HOW DOES TAX TIMING AFFECT SPENDING IN RETIREMENT?

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ABSTRACT

This study draws on theories of mental accounting and the compensatory model of choice to investigate whether and how the timing of taxes on retirement savings affects spending in retirement. Experimental evidence shows tax-deferred account holders – who pay taxes upon withdrawal of funds – consume their savings at a faster rate than Roth account holders – who save after-tax dollars and are not taxed on withdrawals—with equal or greater after-tax spending power. This suggests tax-deferred account holders appear to anchor on their pre-tax nominal account balances and under-adjust for taxes. Further, given equivalent nominal balances, tax-deferred account holders outspend Roth account holders at a rate roughly commensurate with the marginal tax rate. Consistent with a compensatory model of choice, tax-deferred account holders experience greater negative affect associated with taxes, but also focus more on the positive benefits of consumption to counteract those feelings when making desired purchasing decisions.

KEYWORDS: Tax-deferred, Roth, Retirement Spending, Consumption, Anchoring and Adjustment, Tax Aversion.

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INTRODUCTION

The United States (U.S.) government defers or forgoes approximately $240 billion of revenue per year through the tax-preferred treatment of defined contribution retirement plans (Joint Committee on Taxation 2017). For instance, a contribution to a tax-deferred retirement account (e.g., traditional IRA or 401(k) plan, hereafter "tax-deferred plan") receives a tax benefit in the form of a tax deduction or omission from current reported income. These investments then accumulate earnings on a tax-free basis until funds are withdrawn, whereupon the entire amount withdrawn is subject to tax. In contrast, a contribution to a Roth account (e.g., Roth IRA or 401(k) plan, hereafter "Roth plan") does not receive a tax benefit when contributed, but all subsequent withdrawals, including investment earnings, are not taxed. Thus, a primary difference between these plan types is when the tax benefit is received (hereafter "tax timing difference"). While both plan types are meant to encourage individuals to save for retirement, relatively little is known about the long-term effects these tax timing differences have on individuals' *spending* of retirement funds. This study extends prior literature by examining this question.

The statutory differences in tax timing suggest individuals' preferences for tax-deferred versus Roth plans should be determined primarily by expectations about their future versus their current tax rates (Burman, Gale, and Krupkin 2019). However, concurrent studies in accounting (e.g., Cuccia, Doxey, and Stinson 2020; Stinson, Doxey, and Rupert 2020) show that tax timing differences elicit strong psychological preferences and heuristic behaviors during the savings and investment phase of retirement planning that violate this basic economic principle. For example, Cuccia et al. (2020) find a persistent preference for contributing to Roth plans over tax-deferred plans. Further, individuals investing in tax-deferred plans tend to over-estimate their future post-tax spending power and, as a result, choose more conservative investments, thereby limiting

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potential capital appreciation before retirement (Stinson et al. 2020). In addition, Beshears, Choi, Laibson, and Madrian (2017) compare employee contributions to Roth versus tax-deferred retirement accounts immediately after employers add a Roth option to existing plans. Their results suggest individuals misunderstand or ignore tax timing differences when shifting some or all of their future contributions to a Roth account, inadvertently leaving Roth contributors with less current income and more future income than strictly tax-deferred contributors.

While prior literature largely focuses on outcomes achieved in the early stages of retirement planning, retirees' wealth consumption rates can significantly affect their well-being *during* retirement, when one's prospects for new savings and investment are likely constrained. Further, there is evidence that individuals are under-funded in their retirement savings and make suboptimal decisions when planning and investing for retirement (e.g., Benartzi and Thaler 1999, 2001, 2007; Choi, Laibson, and Madrian 2011; Rhee 2013). Such findings suggest that outliving money is a real concern for many retirees (e.g., Banks, Blundell, and Tanner 1998; Northwestern Mutual 2016, 2018; Updegrave 2016). On the other hand, authors in the personal finance arena suggest retirees have a difficult time switching mindsets from saving to spending (LaVigne 2018; Lindauer 2011; Money 2017; Northwestern Mutual 2017). Empirical evidence from archival studies and anecdotal evidence from industry publications suggest some retirees may not spend down their assets as fast as they could, implying a lower standard of living than is strictly necessary based on asset levels (Banerjee 2018; Poterba, et al. 2011; Kitces 2016). One possible explanation for this behavior is that, while taxes on current income streams may appear largely unavoidable, individuals have some leeway to avoid withdrawal of tax-deferred savings and, thus, the associated tax burden.

While prior works suggest individuals are generally better at assessing and accumulating future spending power with a Roth plan, it is unclear how these trends might aid or hinder individuals in their efforts to avoid outliving their money during retirement. It is possible that tax-exempt Roth distributions might encourage individuals to spend faster in retirement than they would if each withdrawal were taxed. Theories of mental accounting (e.g., Prelec and Loewenstein 1998) suggest the taxes triggered by spending tax-deferred funds make spending less attractive. Thus, deferred taxation may reduce the spending rate; or viewed from the Roth perspective, the prospect of "tax-free" money may make spending from a Roth fund easier relative to a tax-deferred account. Alternatively, the difficulty tax-deferred account holders experience in estimating their after-tax spending power while saving and investing (Stinson et al. 2020) may continue to plague them in retirement, potentially leaving them with an overly optimistic view of their financial position. This could place retirees with tax-deferred plans at a disadvantage relative to their Roth plan counterparts who are better able to assess their wealth and spend within their means.[1]

Thus, this study's purpose is to examine whether and how differences in tax timing affect decisions to *spend* savings in retirement. We draw on theories of mental accounting and the compensatory model of choice (Hogarth 1987) to make our predictions. Specifically, we expect negative affect associated with paying taxes to put downward pressure on spending from a tax-deferred plan compared to Roth. However, we also predict that individuals spending from tax-deferred plans will focus more on the positive aspects of spending to compensate for these

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[1] Specifically, individuals with retirement savings in Roth plans do not have to adjust the balance for the tax effects of withdrawals to compute their wealth and thus their spending power. The nominal balance of a Roth account is always equal to its spending power, while the nominal balance of a tax-deferred account is typically greater than its spending power. Limited exceptions may occur for tax-deferred account holders whose tax liability, after credits, is at or below zero, or who previously elected to make after-tax contributions to tax-deferred retirement savings accounts (e.g., because their income exceeded thresholds qualifying for tax-deferred treatment).

negative tax related feelings in order to facilitate desired spending (i.e., they will engage in "retail therapy"). We further consider differences in nominal account balances, required to achieve economic equivalence between tax-deferred and Roth plans, and predict that increasing nominal balances will increase spending levels

To test our hypotheses, we employ a 2×2 between participant online experiment with U.S. individuals, aged 40 or older, obtained from Amazon's Mechanical Turk platform (M-Turk). Participants make budgeting decisions after being randomly assigned to a Roth or tax-deferred account.[2] We hold tax rates constant across conditions and manipulate nominal retirement savings balances at two levels (i.e., low and high). The 2×2 design allows us to compare consumption levels under economically equivalent conditions across plan types (i.e., by design the Roth/low and tax-deferred/high conditions are economically equivalent), isolate consumption differences due to differing nominal balances within plan type, and compare consumption levels across plan types with equal nominal balances. The last comparison puts those in the tax-deferred conditions at a strict disadvantage in spending power and allows us to examine whether tax-deferred account holders spend less than wealthier Roth account holders as simple economics would suggest.

Overall, the results show that tax-deferred account holders feel the "pain" of taxes on their retirement withdrawals, as predicted. Across all conditions, tax-deferred account holders report more tax-related thinking and negative tax-related affect, placing downward pressure on

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[2] The experimental task involves helping a hypothetical recently retired third person named "Sam" budget for a number of "years" or retirement, with the exact number of years unknown to participants. Participants are told Sam has a small pension and social security to cover most day-to-day expenses. Sam also has funds in a Jones (Smith) retirement plan, the simplified tax treatment of which corresponds to a tax-deferred (Roth) plan. However, Sam must budget for a small annual shortfall, additional essential and discretionary spending, and one "big-ticket" item per year (e.g., a home theater system, refrigerator). Those in the tax-deferred conditions also must factor in taxes on any withdrawals. Before participating in the budgeting task, M-Turk workers receive information about Sam's situation and must pass a quiz indicating they understand how the retirement account is taxed. Further, we restricted participation to individuals aged 40 or older to ensure the participants had realistic views of retirement.

their spending decisions. However, tax-deferred account holders also appear to weight the expected benefits of consumption (e.g., comfort, entertainment) more when spending from savings, consistent with a compensatory model of choice for desired purchases (Hogarth 1987). These countervailing sentiments among tax-deferred plan participants produce marginally higher consumption levels, particularly for "big-ticket" purchases, compared to their Roth counterparts under equivalent economic conditions (i.e., when the after-tax spending power for a tax-deferred/high balance equals that of a Roth/low balance). Overall, tax-deferred participants experience a more affectively tumultuous path in making their spending decisions and, arguably, "work harder" by focusing on the positive aspects of their purchases to counteract the utility-diminishing tax effects.

Perhaps most importantly from a policy standpoint, the results show that tax-deferred participants consume their retirement funds significantly faster than Roth participants with equivalent *nominal* balances (e.g., tax-deferred/high vs. Roth/high). Thus, despite their negative affective reactions to the tax setting, the results suggest tax-deferred participants fail to fully account for taxes when making spending choices. As demonstrated in a concurrent study by Stinson et al. (2020), nominal balances serve as a common anchor to both tax-deferred and Roth account holders, but, all else equal, tax-deferred participants consistently under-adjust for taxes and therefore over-estimate their true wealth. In our study, despite 1) having strictly less after-tax spending power than Roth participants with equal nominal balances; and 2) being explicitly notified of their tax obligations before locking in their budgeting decisions, tax-deferred participants spend at the same pre-tax levels as their Roth counterparts. Accordingly, they consume their savings relatively faster, and the difference in overall savings consumption rates is approximately equal to the tax rate used in the study. This suggests tax-deferred participants

effectively ignore the additional taxes triggered by their spending. Ironically, participants of each plan type appear acutely aware of the emotional and economic toll exacted by taxes, but largely fail to adjust their spending behavior in response. Tax-deferred (Roth) participants indicate they would have spent more (less) had they participated in the other plan, which is inconsistent with our observed results.

