the

part of providers, we found that quotes from various providers were highly similar to each other

and to the government's quotes. For example, the average commercial quote for a 2 million

dollar annuity was within 1 percent of the government calculator's quote.

After reading the description of how much money they would hypothetically have in

retirement, all participants were asked to indicate how adequate they thought this amount was

using a seven-point scale that ranged from "totally inadequate" to "totally adequate".

Results and Discussion

Figure 4 depicts the means and standard errors at all 4 wealth levels and 2 presentation

formats. The results are consistent with those of the within-participant analysis. In particular, as

predicted, annuities are more sensitive than lump sums as the underlying value changes. As

before, there is an "illusion of wealth" at low wealth levels: annuities seem less satisfactory than

equivalent lump sums. And as before, the illusion reverses at higher wealth levels where lump

sums are perceived as less satisfactory. The higher sensitivity to annuities can be seen in a

regression analysis. Models 5 and 6 in Table 2 show that there is a strong interaction between

wealth level and presentation format. The only notable difference between the between- and

within- participant studies is the crossover point, which occurs at around $200,000 in Study 1 (Figure 3) but somewhat higher in Study 2 (Figure 4). This may be due to participants in the within-participants study attempting to distribute Likert-scale responses across the possible range (Parducci and Perrett 1971). For example, $200,000 is the middle value presented to participants in the within-participant study, where it received a middling response of about 3.8, however participants in the between-participants study rated it lower. The exact location of the crossover point will depend on market rates for annuities and as we see here, response format. We note that our prediction concerns differences in sensitivity to annuities as compared to lump sums, not if and where a crossover occurs. As it turns out, crossovers do seem to occur for the market rates and presentation formats we test, making the illusion of wealth and its reversal relevant policy concerns.

We conducted a further ANOVA model comparison and found that Model 5 (and necessarily Model 6) fits significantly better than Model 4, which lacks a presentation format dummy ($p < 10^{-6}$) or a model that does not interact presentation format and lump sum equivalent ($p < 10^{-6}$).

STUDY 3: SAVING INTENTIONS

Having demonstrated that presentation format affects perceptions of adequacy, we next examined whether potential monetary amounts expressed as lump sums or annuities would also influence saving intentions.

Method

A sample of 960 middle-aged respondents was recruited via a national survey panel (M_{age} = 54.21, SD = 5.79 years, Range 45-65, 17% women). Participants were paid $5 for completing the study online. As a pre-requisite, participants could not have taken part in Study 2. Further, as in Study 2, to be eligible for participation, participants needed to have an annual household income between $40,000 and $150,000, pass an attention filter, and be between 45 and 65 years old. Due to server error, one participant was prematurely exited from the survey, leaving a total sample of 959 participants.

After responding to demographic questions (age, household income) and the attention filter, participants were randomly assigned to one of eight conditions. As in Study 1, we used a 2(Presentation: lump sum, annuity) x 4(Amount: $100,000, $200,000, $1,000,000, $2,000,000) between-subjects factorial design. In the lump sum conditions, participants were asked to "Suppose that at your current savings rate you would have saved $100k / $200k / $1m / $2m for retirement in your 401(k) plan by age 65." The question was identical in the annuity conditions, except that participants were asked to imagine they had saved enough to pay them "$500 / $1k / $5k / $10k per month for as long as you live." All participants were asked if they would want to increase their savings rate, keep it the same, or decrease it on a five-point scale ("decrease it a lot," "decrease it a bit," "keep it the same," "increase it a bit," or "increase it a lot").

Results and Discussion

Figure 5 shows savings intentions as they relate to amounts of wealth expressed as either a lump sum or as an annuity. Here, higher values indicate greater intentions to increase savings. As would be expected from the results on perceived adequacy, peoples' saving intentions are more sensitive to wealth expressed as monthly amounts (the steeper negative slope in the annuities curve) relative to lump sums. When presenting information in the annuity format,

intentions to save are greater at low wealth levels and lower at high wealth levels. That is, we see

an effect corresponding to the illusion of wealth and its reversal with savings intentions. Mean

saving intentions values run from just above 3 to just below 4.5. Because the third response

category corresponded to keeping savings levels the same, we see that, on average, people in all

conditions intended to increase savings somewhat, consistent with the notion that many people

feel they are saving too little for retirement.

When modeling the intention to save, Models 8 and 9 in Table 3 show a significant

interaction between the presentation format and the lump sum equivalent. A model comparison

ANOVA finds that Model 8 (and necessarily Model 9) fits better than Model 7 ($p = .02$), which

lacks a presentation format term. Model 8 also fits better than a model that does not interact

presentation format and lump sum equivalent ($p = .02$).

STUDY 4: FIELD EXPERIMENT

In Study 4, we examined whether findings from Study 3 would replicate with

consequential decisions. Specifically, we partnered with a financial advisory firm and instructed

the firm's advisors to discuss projected retirement wealth with their clients as either an

annuitized stream of money or a lump sum. After doing so, advisors then presented clients with

the option to change their saving rate. We measured whether clients made a change to their

saving rate, and if so, by how much.