Prior research focuses largely on decisions leading up to retirement, with more recent research beginning to consider the decumulation of assets in retirement (e.g., Browning, Guo, Cheng, and Finke 2016; Poterba, Venti, and Wise 2011; Mortenson, Schramm, and Whitten 2019). However, we are unaware of any prior research that examines the effects of tax timing on individuals' willingness to spend their savings in retirement. Thus, this study's results are important for at least three reasons. First, according to the Committee Report (H. Rept. 105-148 1997, 337) accompanying the initial passage of Roth IRAs in 1997, legislators believed "some individuals would be more likely to save if funds set aside in a tax-favored account could be withdrawn without tax." Thus, increasing savings was a stated motivation for the creation of Roth-type plans. Our paper adds to a growing body of research suggesting Roth plans not only encourage retirement savings and investment, but may also improve retirement outcomes. There is evidence that individuals show a strong preference for Roth plans (Cuccia et al. 2020), save more with Roth plans (Beshears, et al. 2017), and make better investment decisions to achieve a savings goal with Roth plans (Stinson, et al. 2020). We add to this research by showing that individuals also appear to spend their wealth at a slower rate when that wealth is invested in a Roth versus a tax-deferred plan.[3] Thus, our research shows investing in a Roth plan could help

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[3] As Cuccia et al. (2020) point out, this apparent superiority of Roth plans to tax-deferred plans is somewhat ironic given that at the time of passage, many commentators viewed Roth plans as a budget gimmick. This is because there is no immediate tax revenue loss to the government when individuals contribute to Roth plans; instead, the revenue loss is in the future, when contributions and investments returns are withdrawn tax-free. Regardless of whether Roth

alleviate concerns of outliving funds.

Second, most financial models (e.g., Browning, et al. 2016) assume individuals' spending is independent of the type of plan from which they withdraw funds. These models may be missing an important variable that could lead individuals to be under- or over-funded in retirement. Finally, we add to the growing behavioral literature in accounting that seeks to more fully explore the effectiveness and consequences of incentivizing certain behaviors through tax policy. In addition to concurrent studies specifically focusing on tax incentives' ability to promote prudent retirement savings and investment (e.g., Cuccia et al. 2020; Stinson et al. 2020), recent research has examined the design of tax incentives in other common and economically meaningful contexts, including health insurance, energy-efficient purchases, and education (Morrow, Stinson, and Doxey 2018; Stinson, Barnes, Buchheit, and Morrow 2018; and Bobek, Chen, Hageman, and Tian 2016). Further, both Clemons and Shevlin (2016) and Bobek (2018) call for research that is useful to tax policy makers. Our study contributes to this growing body of work by highlighting how past decisions motivated by taxes, specifically the decision of how to accumulate retirement savings, may continue to affect one's quality of life long into the future.

HYPOTHESES DEVELOPMENT

Background

We know that tax policy structure and implementation can spur unanticipated disparate reactions (e.g., Austin, Bobek, and LaMothe 2020; Falsetta, Rupert, and Wright 2013). One of the government's primary goals for retirement savings incentives is to encourage individuals to secure their own futures, thus decreasing their reliance on government aid in retirement. While this goal obviously requires incentives for saving rather than consuming pre-retirement income,

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plans were or were not originally enacted as a budget gimmick, we add to the growing body of research suggesting Roth plans enhance retirement savings accumulations in anticipated and unanticipated ways.

it is also important that retirees feel sufficiently comfortable drawing upon those savings in later years. Absent an expectation of increasing or decreasing tax rates in retirement (e.g., assuming one's marginal tax rate will be constant over time), simple economics indicates an individual should be indifferent to Roth and deferred plan types when saving and spending.[4] As illustrated in Exhibit 1, if individuals begin with economically equivalent *spending* power, any equivalent pre-tax spending decisions they make will leave them with economically equivalent spending power. Strictly speaking, this requires a higher nominal balance for a tax-deferred account, as plan distributions must cover taxes as well as purchase costs. On the other hand, given nominally equivalent balances and a tax rate greater than zero, individuals spending from a tax-deferred account have strictly less purchasing power, and would need to make lower pre-tax spending choices to consume their balance at the same rate as individuals spending from a Roth account.

[Insert Exhibit 1 here]

However, this economically rational view does not account for non-monetary utility spurred by psychological phenomena individuals experience in connection with taxes. Prior research finds individuals struggle with many basic principles of retirement savings and taxes; misunderstanding these principles can affect decision quality and savings adequacy. More specifically, tax timing has been shown to influence retirement saving and investing decisions. Cuccia et al. (2020) show that when individuals first select a retirement plan, normative plan choices based on expected tax rate changes can be enhanced or overridden by non-economic factors such as prepayment preferences and dread of future tax payments. These influences produce a strong preference for Roth over tax-deferred plans, which is difficult to overcome with economic incentives. Similarly, Stinson et al. (2020) find that tax timing affects personal

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[4] Alternatively, if an individual expects future tax rates to be higher (lower) than current tax rates, the after-tax value of a Roth (tax-deferred) plan will be greater than the after-tax value of a tax-deferred (Roth) plan, all else equal.

retirement portfolio risk profiles. Individuals investing in tax-deferred plans tend to under-adjust for future tax burdens and make more conservative investments compared to those investing in Roth plans.

While tax timing has been shown to influence retirement saving and investing decisions, we are unaware of any research directly addressing its behavioral effects on retirement *spending* decisions. Further, Poterba, et al. (2011) note that little research has focused on how individuals make spending choices during retirement and what factors influence those choices. Thus, this study's overarching research question is whether individuals with tax-deferred retirement plans consume their savings at a different rate than those with Roth plans. In the following sections we discuss our predictions about factors that will affect spending when withdrawing from a tax-deferred versus Roth retirement plan.

Mental Accounting and the Pain of Paying

Theoretically, when deciding whether to withdraw retirement funds, an individual should calculate the expected utility from the use of the funds. That is, the individual must weigh the pleasure of using the withdrawn funds against the pain of relinquishing those funds. Prelec and Loewenstein (1998) propose a "double-entry" mental accounting model in which people derive utility from consumption and disutility from paying for consumption. This model is rooted in prospective mental accounting, which argues individuals heavily weight the consequences of future events but heavily discount or ignore past events.

All else equal, the Prelec and Loewenstein (1998) model suggests individuals prefer to make advance payments, as they discount the "pain" associated with a pre-payment and can enjoy the benefit of consumption without the disutility of paying for the consumption concurrently. Similarly, Gourville and Soman (1998) introduce the concept of "payment

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depreciation" and argue that when costs significantly precede benefits, as is the case with the tax

payments in a Roth plan, the costs are mentally discounted. In the context of retirement

spending, if individuals perceive taxes on retirement savings as a cost of retirement consumption,

they may anticipate greater net utility if the related tax is prepaid as it is in Roth plans. At

withdrawal, the previously paid taxes are expected to detract little from the utility of the income.

Conversely, with a tax-deferred plan, individuals may give far greater consideration to taxes

when they are triggered by each savings withdrawal.[5]

In addition, prior research shows individuals have largely negative views about tax-

related issues (Hardisty, Johnson, and Weber 2010) and find the process of determining federal

income tax liability complex and unpleasant (Moon 2009). Aside from any prepayment

preferences suggested by prospective mental accounting, we posit these attitudes may cause

further dread for those withdrawing from tax-deferred plans, creating "negative utility resulting

from contemplation of the future" (Lowenstein, 1987, 667) that is absent for individuals

withdrawing from Roth plans who have already paid their taxes. Thus, when determining

whether, and how much, to withdraw from savings, individuals withdrawing from tax-deferred

plans likely have an additional negative utility component, the dread of taxes, that those

withdrawing from Roth plans do not. In fact, those withdrawing from Roth plans may even

derive positive utility from the fact they can withdraw funds without having to pay taxes.[6]

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[5] Alternatively, individuals may not consider taxes paid as part of the cost of consumption, as taxes may be in a separate "mental account" (Thaler 1985) from the purchase of a consumer product. Nevertheless, if this is the case, it leads to the same intuition regarding whether individuals would prefer to withdraw from a Roth or tax-deferred plan. For the Roth plan, the tax mental account was paid long ago, so the only cost to be considered is the cost of the product. Meanwhile, when withdrawing from a tax-deferred plan an individual has to consider both the product mental account and the tax mental account. In the experimental design we attempt to determine the specific causal mechanism for individuals' preferences.

[6] Prior to collecting data for the main experiment, we conducted a belief elicitation pre-test following the procedures suggested by Ajzen and Fishbein (1980) to ensure we had considered all possible influences on individuals' decisions. One question we asked participants was to list all the "advantages" associated with withdrawing funds to

Building on prior research in prospective mental accounting and taxation, we expect individuals withdrawing from tax-deferred plans will focus more on taxes than those withdrawing from Roth plans, all else equal. We further expect this focus on taxes will produce greater negative affect among individuals withdrawing from tax-deferred plans, which will reduce their desire to spend retirement savings. While traditional economic models do not consider these factors, they are fully consistent with forces guiding preferences *for* Roth plans during retirement planning as documented by Cuccia et al. (2020). In this sense, some of the non-economic forces that compel individuals to prefer Roth plans when saving for retirement may also influence their consumption and enjoyment of retirement savings. Formally, we posit:

> H1a: Taxes will be more salient for individuals when withdrawing funds from a tax-deferred plan versus a Roth plan.

> H1b: Individuals will have more negative affect toward taxes when withdrawing funds from a tax-deferred plan versus a Roth plan.

> H1c: Negative affect toward taxes will reduce individuals' willingness to spend funds from a retirement plan.

While we believe the logic leading to H1 is clear, prior research suggests additional factors influence retirement spending decisions. Therefore, it is not a forgone conclusion that negative tax-related affect lowers spending for tax-deferred account holders relative to Roth account holders. The following sections consider other factors relevant to retirement spending.

Combatting Tax-Related Negative Affect

Collectively, H1 predicts that deferred taxation imposes a greater emotional toll on account holders with each fund withdrawal. In other words, a tax-deferred account holder could have the same after-tax wealth and make the same spending decisions as a Roth account holder,

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make a purchase from either a tax-deferred or Roth plan. Sixty-five percent of those in the Roth condition mentioned "not having to pay taxes" as an advantage, suggesting they did think about taxes in a positive light.

yet still feel worse and experience less utility. The compensatory model of choice (e.g., Hogarth 1987) suggests that, all else equal, if one requires or desires a particular spending pattern that will trigger an aversive tax burden, he or she must identify other positive aspects of the purchase to counteract the tax aversion.

There are at least two methods by which a tax-deferred account holder could try to combat tax aversion and eliminate a discrepancy in utility compared to a Roth account holder making otherwise equivalent choices. One is to lower spending, which is contemplated in our prediction in H1c. However, this strategy may leave the account holder doubly harmed, experiencing both negative affect from taxes and lower utility from reduced consumption. Further, this strategy may not be feasible for a retiree who has primarily accumulated wealth in a tax-deferred plan, and thus must learn to cope with the "pain" of paying taxes in retirement even to achieve a minimal standard of living.

Alternatively, individuals experiencing negative affect from incurring taxes might spend *more* to alleviate the negative affect. Research on "retail therapy" suggests individuals cheer themselves up by purchasing "self-treats," and the benefits do not depend on whether the purchases are impulsive or planned (e.g., Atalay and Meloy 2011; Rick, Pereira, and Burson 2014). In fact, research finds almost all spending increases happiness and that concerns about death and its salience increase this positive psychological impact (e.g., Arndt, Solomon, Kasser, and Sheldon 2004), which could exacerbate a retail therapy effect during retirement.[7] Thus, individuals with tax-deferred plans may spend more to offset the negative affect from tax costs.

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[7] For example, Gilovich, Kumar, and Jampol (2015) show that spending on life experiences (i.e., experiential spending) increases happiness; Aknin, et al. (2013) find using resources to help others (i.e., prosocial spending) increases happiness; and Weidman and Dunn (2016) show that spending on tangible possessions (i.e., material spending) increases happiness.

Under economically equivalent conditions and with equal access to desired products and services, tax incentive type should not affect the objective costs and benefits of a given purchase. However, as described in the motivation for H1, taxes are likely more salient to a tax-deferred account holder than to a Roth account holder for whom taxes are a distant and sunk cost. Thus, with taxes constraining spending from a tax-deferred plan, the compensatory model of choice suggests individuals with tax-deferred accounts will compensate for the negative affect from taxes by increasing their focus on spending's positive aspects to justify the added tax cost and administrative burden spurred by their purchases. Focusing on consumption benefits should give rise to positive affect, or a heightened sense of satisfaction, that reinforces the purchase decision. Formally, we posit:

> H2a: Individuals will experience greater satisfaction with their spending choices when withdrawing funds from a tax-deferred plan than from a Roth plan.

> H2b: Positive affect toward spending will increase individuals' willingness to spend funds from a retirement plan.

Nominal Balances, Anchoring, and Feelings of Wealth

As previously discussed, the pre-tax nominal balance in a tax-deferred account must be strictly greater than the nominal balance of a Roth account in order to achieve equivalent, after-tax spending power (Exhibit 1). Thus, we also consider nominal balances in order to thoroughly examine our overarching research question of whether individuals with tax-deferred retirement plans consume their savings at a different rate than those with Roth plans. Simple economic theory leads to the prediction that within plan type, a higher nominal balance will lead to increased spending. However, it is also possible that tax-deferred account holders will anchor on their nominal balance and under-adjust for taxes (Stinson et al. 2020). Thus, despite individuals in a tax-deferred plan having an immediate reason and sufficient detail to tax-adjust spending decisions in real time, we posit the higher nominal balance of a tax-deferred account may

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nonetheless encourage individuals to spend more freely than a nominally smaller, but economically equivalent, Roth balance.[8] Thus, overall we predict:

> H3: *Ceteris paribus*, a higher nominal account balance will lead to greater spending from a retirement plan.

Assuming one maintains relatively stable preferences and essential needs in retirement, the positive relationship between spending levels and nominal balances proposed in H3 could exhibit diminishing returns as the increase in wealth exceeds an individuals' desired increase in spending. In short, once an individual's primary desires for spending are satiated, subsequent increases in wealth would not be expected to yield the same increases in spending (i.e. there is a ceiling effect). Conversely, if the proposed increase in wealth is relatively small compared to individuals' desired spending, the added wealth could spur no change or even a slight acceleration in the overall rate of consumption. Thus, while we unequivocally predict in H3 that individuals will spend more when their nominal balances increase, all else equal, the effect of that change on the rate at which individuals exhaust their retirement savings is more difficult to predict.

To summarize, our discussion leading up to H1 and H2 argues that individuals spending from tax-deferred accounts experience greater negative affect toward taxes and have an increased focus on consumption benefits compared to those spending from Roth accounts. Further, while H3 posits that a higher nominal balance will increase spending levels, it is unclear to what extent an increase in wealth will change the overall rate at which total wealth is consumed. To the extent tax-deferred account holders overestimate their true wealth and further engage in "retail therapy" to combat tax-related negative affect, they may consume their retirement wealth at a faster pace relative to Roth account holders who have lower nominal, but economically

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[8] Roth account holders' spending power is fully reflected in their nominal balance, and thus no adjustment is needed.

equivalent, balances and fewer tax-related concerns. Thus, to examine our overarching research question *across* plan types, we must simultaneously consider tax-related affect, perceived consumption benefits, and differences in nominal balances required to establish economic equivalence between tax-deferred and Roth plans. Figure 1 displays a summary of the predicted relationships in H1 through H3 with the percentage of wealth consumed as the dependent variable.[9]

[Insert Figure 1 here]

METHOD

Experimental Design

To test the hypotheses and investigate our overarching research question, we examine the differences in budgeting decisions between individuals randomly assigned to tax-deferred and Roth savings plans using an online experiment. We employ a 2×2 between-participants design varying how retirement savings are taxed (*ROTH* or *DEFERRED*) and participants' nominal balances (*HIGH* or *LOW*). Specifically, we manipulate whether Sam, a hypothetical third party, spends from a Roth plan or a tax-deferred plan over four annual periods.[10] We maintain a constant tax rate of 20 percent across conditions and mathematically determine the difference between *HIGH* and *LOW* conditions such that the *DEFERRED HIGH* condition and the *ROTH LOW*

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[9] If the dependent variable is spending as opposed to wealth consumed (which is merely spending/nominal balance), the predictions in Figure 1 are unchanged except for the fact that the sign for H3 would be unambiguously positive.
[10] We use fictitious names for the retirement plans (i.e., Smith and Jones plans) in order to simplify the experiment and control for differences in participants' knowledge of the features of existing Roth and tax-deferred plans, such as contribution limits and required distributions. Further, tax studies often use third-person scenarios in order to avoid concerns related to social desirability bias. Research shows that presenting questions in this manner reduces the effects of social desirability (Epley and Dunning 2000) while still revealing individuals' true feelings (Fisher 1993). While we do not believe social desirability bias will impact participants' responses in the experiment, we do note that not all participants will have the same preferences regarding what constitutes a desirable purchase apart from plan-type considerations (e.g., perhaps participants on average would not choose to go on a cruise). By using a third party's choice, we hope to minimize any effects of taste for a particular item. Further, participants do not know the number of rounds to avoid end of experiment effects.

condition are economically equivalent, having equal after-tax spending power. As a result, the balance in the *LOW* (*HIGH*) conditions starts out at \$158,960 (\$198,700).[11] This aspect of the design allows us to compare consumption levels under economically equivalent conditions across plan types and further isolate consumption differences attributable to the sheer magnitude of spending power within each plan type. Exhibit 2 displays the account balances by condition and round, discussed below.

[Insert Exhibit 2 here]

Experimental Task

Participants are presented with the following scenario: Sam is 65 years old and has just retired, and the participants' task is to budget for Sam's spending. Sam earned money and invested in a retirement savings plan over many years. In the *DEFERRED* conditions, Sam is taxed on each withdrawal of funds from the savings plan at the stated tax rate of 20 percent. In the *ROTH* conditions, Sam has already paid 20 percent in taxes on funds contributed to the plan and withdrawals are not taxed. To advance in the study, participants had to pass a knowledge-check confirming they understood how withdrawals from the savings plan are taxed.

We present participants in each condition with four years (i.e., rounds) of hypothetical annual budgeting decisions.[12] After introducing Sam's randomly assigned retirement account

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[11] These balances were chosen so that participants in the *DEFERRED HIGH* and *ROTH LOW* conditions have equal after-tax spending power. Thus, the *DEFERRED HIGH* nominal balance of \$198,700, adjusted downward for the 20% tax rate used in the study, yields the same after-tax balance of \$158,960 that participants in the *ROTH LOW* condition can withdraw tax-free. Further, the amounts are described to participants as resulting from annual savings of \$1,000 or \$800 per year, depending upon condition, for 43 years with an average annual return of six percent. With regard to external validity, there are many different estimates of the median and mean retirement savings of 65-year old individuals (i.e., the age of Sam in the experiment). For example, CNBC reports that in 2013 the mean (median) retirement savings of families between 56 and 61 was \$164,577 (\$17,000) (Elkins 2017); Investopedia reports that the estimated median savings for "sixtysomethings" in 2018 was \$172,000 (Investopedia 2020); and Market Watch reports that in 2018 the mean (median) 401(k) balance for those in their sixties was \$198,600 (\$63,000) (O'Shea 2019).

[12] To minimize potential gaming effects near the end of the study, we do not explicitly tell participants they will face four rounds of budgeting decisions. Instead, after introducing the study, we tell participants they will help Sam make a spending budget for up to five years in retirement.

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structure and nominal balance, we inform participants that Sam has a small pension and social security benefits amounting to $36,000 per year, which will cover most day-to-day expenses. We then provide a breakdown of Sam's annual living expenses (i.e., housing, utilities, groceries, healthcare, basic transportation, and taxes on pension and social security income) totaling $38,800. We explain that Sam expects to withdraw a small amount from retirement each year to "make ends meet" for day-to-day expenses (i.e., $2,800 before taxes in all conditions, and those in the tax-deferred conditions are informed that the after-tax amount is $3,500). Thus, participants expect a minimum withdrawal from retirement each year to cover the annual shortfall for Sam's minimum costs of living but are free to use the remaining retirement funds to adjust Sam's overall standard of living as they see fit.

To accommodate differences in taste, participants are told Sam might want to budget for some additional discretionary spending and essential spending. We describe each static category in broad terms and offer potential examples of each (e.g., hobbies, dinners out, and movies for other discretionary items; small appliance repair, clothes, and personal care items for other essential spending). We also provide a range of $600 to $12,000 per year for Sam's historical spending in each category, which is intended to afford sufficient variability in participants' responses while providing realistic bounds to limit nonsensical or outlying responses.[13] These two categories of additional spending and their descriptions are constant through all rounds of the task. The screen presented to participants is reproduced in Appendix A.

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[13] While we provide participants Sam's historical spending range in the categories, they are not limited to these bounds when they respond. For example, a response of $0 in a category is still allowed, as are amounts greater than the upper end of the range. Forty-three participants (12.3 percent) responded with amounts below $600 at least once, suggesting participants did not feel artificially limited by the historical lower bound. While no participants budgeted an amount over $12,000, suggesting a possible implicit cap, only five participants (1.4 percent) ever chose the upper-bound, suggesting any implicit cap had minimal impact.