Method

One-hundred and thirty-nine clients ($M_{age} = 51.40$, $SD_{age} = 8.67$ years, Age Range: 22-67,

32% women) of a mid-sized financial advisory firm were approached by their financial advisor

(via phone) to discuss making changes to their retirement accounts. Annual income of the clients

ranged from $16,000 to $600,000 with a median of $105,000; retirement account balances

ranged from $3,000 to $1,950,000 with a median of $361,344; and, saving rates ranged from 0%

to 35%, with a median of 12%. Nine financial advisors took part in the study. To eliminate bias,

a script was developed to which each advisor adhered during their phone calls. Clients were

randomly assigned to one of two conditions (lump sum versus annuity), and heard the following

from their advisor [lump sum condition instructions in brackets]:

> "Thank you for scheduling time with me today to review the retirement plan I've put together
> for you. As you can see, if we continue on the current course you will have a projected
> income of $xx per month [account balance of $xx] by the time you retire. There are basically
> three variables that affect that outcome:
>> Length of time you work,
>> Your account's rate of return over that time, and
>> Your savings or contribution rate into the account."

Projected account balance and projected monthly income were calculated using the following

assumptions: 1) Calculation starting point was the client's current 401(k) balance, 2) Current

deferral rate would be maintained through age 67 with 3% annual cost of living adjustment, 3)

Portfolio rate of return will be 7%, and 4) Retirement income is based on 4.5% of asset base at

retirement age of 67. Advisors then asked clients whether they knew their current savings rate. If

the client did not know it, or if they answered incorrectly, the financial advisor told them the

accurate amount. Next, advisors said:

> "Now that we've established your actual savings rate, would you like to change it? If so,
> what would you like your new savings rate to be?

If the client wished to make a change to his or her savings rate, the advisor recorded it and filled

out the necessary paperwork.

Results and Discussion

As a check of random assignment, we first examined whether there were any systematic

differences between conditions on demographic variables. No differences were found for gender

(Control: 66% male; Experimental: 71% male; $\chi(1, N = 139) = 0.45$, $p = .50$), age (Control: M =

51.91 years, SD = 8.76 years; Experimental: 50.88 years, SD = 8.61 years; $t(137) = .70$, $p = .49$),

salary (Control: M = \$124,092, SD = \$72,245; Experimental: M = \$109,510, SD = 32,118;

$t(95.55) = 1.54$, $p = .13$), and current retirement balance (Control: M = 457,055, SD = 380,795;

Experimental: \$453,634, SD = 365,658; $t(137) = 0.05$, $p = .96$. There was, however, a significant

difference between existing saving rates, such that those in the experimental condition had a

higher saving rate (M = 13.58%, SD = 6.19%) than those in the control condition (M = 11.53%,

SD = 5.67%), $t(137) = 2.04$, $p = .04$. Given that all other measured demographic factors showed

no differences between conditions, we suspect that this weak difference in saving rates was a

random occurrence. Furthermore, if anything, a higher existing saving rate in the experimental

condition creates a conservative test of our hypothesis in that it should be theoretically more

difficult to enhance saving for people who are already saving at a higher rate. We nonetheless

control for saving rate in the analysis below.

To examine whether presentation format affected the proportion of people who made a

change to their savings accounts, we conducted a chi-square analysis. We found that more people

in the annuity condition (36.2%) made a change compared to those in the lump sum condition

(21.4%), $\chi(1, N = 139) = 3.72$, $p = .05$.

Next, we regressed new saving rate on condition (coded as 0 = lump sum and 1 =

annuity). Echoing the findings from Study 3, and shown in Table 4, Model 10, we observed a

significant effect of condition, such that those in the annuity condition had significantly higher

saving rates (M = 14.96%, SD = 5.91%) compared to those in the lump sum condition (M =

12.27%, SD = 5.63%), p = .007. When controlling for existing savings rate, condition remained a

significant predictor of new savings rate (p = .017; Model 11). Similarly, when controlling for

age and salary, condition remained a significant predictor (p = .03; Model 12).

Accordingly, in the present study, we find an illusion of wealth in that people are not only

more likely to make a change to their saving rate when presented with a projected monthly

income stream versus a lump sum, but also to have a higher saving rate. These findings are

consistent with the idea that people are more sensitive to monetary amounts when they are

expressed as monthly streams than lump sums.

In Studies 1-3, though, we also found that the different sensitivities to monetary

presentation resulted in a significant interaction between the two presentation formats: a

crossover point existed after which large monthly streams were perceived as more adequate and

less likely to prompt saving changes than equivalently large lump sums. For example, in Study 3,

which examined saving intentions, we found that these different sensitivities produced a

crossover point at approximately $1.25m: annuitized streams prompted higher saving intentions

than lump sums below this threshold, and lump sums prompted higher saving intentions above

this threshold. In the current study, a similar interaction would be found if projected retirement

balance moderated the effect of income presentation on saving rates. To examine whether this

was the case, we regressed new saving rate on condition, the projected balance at retirement, and

their interaction, controlling for age, salary, and current saving rate. As shown in Table 4, Model

13, condition remains a significant predictor of new saving rate (p = .02). The interaction

between projected balance and condition was in the predicted direction, though not significant (p

= .15). In the previous studies we examined hypothetical decisions, but in the present study we

examined consequential choices. Given the gap between intentions and behavior when it comes

to savings decisions and the relatively small number of people who actually make changes to

their retirement accounts in experimental studies (Choi et al. 2006), it is possible that a larger

sample is needed for enough power to detect a significant interaction between projected balance

and presentation format (i.e., a reversal in the illusion of wealth).

GENERAL DISCUSSION

Studies 1, 2 and 3 support the possibility of an illusion of wealth and its reversal at higher

monetary amounts. For smaller amounts of money, we found that middle-aged adults felt that a

lump sum would be more adequate for retirement than an equivalent monthly annuity. They were

also less likely to want to increase their saving behavior when exposed to a lump sum rather than

an annuitized amount. We predicted and found a reversal of this pattern for larger amounts of

money, consistent with the view that people are more sensitive to amounts expressed as

annuities, and less sensitive to lump sums, which they tend to assign intermediate ratings.