To offer more concrete budgeting options, participants also budget for one "big-ticket" item that Sam is considering purchasing in each round. We chose two hedonic items (a cruise and a home theater system) and two utilitarian items (a refrigerator and a washer/dryer set), presented in random order.[14] We include both hedonic and utilitarian items because there is some evidence that prepayment preferences may differ between hedonic and utilitarian items.[15] For both hedonic items we note it is something Sam has been thinking of purchasing to enjoy retirement. For both utilitarian items we indicate that Sam owns a current version that is sufficient but near the end of its useful life and lacking more modern properties (e.g., a newer version has a larger capacity, energy-efficient features, etc.). An example of the budget template participants complete each round is displayed in Exhibit 3.

[Insert Exhibit 3 Here]

Following each budgeting round, we inform participants of the total withdrawal from their savings plan based on their budget—for participants in the *DEFERRED* conditions, this includes the "gross-up" withdrawal required to cover the taxes triggered by withdrawals for the annual shortfall and any additional spending. To simplify the design and analyses, we adjust the retirement account balance at the start of each subsequent round to reflect "a year of spending and investment returns." As displayed in Exhibit 2, the balances in rounds two through four trend gradually downward from the first-round levels, with *LOW* balances always at 80 percent of *HIGH* balances, and follow a fixed schedule, unannounced to participants, to ensure that all participants

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[14] As noted earlier, prior to launching the study, we conducted a pre-test serving two purposes. First, we employed a belief elicitation procedure (Ajzen and Fishbein 1980) to elicit individuals' attitudes about withdrawing funds from a Roth or tax-deferred plan to aid in constructing the process measures. Second, we asked participants' opinions about various products to ensure that the potential items for purchase in the experiment are indeed perceived as hedonic/utilitarian and individuals would reasonably be willing to purchase them.

[15] Patrick and Park (2006) find the preference for prepayment only occurs for nondurable hedonic goods (e.g., a cruise).

in a given condition begin each round with the same purchasing power.[16] Thus, we view each

budgeting decision as independent of the others, but control for possible dependency by

randomizing the order of specific purchase options.

To examine the mediating forces contemplated in the hypotheses, we ask participants to

rate how Sam felt about the budget chosen in each round, and we include several post-

experimental items. The post-experimental items measure the extent to which tax consequences

enter the spending decision and whether thinking about taxes leads to negative affect (Elliot,

Jackson, Peecher, and White 2014). The specific items included in the instrument are displayed

in Appendix B. To explore more nuanced subgroups, we follow Park and Sela (2018) and

measure the extent to which individuals perceive themselves as affective or analytical thinkers

using the Hsee, Yang, Zheng, and Wang (2015) 6-item lay rationalism scale. We also include the

4-item spend-thrift scale developed by Rick, Cryder, and Loewenstein (2008).

RESULTS

Participants

Using best practices suggested by Buchheit, Doxey, Pollard, and Stinson (2018), in the

Fall of 2019 we recruited U.S. resident individuals from M-Turk based on the following criteria:

at least 40 years of age, filed at least five tax returns in the past seven years, and experience with

some type of investment vehicle (e.g., IRA, 401(k), mutual fund, employer pension plan, etc.).

We implemented these criteria to ensure participants have the knowledge and experience to

relate to the scenario and are old enough to have a realistic perspective on retirement. We

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[16] This design choice does come with the trade-off that participants could have concluded their spending decisions
were inconsequential. However, untabulated supplemental analysis using within-participant repeated measures
ANOVA suggests this is not the case. Round-to-round balance reductions negatively affect spending ($F = 3.578$, df
$= 3$, $p = 0.014$, all reported p-values are two-tailed unless noted otherwise), but none of the other independent
variables interact with round (all $F \leq 0.878$, df $= 3$, $p \geq 0.453$).

received 393 complete instrument responses. Of those, nine were multiple attempts from the same participants and five showed evidence of lying about their age to gain access to the instrument, leaving a total of 379 complete, valid responses. Those 379 participants took an average of 17.44 minutes to complete the study. We paid a flat rate of $1.00 for participation with a $1.00 bonus for careful completion of the instrument, yielding an effective hourly rate of $6.88. Of the 379 participants who provided complete, valid responses, six failed basic attention checks and 23 more failed manipulation checks, leaving 350 participants in the primary analyses.[17]

Table 1 presents participant demographics. Participants' mean age is 48.76 years, 52 percent are female, and 8 percent were retired at the time of the study. On average, they have 26.76 years of work experience, have filed tax returns in each of the past seven years, and report a mean and median household income in the range of $50,000 - $74,999. Participants are relatively diligent savers and report saving an average (median) of 12.02 (10) percent of their income for retirement annually. Their self-assessed financial knowledge is "average" (mean of 4.41 on a 7-point scale). Seventy-seven percent of participants report having saved in some type of tax-preferred account; 65 (40) percent have experience with a tax-deferred (Roth) account and 28 percent have used both. None of these demographics vary significantly by cell based on ANOVA or chi-square analyses (all $p \geq 0.328$) except for self-assessed financial knowledge ($p = 0.087$).[18]

[Insert Table 1 here]

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[17] Bonuses were awarded to participants who correctly answered an attention check question. Results of hypotheses testing are qualitatively unchanged when including the 29 participants who failed attention or manipulation checks.
[18] Self-assessed financial knowledge is not significantly correlated with the dependent variables (all $p \geq 0.327$), nor is it a significant covariate in the reported ANOVA models (all $p \geq 0.359$), nor does it have significant explanatory power in any of the reported structural equation models (all path coefficient p-values ≥ 0.373). Thus, we do not control for this variable in the reported results.

Dependent Variable and Mediator Descriptive Statistics

Research suggests that participants in Roth and tax-deferred plans will not necessarily accumulate the same amount of after-tax wealth (Stinson et al. 2020; Beshears et al. 2017), making the examination of nominal equivalence in addition to economic equivalence practically meaningful. As such, our primary dependent variable, *WealthConsumed*, grosses up *DEFERRED* participants' budgeting decisions to include tax effects and scales all participants' after-tax spending by their starting nominal account balance. The analysis of *WealthConsumed* accounts for the fact that to spend down nominally equivalent balances at the same rate, *DEFERRED* participants would need to spend strictly less than *ROTH* participants on the pre-tax price of goods. In other words, if two individuals retire with the same nominal balance, one in a tax-deferred account and the other in a Roth account, and make identical purchasing decisions, the individual with a tax-deferred account will run out of money sooner than the individual with a Roth account due to taxes. As displayed in Table 2, Panel A, on average, participants budgeted a total of 22.55 percent of their starting balance, with a standard deviation of 10.40 percent.

[Insert Table 2 here]

We conduct confirmatory principal components factor analyses on the post-experimental scales (see individual items in Appendix B) capturing the salience of tax thoughts (*TaxThoughts*) during budgeting and negative affect for the taxes imposed (*NegTaxAffect*). Untabulated factor analyses reveal the items measuring *TaxThoughts* (*NegTaxAffect)* load on a single factor with all factor loadings $\geq$ 0.858 (0.850).[19] Table 2, Panel B, reports descriptive statistics for the factor scores and individual items by cell. We use the factor scores in all subsequent non-SEM analyses but re-estimate the latent variables from the individual scale items in the SEM analyses.

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[19] Relying on the arithmetic mean of all items comprising each factor instead of the factor score does not qualitatively change the statistical conclusions nor study inferences.

Finally, we capture participants' affect for their completed budget in each round using a seven-point "pain face" scale, displayed in Appendix B. We use each participant's mean score over the four rounds (*SpendAffect*) in the univariate analyses, while the SEM models treat *SpendAffect* as a latent variable with each round as an indicator.[20] As shown in Table 2, Panel A, participants generally achieved a neutral or slightly positive level of spending affect (mean of 4.73 on the 7-point scale), suggesting they felt Sam was neither deprived of essential spending nor able to spend without consequence.

H1 – Tax Thoughts, Tax Affect, and Mediation

H1a predicts taxes will be more salient for individuals withdrawing funds from tax-deferred plans compared to Roth plans. We test this hypothesis using a two-way ANOVA on *TaxThoughts* with tax condition and balance level as factors. The results show that taxes are more salient to *DEFERRED* participants during the budgeting task, as predicted (F = 225.697, p < 0.001, Table 3, Panel A). We note that balance level does not have a significant main effect on *TaxThoughts* (F = 0.007, p = 0.934), nor does it interact with tax condition (F = 0.733, p = 0.393). Accordingly, limiting the hypothesis test to the two economically equivalent cells (*DEFERRED HIGH* and *ROTH LOW*) produces identical inferences (t = 11.013, df = 176, p < 0.001, untabulated).

[Insert Table 3 here]

Like H1a, we test H1b, which predicts *DEFERRED* participants will have significantly more negative tax affect, using a two-way ANOVA on *NegTaxAffect* with tax condition and balance level as factors. The evidence supports H1b; *DEFERRED* participants express significantly

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[20] Since this measure is collected after the budgeting decision, it likely also includes the influence of "tax thoughts" on spending affect. Thus, in the SEM analyses that follow, we control for *NegTaxAffect* when testing the influence of *SpendAffect* on participants' budgeting decisions.

more negative tax affect than *ROTH* participants (F = 228.308, p < 0.001, Table 3, Panel B). As in H1a, we note that balance level does not have a significant main effect on *NegTaxAffect* (F = 0.273, p = 0.601), nor does it interact with tax condition (F = 0.140, p = 0.709). Accordingly, limiting the hypothesis test to the two economically equivalent cells (*DEFERRED HIGH* and *ROTH LOW*) again produces identical inferences (t = 10.918, df = 176, p < 0.001, untabulated).

H1c predicts that negative tax affect will reduce spending. In order to test *NegTaxAffect* as a mediator between tax condition and spending, we construct the structural equation model (SEM1) depicted in Figure 2. The two manipulated independent variables (i.e., Tax Condition and Balance Level) and the primary dependent variable (*WealthConsumed*) are observed variables, while *TaxThoughts* and *NegTaxAffect* are latent variables with the individual scale items serving as indicator variables. For parsimony, we omit individual indicator and error variables from the figures. Fit statistics for the model are displayed in Table 4 and indicate acceptable fit based on commonly cited cutoffs for the CFI and RMSEA fit statistics (Byrne 2010).[21]

[Insert Figure 2 and Table 4 here]

The model estimation results in Figure 2 and Table 4 support H1c. Taxes are more salient to *DEFERRED* participants (standardized coefficient = 0.674, Z = 14.198, p < 0.001), who also have greater negative affect toward taxes in the experimental task (standardized coefficient = 0.490, Z = 7.718, p < 0.001), providing additional support for H1a and H1b, respectively. After controlling for direct effects of tax condition and balance level (H2) on *WealthConsumed*, *NegTaxAffect* significantly reduces spending (standardized coefficient = −0.241, Z = −3.437, p <

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[21] Byrne (2010, 78-79) notes that comparative fit index (CFI) values greater than 0.95 is considered indicative of a "well-fitting" model, while root mean error of approximation (RMSEA) values between 0.08 and 0.10 indicate mediocre fit.

0.001), as predicted in H1c. However, *NegTaxAffect* does not fully mediate the relation between tax condition and wealth consumed, as the direct link from tax condition (i.e., *DEFERRED* or *ROTH*) to *WealthConsumed* is positive and statistically significant (standardized coefficient = 0.397, Z = 5.869, p < 0.001).

H2 – Consumption Affect

The intuition leading to H2 suggests that because *DEFERRED* participants will experience significantly more negative affect associated with taxes than their *ROTH* counterparts, they may engage in a compensatory decision-making approach and thus focus more on the positive affect from consumption. To explore this possibility, we modify SEM1 to include the latent variable *SpendAffect*, resulting in SEM2, displayed in Figure 3 and Table 5.

[Insert Figure 3 and Table 5 here]

As with SEM1, SEM2 fits the data reasonably well, with fit statistics better than those of SEM1.[22] The relations identified in SEM1 hold in SEM2. Importantly, and consistent with H2a, *DEFERRED* participants feel happier about their spending choices after controlling for *NegTaxAffect* (standardized coefficient = 0.288, z = 3.969, p < 0.001). This, in turn, is associated with increased *WealthConsumed* (standardized coefficient = 0.156, z = 2.779, p = 0.005), consistent with *DEFERRED* participants engaging in "retail therapy" and using a compensatory model of choice to improve their overall affect for their budgeting as contemplated in H2b.

H3 – The Role of Nominal Balances

While H1 and H2 speak to countervailing affective reactions during taxpayers' retirement spending decisions, H3 considers the impact of individual wealth conveyed by nominal account

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[22] RMSEA for SEM2 is below the 0.08 cut-off for mediocre fit, and closer to the 0.05 cut-off for excellent fit. CFI has increased, and though it is still significant, the ratio of the chi-square statistic to degrees of freedom is now in the acceptable range of 2-3, at 2.49 (Byrne 2010).

balances. As previously discussed, we manipulated nominal account balances at two levels, high

and low. Given the same tax treatment (e.g., *ROTH HIGH* versus *ROTH LOW* or *DEFERRED HIGH*

versus *DEFERRED LOW*), raising the nominal balance of the account increases after-tax purchasing

power for the participant, and naturally leads to a predicted increase in spending. The highly

significant negative link from balance level (*HIGH/LOW*) to *WealthConsumed* in Table 5 and

Figure 3 is consistent with a ceiling effect on individual spending (standardized coefficient =

−0.145, z = −2.891, p = 0.004), suggesting any spending increases spurred by a higher nominal

balance were smaller than the simultaneous increase in wealth. However, to more directly test

the impact of nominal balances on spending levels contemplated in H3, we alter our SEM2

model to replace the *WealthConsumed* dependent variable with *TotalSpending*, representing the

sum of experimental dollars spent over the four experimental rounds (SEM3). Further supporting

H3, the results for SEM3 in Figure 4 and Table 6 show that participants with a higher nominal

balance spent more on the raw price of goods (standardized coefficient = 0.097, z = 1.856, p =

0.063), while all other paths remain consistent with our SEM2 results in Figure 3 and Table 5.

Thus, while participants in the *HIGH* conditions spend more than those in *LOW* conditions overall

(i.e., in nominal terms), they consume their larger wealth at a slower rate (i.e., in percentage

terms), which produces the significantly negative links between balance level and

WealthConsumed.

[Insert Figure 4 and Table 6 here]

Overall Spending Patterns

     Finally, we turn to the overarching research question: does tax timing impact retirees'

overall willingness to spend? We examine this question in two ways. First, using

WealthConsumed, we compare each pair of nominally equivalent conditions (*DEFERRED HIGH*

versus *ROTH HIGH* and *DEFERRED LOW* versus *ROTH LOW*). A two-way ANOVA on

WealthConsumed using tax condition and balance level as factors indicates that individuals with

nominally higher balances consume wealth significantly slower (F = 6.101, p = 0.014, Table 7).

The two-way ANOVA model in Table 7 also shows a significant, positive main effect of

DEFERRED on *WealthConsumed* (F = 21.650, p < 0.001) and an insignificant interaction (F =

0.003, p = 0.959) with the main effect of a *HIGH* nominal balance. Figure 5 further shows that

DEFERRED participants use more of their wealth than *ROTH* participants in every category. These

findings answer our overarching research question, suggesting that, given nominally equivalent

balances, *DEFERRED* participants fail to adjust for taxes in an economically rational way, and

thereby spend down their balance at a significantly faster rate.

[Insert Figure 5 and Table 7 here]

Next, we compare only the two economically equivalent cells, *DEFERRED HIGH* and

ROTH LOW. An independent samples t-test suggests *DEFERRED HIGH* participants spend down

retirement wealth significantly faster ($M_{Deferred}$ = 15.31 percent) than *ROTH LOW* participants

(M_{Roth} = 13.03 percent, t = 1.817, df = 166, p = 0.071, two-tailed, Table 8).[23] Interestingly,

spending choices on the big-ticket items appear to be driving the difference in *WealthConsumed*,

as *DEFERRED HIGH* participants budgeted 5.32 percent of total wealth compared to 4.66 percent

for the *ROTH LOW* participants (t = 2.050, df = 176, p = 0.042). The difference in wealth

consumption rates for the two additional "general essential" and "general discretionary"

spending categories approach marginal significance (t = 1.641, df = 166, p = 0.103, two-tailed).[24]

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[23] When examining budgeting by category, we noted outlier observations (i.e., observations outside of the three times interquartile range distance) within the "other" budget categories. In untabulated testing we determine this is the only analysis where inferences are affected by excluding versus including outliers. Therefore, we compare wealth consumption rates between the *ROTH LOW* and *DEFERRED HIGH* conditions after removing these outliers. Retaining the outliers reduces significance on the *WealthConsumed* comparison to p = 0.115, two-tailed.

[24] In all but one response (i.e., one out of 1,400 shortfall budgets), participants always budgeted $2,800 for the annual shortfall (i.e., the amount provided in the example), so that category is not included in this discussion.

It is worth noting, however, that there is a distinct pattern of spending results as shown in Figure 6; *DEFERRED HIGH* participants spend nominally more than *ROTH LOW* participants in *every* category. The overall pattern of results suggests that, given economic equivalence, the *DEFERRED* participants consume wealth faster than *ROTH* participants.

[Insert Figure 6 and Table 8 here]

Supplemental Analyses

Balance Affect

Given that *DEFERRED* participants spent down their available balance faster than *ROTH* participants, we also examine how the participants felt about their retirement balances. Participants responded to four items measuring their feelings about Sam's savings plan balance (see Appendix B for the items). *DEFERRED* participants felt significantly worse about their retirement balance in the task than the *ROTH* participants without regard to balance levels (t = 2.020, df = 348, p = 0.044, untabulated). This appears rational, as the *DEFERRED* participants do in fact have less spending power than *ROTH* participants with nominally equivalent balances. Further, comparing only the economically equivalent cells eliminates the difference in affect toward the retirement plan balance (t = 0.337, df = 176, p = 0.736, untabulated). However, despite generally feeling worse about their balances and spending down those balances faster than *ROTH* participants, *DEFERRED* participants did not report being more concerned about Sam running out of money during retirement (t = 0.977, df = 348, p = 0.329, untabulated, see Appendix B for the text of the item), again suggesting that they fail to take taxes into account during their conscious spending decisions.

Interestingly, participants may believe that they *are* in fact incorporating taxes into their spending decisions. When asked, on a −3 to + 3 Likert Scale, how Sam would spend differently

if the retirement plan was taxed differently, participants in the *DEFERRED* plan believed they

would spend significantly *more* if they were taxed in the manner featured in the *ROTH* conditions

($M_{Deferred} = 0.65$, $t = 7.533$, $df = 174$, $p < 0.001$, see Appendix B for text of the questions).

Likewise, *ROTH* participants believed they would spend significantly *less* if they were taxed as in

the *DEFERRED* conditions ($M_{Roth} = -1.53$, $t = -16.987$, $df = 174$, $p < 0.001$). Both responses are

economically rational, assuming the participants believed their nominal balance would remain

the same. However, these responses clearly contrast with the experiment results, suggesting tax

timing's effects on retirement spending decisions are not, or at least not entirely, conscious.

Control Variables

The order of the big-ticket items is randomized by round, resulting in 24 unique

instrument orders. The order randomization was successful as no individual item's order is

associated with experimental condition (all $\chi^2 \leq 9.738$, $df = 9$, $p \geq 0.372$, untabulated). Order has

no significant main, two-way, or three-way interaction effects on any of the primary or mediating

dependent variables used in hypotheses testing (all $F \leq 1.352$, $df = 23$, $p \geq 0.151$, untabulated).

Participants' measured lay rationalism (Hsee, et al. 2015) does not significantly moderate the

SEM1 or SEM2 results displayed in Figures 2 and 3 based on a median split or scale midpoint

split. Specifically, there is no significant improvement in model chi-square (all $p \geq 0.406$,

untabulated) from allowing the model parameters to vary freely between participants who tend to

be financial thinkers versus feelers. Further, including the lay rationalism scale as a control

variable does not qualitatively change the SEM1 and SEM2 results. While lay rationalism is

significantly negatively related to *WealthConsumed* (standardized path coefficient $= -0.117$, $p =$

0.020, untabulated), it does not affect the mediating variables (both $p \geq 0.175$, untabulated), and

the previously reported path coefficients remain qualitatively unchanged.[25] Although age is associated with a significant decrease in wealth consumption (standardized path coefficient = −0.140, p = 0.005, untabulated), age does not affect the mediating variables (both p ≥ 0.263, untabulated) and including age as a control in the SEM models does not qualitatively change the reported results.

CONCLUSION

The tax incentives afforded to tax-deferred and Roth retirement plans are ostensibly designed to encourage taxpayers to accumulate their own retirement savings and become less reliant on other government- or employer-provided sources of income (e.g., Social Security, pensions, etc.), However, while individuals generally prefer Roth patterns of taxation (Cuccia et al. 2020) and are generally better at assessing and accumulating future spending power under such a plan (Stinson et al. 2020), relatively little is known about the long-term effects differing modes of taxation have on individuals' spending and utility derived from retirement funds. To provide evidence on this research question, we employ an online experiment in which U.S. individuals make budgeting decisions after being randomly assigned to a tax-deferred or Roth account. We maintain constant tax rates across conditions and further manipulate the nominal balance of retirement savings at two levels (high/low).