Additional research is needed to explore the effect of these findings not just on saving

intentions, but also on key decisions around the point of retirement, such as whether or not to

cash out one's defined benefit pension. We speculate that some retirees at lower wealth levels

opt to forego annuities in exchange for lump sums because the lump sum appears larger than the

monthly pension payments. Clearly more research is needed in this area given that: i) people are

living longer than they have before, ii) many defined benefit pensions now offer benefits as a

large lump sum, and iii) the fact that about 50 percent of retirees do cash out their pensions

(Benartzi, Previtero, and Thaler 2011).

The results on the perceived adequacy of lump sums versus equivalent monthly streams

of income might contribute to our understanding on the so-called "annuity puzzle" (Yaari 1965; Benartzi et al. 2011). If people perceive small lump sums as much bigger than they are, then exchanging them for what seems to be very-small monthly payments would be unappealing. Some stylized facts are consistent with the reversal of the illusion of wealth affecting annuity purchase decisions. For example, we predict that annuities become more attractive the larger the amount at stake. An analysis of archival data from defined benefit plans shows that retirees are less likely to cash out their benefits as a lump sum payment, if their total benefits are rather large (Previtero 2014). An increase in the benefit amount of $100,000 increases the likelihood of annuitization by 3.3 percentage points. Of course, more research is needed to determine whether those cashing out their pensions as a lump sum are making a mistake in cashing out their pensions and to what extent such a potential mistake is driven by the illusion of wealth or other factors. This is an important and timely question, given many firms are offering retirees the choice to cash out their defined benefit pensions as a lump sum.

Lastly, and of social importance, the illusion of wealth might also contribute to the tendency of Americans to claim their social security benefits early on with over 40-50% claiming at 62, the earliest possible age (Social Security Administration 2012, Table 6.B5). Given the very attractive economics of claiming later (Sass 2012), one wonders if the elderly are making a mistake in claiming too early. Until not too long ago, the social security administration had a tool that attempted to help older Americans decide when to claim their social security benefits by displaying the amount forfeited by not claiming at 62 and waiting a year to age 63 (say $21,492) versus the monthly increase for those waiting till 63 (say $119 per month). Applying the illusion of wealth, the lump sum loss of $21,492 is perceived much larger than the monthly increase in lifetime payments of $119. Again, further research is needed to better understand the role of the

illusion of wealth in annuitization decisions and social security claiming decisions.

In sum, this is a work on information architecture. Information about wealth in retirement can be presented in two forms, lump sums or equivalent monthly income. Going beyond the basic annuity puzzle, we find that the relative attractiveness of annuities and lump sums depends on underlying wealth levels in a way that is consistent with how people perceive numbers of small and large magnitudes. Information architects may wish to consider this perceptual regularity when presenting information to those saving for retirement. Can one way of representing the information be said to be superior to the other? While this will always be open to debate, we do speculate that perceptions of wealth as an annuity are more likely to lead to satisfactory choices as it is easier to estimate a month's expenses than to estimate expenses over the entire retirement journey. In terms of helping people to reason better about spending in retirement, it may be helpful to provide people with projected monthly income at retirement based on their current saving behavior instead of the current practice of providing just account balances. We recommend that projected monthly income be presented before, and therefore be made more salient than, any information on account balances that is presented in one's 401(k) statement. A similar idea has already been voluntarily implemented by at least a few retirement plan administrators, including Great West Retirement Services, TIAA-CREF and Vanguard, and is being considered by the U.S. Congress under the Lifetime Income Disclosure Act.

A few avenues for future research are worth mentioning. While we examined the reaction of individuals to projected account balances versus projected income at retirement, current proposals suggest displaying both account balances and income streams. In fact, individuals might see up to six different numbers on their statements, consisting of projected balances and income based on savings to date, projected balances and income based on assumed savings

through retirement, and the above income numbers based on joint and survivor annuities for

couples. It remains an open question how individuals might react to the complete set of numbers.

Another open question is whether individuals will find income projections credible or not, given

all the assumptions that are required to make long-term estimates. While we do not have all the

answers, we do feel strongly that in a world with increasing investor autonomy, understanding

the role of information architecture on key financial decisions is essential to public policy. For

instance, as of April, 2015, Britons will have more flexibility in cashing out their retirement

accumulations.[1] To help retirees manage the increased flexibility, free and impartial face-to-face

guidance will be offered, but how such guidance will be framed and what information be

provided remains an avenue for future research.

REFERENCES

Bartels, Daniel M., & Lance J. Rips (2010), "Psychological Connectedness and Intertemporal

choice," *Journal of Experimental Psychology: General, 139*(1), 49-69.

Benartzi, Shlomo, Alessandro Previtero, and Richard H. Thaler (2011), "Annuitization Puzzles,"

Journal of Economic Perspectives, 25(4), 143 – 64.

—— and Richard H. Thaler (2013), "Behavioral Economics and the Retirement Savings Crisis,"

*Science, 339(*6124*)*, 1152-1153.

Bhattacharya, Utpal, Craig W. Holden, and Stacey Jacobsen (2012), "Penny Wise, Dollar

Foolish: Buy-Sell Imbalances On and Around Round Numbers," *Management Science,*

58(2), 413-431.