Overall, the results suggest that tax-deferred account holders feel the "pain" of taxes due on their retirement withdrawals. Across all conditions, tax-deferred account holders report higher levels of tax-related thinking and negative affect during their budgeting decisions, which places downward pressure on their spending decisions. However, consistent with research on "retail

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[25] Additionally, participants' tendency to spend in general as measured by the spendthrift scale (Rick et al. 2008) does not significantly affect wealth consumed (p = 0.188, untabulated), or the mediating variables in the SEM models (both p ≥ 0.493, untabulated) nor does including it as a control variable in the structural equation models qualitatively change the results.

therapy" and the compensatory model of choice for desired purchases (Hogarth 1987), tax-deferred account holders also appear to give greater consideration to the expected benefits of consumption (e.g., comfort, entertainment) when they choose to spend from savings. The results also show that tax-deferred participants are uniquely susceptible to the anchoring and adjustment heuristic. Specifically, tax-deferred and Roth participants with equivalent *nominal* balances spend at the same rate in *nominal* terms. As a result, tax-deferred participants effectively ignore the additional taxes triggered by their spending and consume retirement funds at a significantly faster rate than Roth participants.

This study is not without limitations. First, while we restricted participants to those over 40, only a small percentage of participants are currently retired. Thus, to the extent their current decisions do not reflect the decisions they would make in the future, this limits the generalizability of the results. In addition, participants responded to a hypothetical budgeting task, and thus did not make actual spending decisions. We do not have any reason to believe either of these limitations would interact with tax condition. Further, while the range of participants' reported income included the entire range of the response scale, on average the participants have slightly higher income than national medians, raising the question of whether the results generalize to significantly higher or lower income levels. Finally, we limited participation to individuals 40 years or older to ensure participants could realistically think about a retirement scenario. In our results, age did not interact with the independent variables, but it is possible that younger generations will make retirement decisions differently, and future studies could include younger participants.

The results of this study have important implications for theory, financial advisors, and policy makers alike. This study is the first to examine how economic (e.g., tax timing) and non-

economic (e.g., negative tax-related affect, positive affect from spending) variables affect the use of retirement savings. By providing this evidence we add to theory surrounding incentives to save and spend in a way that is not discernable from archival analysis. This is particularly important as concerns rise about whether individuals can properly save for and spend during retirement (e.g., Banks et al. 1998, Moore 2018). In addition, this information should prove useful for financial advisors who may better inform their clients of potential implications of their savings choices. Finally, the results should interest policy makers with respect to the economic trade-offs associated with different policy choices, as it is unlikely lawmakers have considered that individuals will ultimately spend differently depending on the timing of tax payments.

After being presented with Sam's savings plan information, recurring expenses and estimated shortfall, participants read the following text: "The balance in the Smith/Jones Savings Plan is also meant to cover any additional expenses Sam faces during retirement. For example,"

Essential Spending

Sam needs to include in the budget any other essential spending possibly occurring in the year. This could include, among other categories: clothes, personal care, replacing or repairing minor appliances like the toaster, etc. In the past, depending on things that occurred during the year and the choices Sam made, other essential spending totaled anywhere from $600 to $12,000.


Discretionary Spending

Sam also needs to include in the budget any discretionary spending possibly occurring in the year. This could include, among other categories: gifts for loved ones, entertainment like going to the movies and dining outside the home, hobbies, etc. In the past, depending on things that occurred during the year and the choices Sam made, other discretionary spending totaled anywhere from $600 to $12,000.

SpendAffect
After each budgeting round, after participants were shown how much money would be withdrawn from Sam's savings plan, participants responded to the following "pain" scale. Responses are coded 1-7 such that higher numbers indicate more positive affect. *SpendAffect* is the mean of the responses for the four budgeting rounds.
Instructions: Which of the following best summarizes how Sam feels about these budgeting decisions.
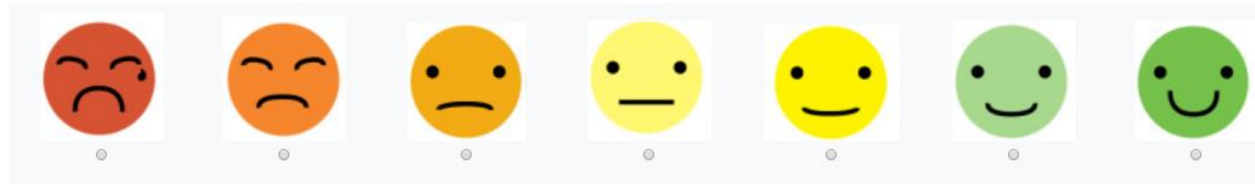
TaxThoughts
These items were asked after the budgeting task for all rounds was completed.
Instructions: Please indicate the extent to which you agree or disagree with the following statements about things Sam may have considered when making budgeting decisions [Response scale is a 7-point labeled Likert scale ranging from "strongly disagree" to "strongly agree".]
1. Sam was thinking about the tax consequences while making budgeting decisions. [Salient]
2. Taxes were a major influence on Sam's budgeting decisions. [Influential]
3. Sam was worried about paying taxes during retirement. [Worrisome]

NegTaxAffect
These items were asked after the budgeting task for all rounds was completed.
Instructions: Please indicate the extent of your agreement with each of the following statements about Sam's feelings about how retirement savings were taxed. [Response scale is a 7-point labeled Likert scale ranging from "strongly disagree" to "strongly agree"]. Items indicated with an (R) are reverse coded for purposes of created the scale.
1. Sam was happy with how retirement savings were taxed. [Happy] (R)
2. Sam was angry with how retirement savings were taxed. [Angry]
3. Sam was disappointed with how retirement savings were taxed. [Disappointed]
2. Sam was pleased with how retirement savings were taxed. [Pleased] (R)

BalanceAffect
These items were asked after the budgeting task for all rounds was completed.
Instructions: Please indicate the extent of your agreement with each of the following statements about Sam's feelings about the savings plan balance. [Response scale is a 7-point labeled Likert scale ranging from "strongly disagree" to "strongly agree"]. Items indicated with an (R) are reverse coded for purposes of created the scale.
1. Sam was happy with the savings plan balance. [Happy] (R)
2. Sam was angry with the savings plan balance. [Angry]
3. Sam was disappointed with the savings plan balance. [Disappointed]

2. Sam was pleased with the <u>savings plan balance</u>. [Pleased] (R)

<u>Other post-experimental items about Sam's thoughts and feelings.</u>
These items were asked after the budgeting task for all rounds was completed.
Instructions: Please indicate the extent to which you agree or disagree with the following statements about things Sam may have considered when making budgeting decisions [Response scale is a 7-point labeled Likert scale ranging from "strongly disagree" to "strongly agree".]
1. Sam was concerned about running out of money during retirement.
2. Sam was concerned about missing out on future investment returns.
3. Sam finds taxes confusing.
4. Sam views taxes as cheap.
5. Sam wanted to enjoy retirement.

Spend Differently
Response scale is a 7-point Likert scale coded -3 to +3 and anchored with "spend a great deal **less**" and "spend a great deal **more**"; the midpoint was labeled "No difference in spending"

ROTH Conditions responded to the following item:
"How would Sam spend differently if the funds in the Smith Savings Plan had been taxed when they were withdrawn instead of upfront (i.e., when they were contributed)?"

DEFERRED Conditions responded to the following item:
"How would Sam spend differently if the funds in the Jones Savings Plan had been taxed upfront i.e., when they were contributed) instead of when they were withdrawn?"

Selected Demographic Items
Household Income
"What is your household income (before taxes)?" Response options: under $15,000, $15,000-$24,999, $25,000-$34,999, $35,000-$49,000, $50,000-$74,999, $75,000 - $99,000, $100,000-$149,000, $150,000 - $199,999, $200,000 or more, and prefer not to respond.

Retirement Savings Rate
"On average, what percentage of your total household income do you (and your spouse or significant other as applicable) save for retirement? (A rough estimate is fine.)" Response is a text box requiring a valid response between 0 and 100.

Currently Retired
Are you currently retired? Response options: yes, no.

Financial Knowledge
"I would describe my knowledge of personal finances and investing as…" Responses are on a 7-point Likert scale with the following labeled points: far below average, below average, somewhat below average, average, somewhat above average, above average, and far above average.

Roth/Deferred Experience
This item was included at the beginning of the study, and was one of the screening items for participation: "Which of the following accounts do you [or your spouse/significant other (if applicable)] have money in? Please select all that apply." Response options [*indicates a response that would qualify for participation]:

*1. Roth IRA, 401(k), 403(b), or any other defined contribution plan that DID NOT reduce my current taxes.

*2. Traditional (i.e., regular) IRA, 401(k), 403(b), 457, or other defined contribution plan that DID reduce my current taxes.

3. Savings account.

4. Checking Account.

*5. Mutual fund outside of retirement plan.

6. Paypal Account.

*7. Direct Savings Plan (through federal government).

*8. Employer Pension Plan.

9. None of the above. I (we) do not have any savings, checking, or investment accounts.

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Exhibit 1
Illustration of Nominal Account Balances Necessary to Create Spending Power Equivalence for Roth and Tax-Deferred Plans

Assume: Tax Rate 10%	Hypothetical Return	Roth Withdrawal	Roth Balance	Tax-Deferred Withdrawal, Including Tax*	Tax-Deferred Nominal Balance	Tax-Deferred After-Tax Spending Power of Balance[ꜩ]
RETIREMENT DAY			$ 125,000		$138,889	$125,000
Year 1	0%	$ 10,000	$ 115,000	$ 11,111	$127,778	$115,000
Year 2	2%	$ 8,000	$ 109,140	$ 8,889	$121,267	$109,140
Year 3	5%	$ 11,000	$ 103,047	$ 12,222	$114,497	$103,047
Year 4	7%	$ 9,000	$ 100,630	$ 10,000	$111,811	$100,630
Year 5	−3%	$ 12,000	$ 85,971	$ 13,333	$95,524	$85,971

This exhibit provides an illustration of a Roth and Tax-Deferred plan with equivalent spending power, assuming a 10% tax rate. Specifically, a tax-deferred plan will have a higher nominal balance; however if after-tax spending is equal and, in the case of the tax-deferred plan, taxes are paid with funds from the tax-deferred account, the spending power equivalence will be preserved despite taxes on withdrawals and investment returns.

* Tax-Deferred Withdrawal is calculated so that the withdrawal from the tax-deferred account will have the same spending power as the withdrawal from the Roth account. For instance, the spending power of a tax-deferred withdrawal of 11,111 will result in a tax of 1,111 (11,111 × 10% = 1,111). Thus, after the tax consequences, a withdrawal of 11,111 will result in a remaining amount available to spend of 10,000.