Bleich, Sara N. and Lainie Rutkow, (2013), Improving Obesity Prevention at the Local Level –

Emerging Opportunities," *New England Journal of Medicine, 368*(19), 1761-1763.

Boseley, Sarah (2013), "Opt-out Organ Donation Scheme Given Go-Ahead in Wales," *The*

Guardian, July 2, 2013, Main Section, p. 15. London: Guardian News and Media.

http://www.theguardian.com/society/2013/jul/02/opt-out-organ-donation-wales

Choi, James J., David Laibson, Brigitte C. Madrian, and Andrew Metrick (2006), "Saving For

Retirement on the Path of Least Resistance," in *Behavioral Public Finance: Toward a*

New Agenda, Edward J. McCaffrey and Joel Slemrod, eds. New York, NY: Russell Sage

Foundation, 304-351.

Dowray, Sunaina, Jonas J. Swartz, Danielle Braxton, and Anthony J. Viera (2013) "Potential Effect of Physical Activity Based Menu Labels on the Calorie Content of Selected Fast Food Meals," *Appetite, 62(*1*)*, 173-181.

Doyle, John R. (2013), "Survey of Time Preference, Delay Discounting Models," *Judgment and Decision Making, 8*(2), 116-135.

Fechner, Gustav T. (1860), *Elemente der Psychophysik.* Leipzig: Breitkopf und Härtel.

Goda, Gopi S., Colleen F. Manchester, and Aaron Sojourner (2013), "What Will My Account Really Be Worth? Experimental Evidence on how Retirement Income Projections Affect Saving," Working paper, Rand Corporation, WR-873.

Goldstein, Daniel G., Eric J. Johnson, Andreas Herrmann, and Mark Heitmann (2008), "Nudge Your Customers Toward Better Choices," *Harvard Business Review 86(*12*)*, 99-105.

Gourville, John T. (1998), "Pennies-a-Day: The Effect of Temporal Reframing on Transaction Evaluation," *Journal of Consumer Research, 24(*4*)*, 395-403.

Halpern, Scott D., Peter A. Ubel, and David A. Asch (2007), "Harnessing the Power of Default Options to Improve Health Care," *New England Journal of Medicine, 357*(13), 1340-1344.

——, George Loewenstein, Kevin G. Volpp, Elizabeth Cooney, Kelly Vranas, Caroline M. Quill, Mary S. McKenzie, Michael O. Harhay, Nicole B. Gabler, Tatiana Silva, Robert Arnold, Derek C. Angus, and Cindy Bryce (2013), "Default Options in Advance Directives Influence How Patients Set Goals for End-of-Life Care, *Health Affairs, 32*(2), 408-417.

Hershfield, Hal E., Daniel G. Goldstein, William F. Sharpe, Jesse Fox, Leo Yeykelis, Laura L. Carstensen, and Jeremy N. Bailenson (2011), "Increasing Saving Behavior Through Age-

Progressed Renderings of the Future Self," *Journal of Marketing Research, 48*(Special

Issue), S23-S37.

Johnson, Eric J. and Daniel G. Goldstein (2003), "Do Defaults Save Lives?," *Science,*

302(5649), 1338-1339.

——, Suzanne B. Shu, Benedict G. C. Dellaert, Craig Fox, Daniel G. Goldstein, Gerald Häubl,

Richard P. Larrick, John W. Payne, Ellen Peters, David Schkade, Brian Wansink, and

Elke U. Weber (2012), "Beyond Nudges: Tools of a Choice Architecture," *Marketing*

Letters, 23(2), 487-504.

Kahneman, Daniel, and Amos Tversky (1979), "Prospect Theory: An Analysis of Decision

Under Risk," *Econometrica, 47*(2), 263-291.

Larrick, Richard P., Jack B. Soll, (2008), "The MPG Illusion," *Science, 320*(5883), 1593-1594.

Lifetime Income Disclosure Act (S. 267; H.R. 677) (2011) Washington, DC: U.S. Government

Printing Office.

Nenkov, Gergana Y., J. Jeffrey Inman, and John Hulland (2008), "Considering the Future: The

Conceptualization and Measurement of Elaboration on Potential Outcomes," *Journal of*

Consumer Research, *35*(1), 126-141.

Oppenheimer, Daniel, Tom Meyvis, and Nicolas Davidenko (2009), "Instructional Manipulation

Checks: Detecting Satisficing to Increase Statistical Power," *Journal of Experimental*

Social Psychology, 45(4), 867-872.

Parducci, Allen (1965), "Category Judgment: A Range-Frequency Model," *Psychological*

Review, 72(6), 407-418.

—— and Linda F. Perrett (1971), "Category Rating Scales: Effects of Relative Spacing and

Frequency of Stimulus Values," *Journal of Experimental Psychology, 89*(2), 427-452.

Pichert, Daniel and Konstantinos V. Katsikopoulos (2008), "Green Defaults: Information

Presentation and Pro-Environmental Behaviour," *Journal of Environmental Psychology,*

28(1), 63-73.

Previtero, Alessandro (2014), "Stock Market Returns and Annuitization," *Journal of Financial*

Economics, 113(2), 202-214.

Pronin, Emily, Christopher Y. Olivola, and Kathleen A. Kennedy (2008), "Doing Unto Future

Selves as You Would Do Unto Others: Psychological Distance and Decision Making,"

Personality and Social Psychology Bulletin, 34(2), 224-236.

Sass, Steven A. (2012), "Should You Buy an Annuity from Social Security?," *Center for*

Retirement Research Working Paper No. 2012 - 10. Chestnut Hill, MA: Center for

Retirement Research, Boston College, pp. 12 - 60.

Social Security Administration (2012), "Social Security Bulletin: Annual Statistical Supplement

2012," United States Government Printing Office.

Stevens, Stanley S. (1975), *Psychophysics*. New York: Wiley.

Stewart, Neil, Nick Chater, and Gordon D.A. Brown (2006), "Decision by Sampling," *Cognitive*

Psychology, 53(1), 1-26.

Thaler, Richard H. and Cass R. Sunstein (2008), *Nudge: Improving Decisions About Health,*

Wealth, and Happiness. New Haven: Yale University Press.

Trope, Yaacov and Nira Liberman (2003), "Temporal Construal," *Psychological Review, 110*(3)*,*

403-421.

Urban, Glen L., John R. Hauser, William J. Qualls, Bruce D. Weingberg, Jonathan D. Bohlmann,

and Roberta A. Chicos (1997), "Information Acceleration: Validation and Lessons from

the Field," *Journal of Marketing Research, 34*(February), 143-153.

Yaari, Menahem E. (1965), "Uncertain Lifetime, Life Insurance, and the Theory of the

Consumer," *The Review of Economic* Studies, *32*(2), 137-150.

FOOTNOTES

1. A brief summary of the forthcoming changes in the U.K. is available at:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/301563/Pensions_
fact_sheet_v8.pdf.

TABLE 1

	Model 1	**Model 2**	**Model 3**
(Intercept)	-13.33 (.25)***	-14.79 (.36)***	-14.62 (.35)***
Log Lump Sum Equivalent	1.41 (.02)***	1.53 (.03)***	1.53 (.03)***
Presentation Format (lump)		2.87 (.50)***	2.91 (.50)***
Log Lump Sum Equivalent x Presentation Format		-.23 (.04)***	-.24 (.04)***
Age			-.02 (.00)***
Gender			.01 (.06)
R^2	0.709	0.714	0.728
Adj. R^2	0.710	0.714	0.727
Num. obs.	1946	1946	1883

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

Within-participant study. Perceived satisfaction on a seven-point scale regressed on lump sum

equivalent, presentation format, and their interaction and demographics. Gender is coded such

that 1 is male and 2 is female.

TABLE 2

	Model 4	Model 5	Model 6
(Intercept)	-14.23 (.55)***	-17.58 (.76)***	-17.48 (.96)***
Log Lump Sum Equivalent	1.39 (.04)***	1.65 (.06)***	1.62 (.06)***
Presentation Format (lump)		6.68 (1.08)***	6.24 (1.11)***
Log Lump Sum Equivalent x Presentation Format		-.51 (.08)***	-.47 (.08)***
Age			.02 (.01)
Gender			.23 (.10)*
Income			-.09 (.02)***
R^2	0.534	0.552	0.562
Adj. R^2	0.533	0.551	0.559
Num. obs.	960	960	890

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

Between-participant study. Perceived satisfaction on a seven-point scale regressed on lump sum equivalent, presentation format, and their interaction and demographics. Age is in years. Gender is coded such that 1 is male and 2 is female. Income was coded on a 17-point scale, with each point representing a $9,999 increment ranging from 1 ($-$9,999) to 17 (more than $160,000).

TABLE 3

	Model 7	Model 8	Model 9
(Intercept)	8.79 (.30)***	9.53 (.42)***	10.14 (.55)***
Log Lump Sum Equivalent	-.38 (.02)***	-.43 (.03)***	-.45 (.03)***
Presentation Format (lump)		-1.47 (.59)*	-1.37 (.59)*
Log Lump Sum Equivalent x Presentation Format		.11 (.05)*	.10 (.04)*
Age			-.01 (.00)
Gender			-.17 (.08)*
Income			.03 (.01)**
R^2	0.227	0.233	0.247
Adj. R^2	0.226	0.231	0.243
Num. obs.	954	954	953

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Between-participant study on saving intentions. Savings intentions on a five-point scale (with 5 being the intention to increase saving the most) are regressed on lump sum equivalent, presentation format, and their interaction and demographics. Age is in years. Gender is coded such that 1 is male and 2 is female. Income was coded on a 17-point scale, with each point representing a $9,999 increment ranging from 1 ($-$9,999) to 17 (more than $160,000).

TABLE 4

	Model 10	Model 11	Model 12	Model 13
(Intercept)	12.27 (.69)***	1.71 (.40)***	2.91 (1.17)*	2.39 (1.46)
Presentation Format (annuity)	2.69 (.98)***	0.81 (.33)*	0.75 (.34)*	1.55 (.65)*
Previous Savings Rate		0.92 (.03)***	0.92 (.03)***	0.92 (.03)***
Salary			-2.59E-6 (.00)	-3.54E-6 (.00)
Age			-0.02 (.02)	-0.02 (.03)
Gender			0.22 (.35)	0.24 (.36)
Balance				2.61E-7 (.00)
Balance X Condition				-4.78E-7 (.00)
R^2	0.052	0.894	0.897	0.898
Adj. R^2	0.045	0.893	0.893	0.893
Num. obs.	139	139	139	139