[ꜩ] The Tax-Deferred After-Tax Spending Power is the amount an individual would have remaining if the entire account balance was withdrawn after paying a 10% tax (e.g., $138,889 × 10% = $13,889, leaving $138,889 – 13,889 = $125,000).

Exhibit 2
Beginning Retirement Account Balances by Condition and Round

	Retirement Plan Condition		
Balance Condition	ROTH	DEFERRED	
	Nominal Balance = Spending Power	Nominal Balance	Spending Power
HIGH			
Round 1	$198,700	$198,700	$158,960
Round 2	$192,739	$192,739	$154,191
Round 3	$186,778	$186,778	$149,422
Round 4	$180,817	$180,817	$144,654
LOW			
Round 1	$158,960	$158,960	$127,168
Round 2	$154,191	$154,191	$123,353
Round 3	$149,422	$149,422	$119,538
Round 4	$144,654	$144,654	$115,723

Note: The ROTH LOW and DEFERRED HIGH conditions are economically equivalent given the stated 20 percent tax rate (e.g., for round 1, $198,700 less taxes of $39,740 at 20% = $158,960). The other two conditions are included: 1) so the design is fully crossed; and 2) to control for any effects based on the nominal size of the balance. In the experiment the Roth (tax-deferred) type plan is called the Smith (Jones) plan to control for differences in participants' knowledge of features of existing Roth and tax-deferred plans. At the beginning of rounds 2 – 4 participants were informed: "After a year of spending and investment returns on the remaining balance in the Smith [Jones] plan, Sam's balance going into Year 2/3/4 is:" Balances were readjusted each round in order to simplify the analyses and account for the possibility of investment returns.

Exhibit 3
Budgeting Task All Conditions

Complete Sam's spending budget using the fields below.

Sam's Spending Budget

Annual Shortfall ($2,800 per year)	$ [2800]
Washer & Dryer (Est. $1,225 to $4,925)	$ [-]
Other Essential Spending examples: clothes, personal care, minor appliance repair/maintenance, etc. (Historical spending $600 to $12,000)	$ [-]
Other Discretionary Spending examples: gifts, entertainment, hobbies (Historical spending $600 to $12,000)	$ [-]

Confirmation and Modification Opportunity

Deferred   Roth

You think Sam will budget the following amounts for the year.

Withdrawals

Annual Shortfall	$ 2,800
Washer & Dryer	2,000
Other Essential Spending	1,000
Other Discretionary Spending	1,000
Total Spending Budgeted	6,800
Tax Cost for Withdrawal	1,700
Total to be Withdrawn from Jones Plan	$ 8,500

Do you wish to revise any of Sam's budget items before moving on to the next decision?

○ Yes, I want to change some of my answers.

○ No, I am satisfied with my answers.

You think Sam will budget the following amounts for the year.

Withdrawals:

Annual Shortfall	$ 2,800
Washer & Dryer	2,000
Other Essential Spending	1,000
Other Discretionary Spending	1,000
Total Budgeted Withdrawals	$ 6,800

Do you wish to revise any of Sam's budget items before moving on to the next decision?

○ Yes, I want to change some of my answers.

○ No, I am satisfied with my answers.

Note: In each of 4 rounds participants budget for the annual shortfall, other essential spending, and other discretionary spending (see Appendix A). In addition, each round also includes one big-ticket item; the big-ticket items are randomized across rounds. The example depicted here includes the washer & dryer as the big-ticket item. The other three big-ticket items are a cruise, a home theater system, and a refrigerator.

Figure 1

Summary of Hypotheses
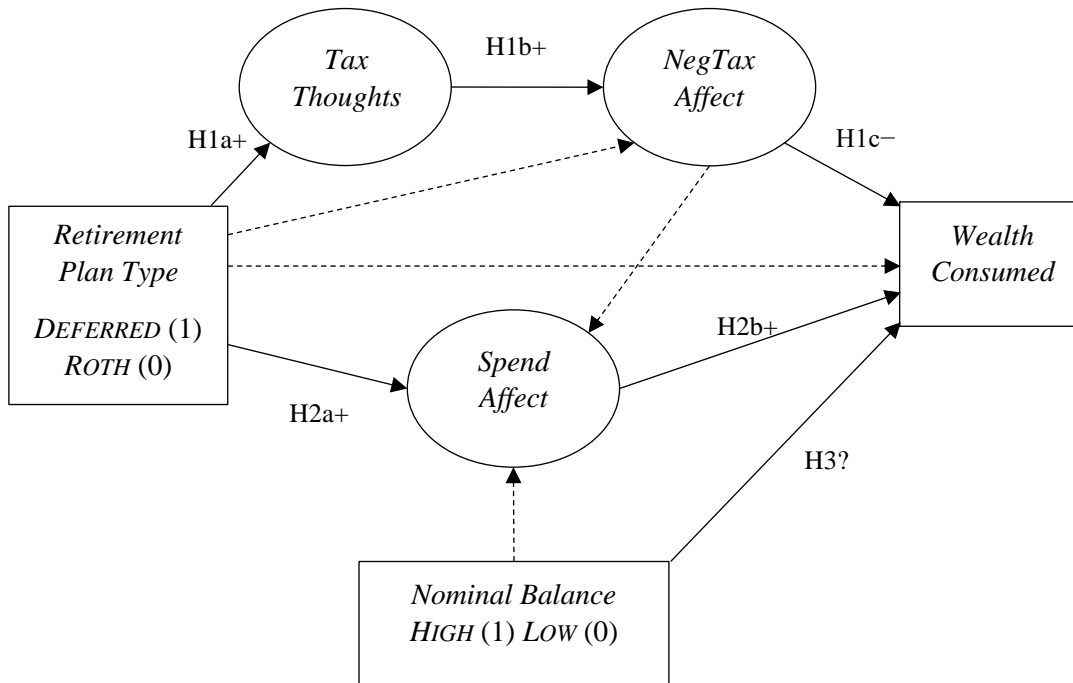
Where:

TotalSpending	=	Spending from retirement accounts.
TaxThoughts	=	Salience of thoughts about taxes.
NegTaxAffect	=	Negative affect towards taxes.
SpendAffect	=	Affect towards spending.
Retirement plan type	=	Equal to 1 (0) for tax-deferred (Roth) retirement plan condition.
Nominal Balance	=	Equal to 1 (0) for high (low) nominal balance condition.

Solid lines represent hypothesized effects, dashed lines represent un-hypothesized control effects.

Figure 2

Structural Equation Model (SEM1) Testing H1
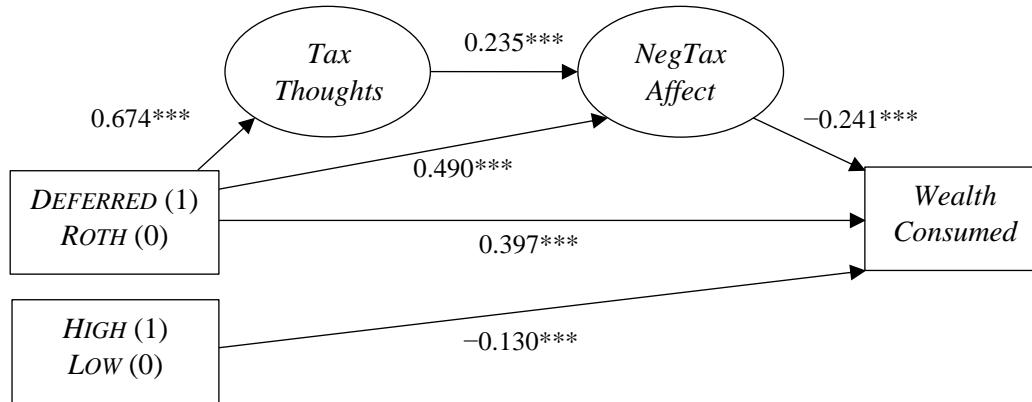
Tax Thoughts → 0.235*** → *NegTax Affect*

0.674***

−0.241***

DEFERRED (1)
ROTH (0)

0.490***

Wealth Consumed

0.397***

HIGH (1)
LOW (0)

−0.130***

***, **, and * represent two-tailed significance at the 0.01, 0.05, and 0.10 levels, respectively.

See Table 4 for variable descriptions and fit statistics.

Figure 3

Expanded Structural Equation Model (SEM2) to test H2

Panel B: Nominal Spending
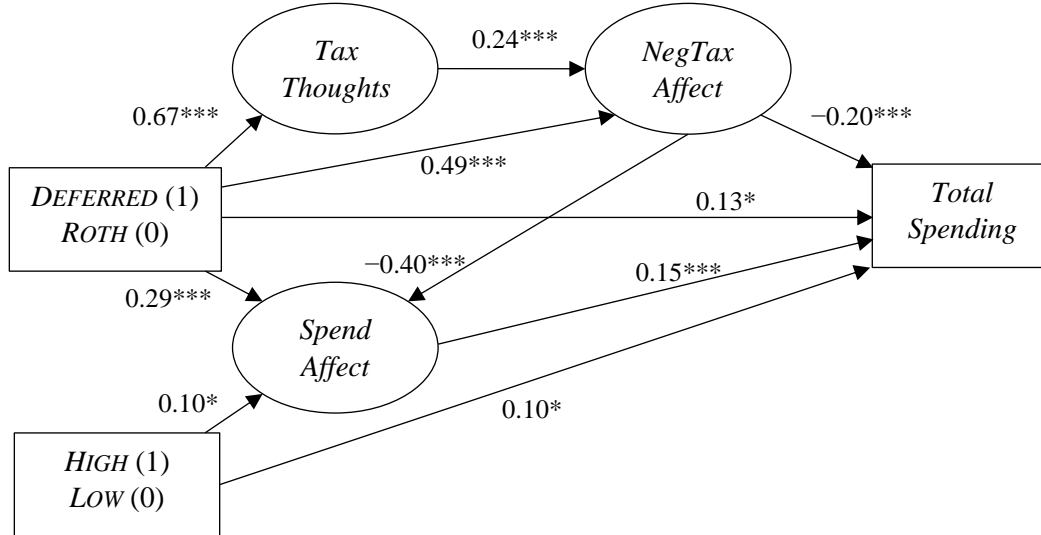
***, **, and * represent two-tailed significance at the 0.01, 0.05, and 0.10 levels, respectively.

See Table 5 for variable descriptions and fit statistics.