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Table 4: Field experiment. Post-intervention savings rate is regressed on presentation format, previous savings rate, salary in dollars, age in years, gender (1 is male and 2 is female), balance (centered), and the balance (centered) by condition interaction.
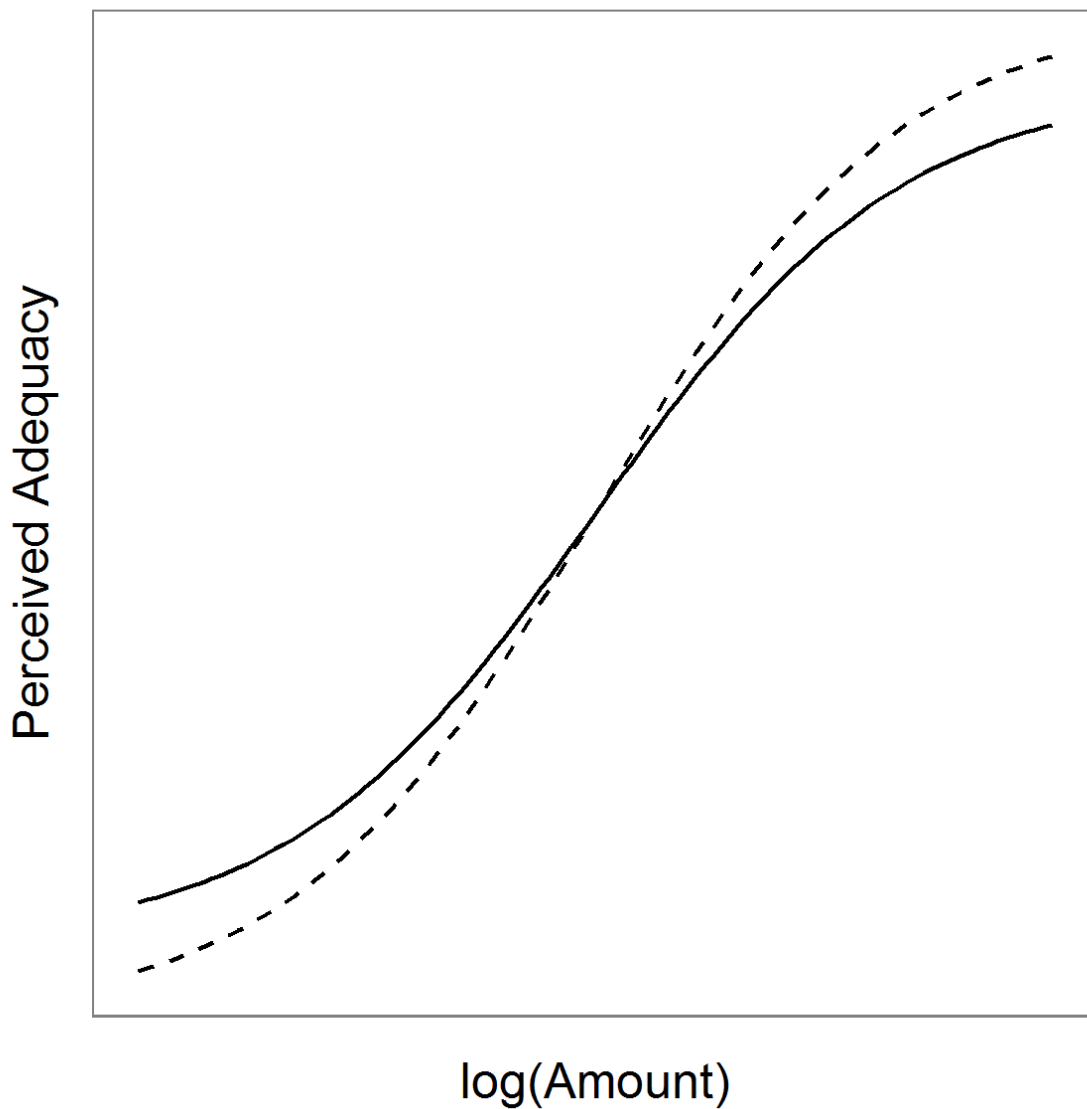
Figure 1. Predicted perceptions of adequacy for retirement of varying amounts of wealth depending on whether they are expressed as a lump sum (dotted line) or an equivalent monthly annuity payment (solid line). Savers are predicted to be more sensitive to changes in monthly payments than to changes in lump sums. S-shaped response curves are used because the experiments employ Likert scales that impose a floor and ceiling on possible responses.

Figure 2. Percentiles of net worth amounts (top) and monthly income amounts (bottom) relative

to their respective distributions. Net worth and income percentiles derived from census data from

2010 and 2012, respectively (U. S. Census Bureau, 2010, 2012).The points along the horizontal

on both panels are directly comparable, for example, a 65 year old can exchange a lump sum of

$100,000 for an annuity (monthly income) of about $500. Under Decision by Sampling, the

psychological impact of a change in monetary amounts is proportional to the change in the

percentiles in the corresponding distribution. Accordingly, people are predicted to be less

sensitive to change in lump sums (lower slope in top graph) than to changes in the monthly

annuities that can be purchased with those lump sums (higher slope in lower graph).
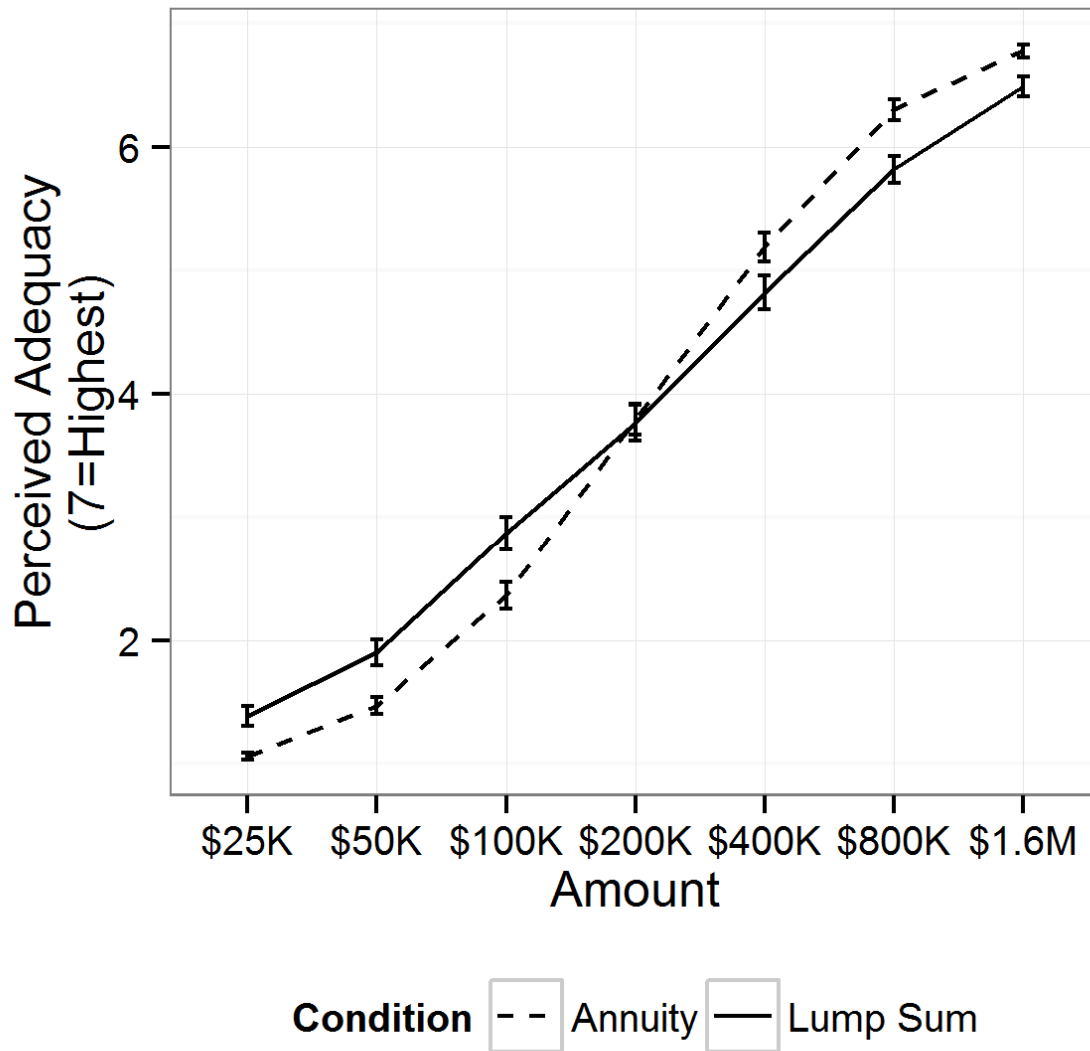
Figure 3. Perceived adequacy of varying amounts of wealth in retirement depending on whether

they are expressed as a lump sum (dotted line) or an equivalent monthly annuity payment (solid

line). Error bars extend one standard error above and below the means.
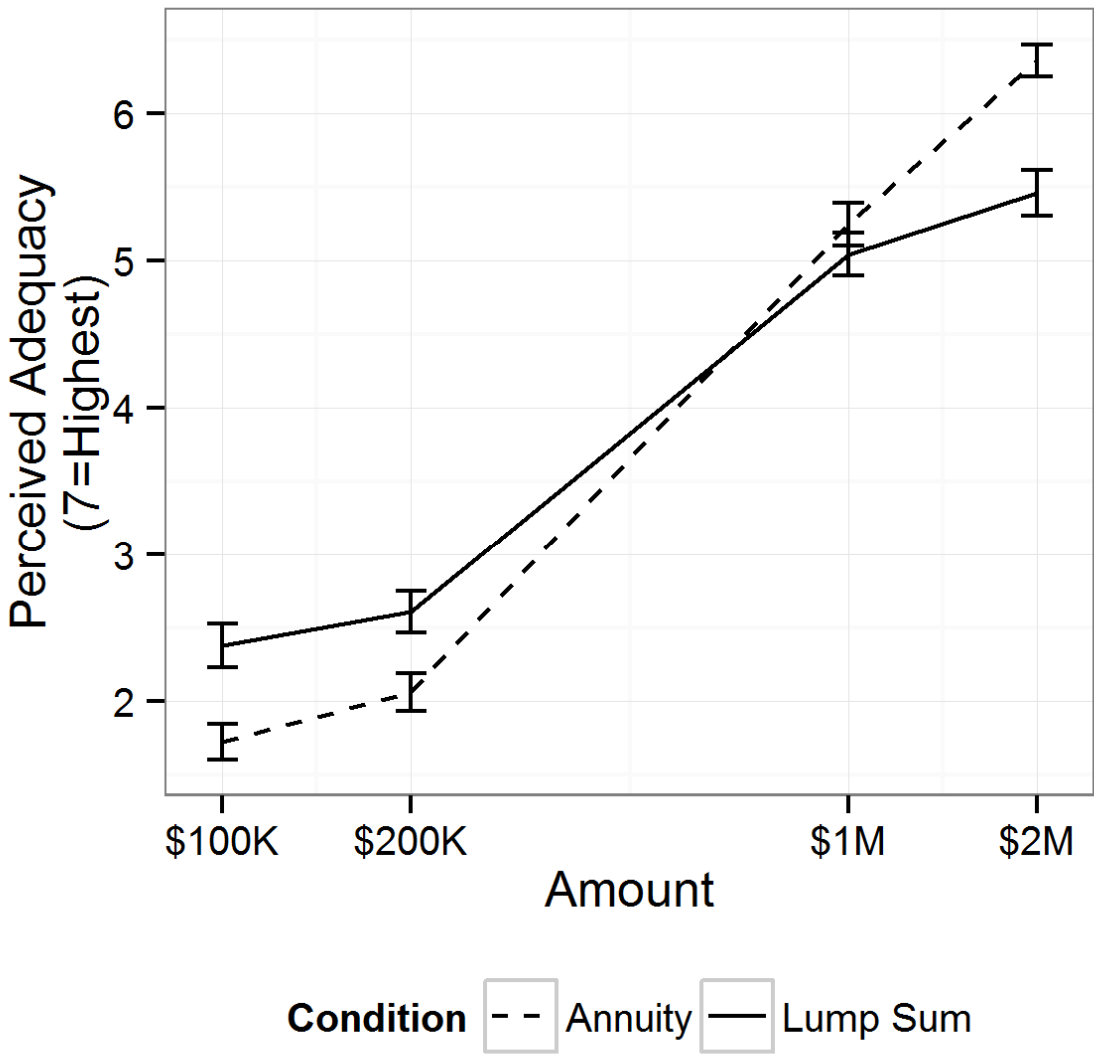
Figure 4. Perceived adequacy (between participants) to amounts of money in 401(k) plan. Error bars extend one standard error above and below the means.
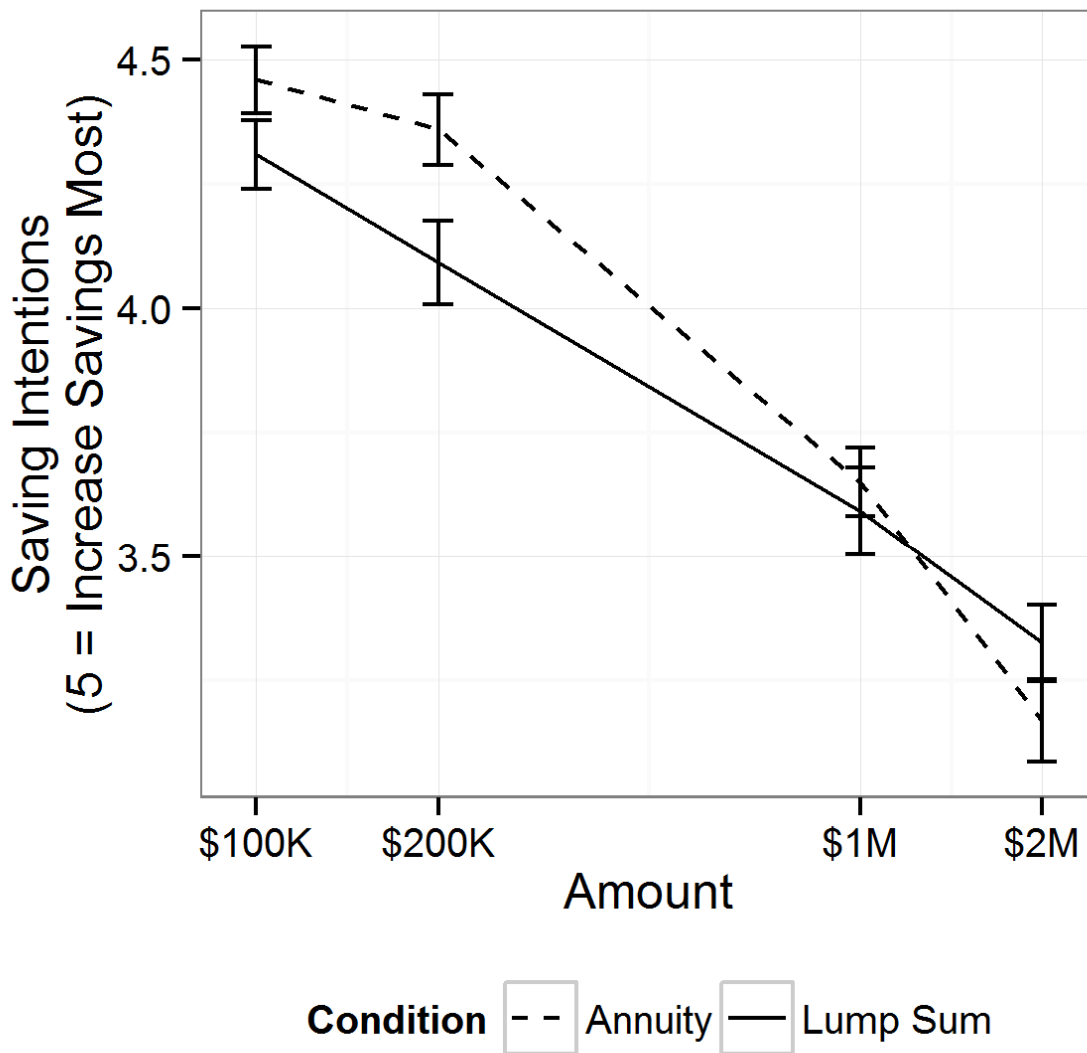
Figure 5. Intended change in savings rate (between participants) by condition. Higher numbers are associated with a greater tendency to increase savings. Error bars extend one standard error above and below the means.