Figure 4

Expanded Structural Equation Model (SEM3) to test H3

Tax Thoughts → *NegTax Affect*: 0.24***

DEFERRED (1) *ROTH* (0) → *Tax Thoughts*: 0.67***

DEFERRED (1) *ROTH* (0) → *NegTax Affect*: 0.49***

NegTax Affect → *Total Spending*: −0.20***

DEFERRED (1) *ROTH* (0) → *Total Spending*: 0.13*

NegTax Affect → *Spend Affect*: −0.40***

Spend Affect → *Total Spending*: 0.15***

DEFERRED (1) *ROTH* (0) → *Spend Affect*: 0.29***

HIGH (1) *LOW* (0) → *Spend Affect*: 0.10*

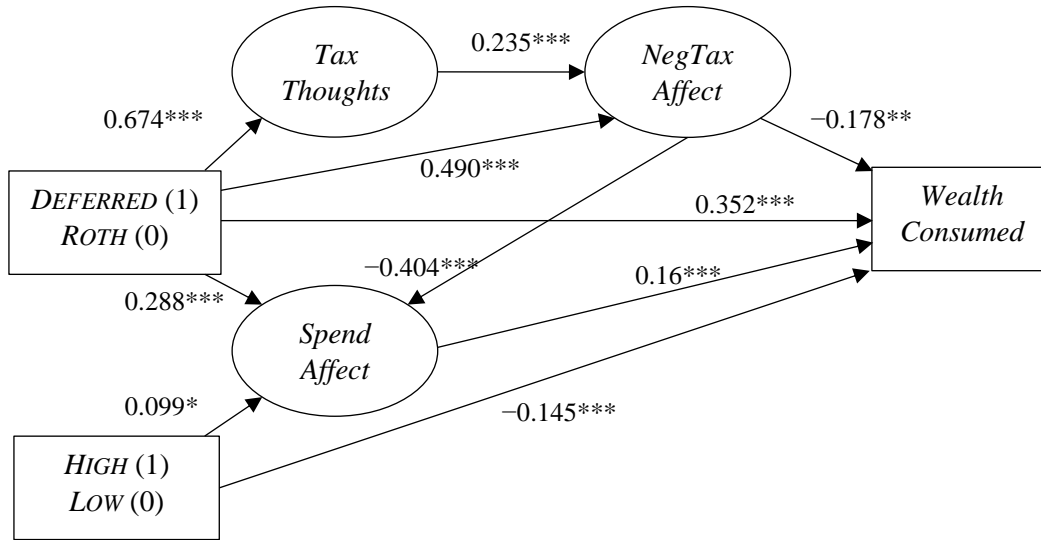*HIGH* (1) *LOW* (0) → *Total Spending*: 0.10*

***, **, and * represent two-tailed significance at the 0.01, 0.05, and 0.10 levels, respectively.

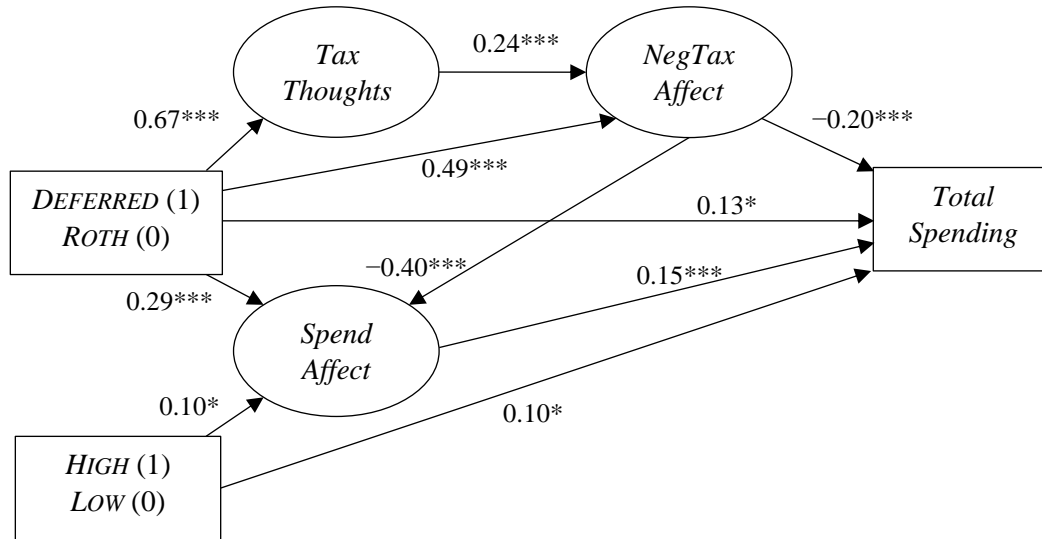See Table 6 for variable descriptions and fit statistics.

Figure 5
Nominally Equivalent *ROTH* and *DEFERRED* Participants' *WealthConsumed* by Category
Panel A: *HIGH* Balance Conditions
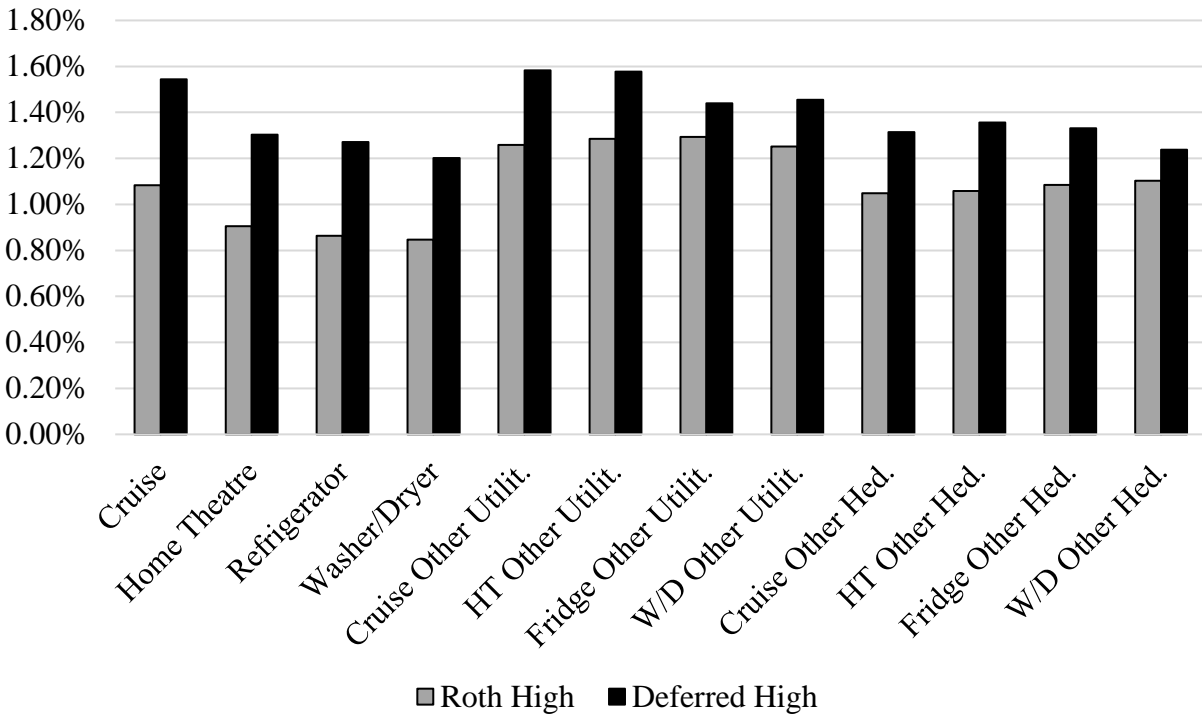
Panel B: *LOW* Balance Conditions
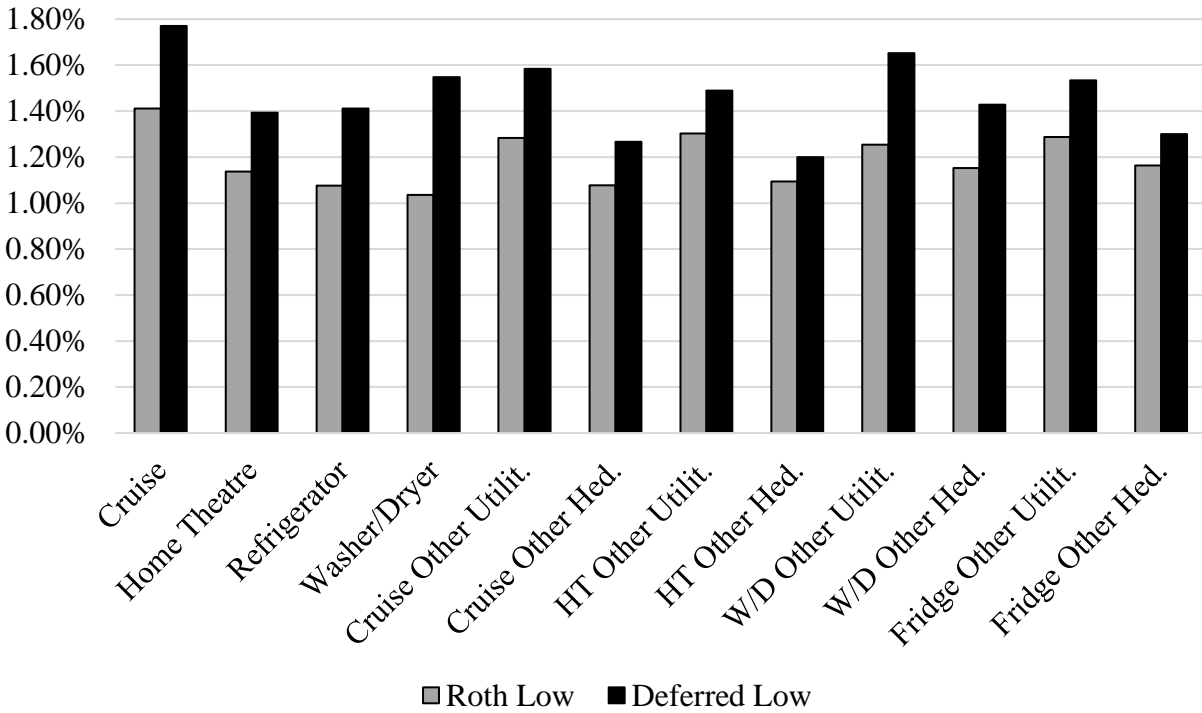
Note: *HIGH* and *LOW* refer to the level of nominal account balances in each round (see Figure 2). The experiment includes four randomly ordered budgeting rounds. In each round, participants budget for the annual shortfall (not displayed above), the other essential (labeled "Utilit." above), and discretionary (labeled "Hed." above) items (see Appendix A for the information provided to participants about these expenditures). They also budget for one big-ticket item (i.e., a cruise, home theatre system, refrigerator, or washer & dryer) in each round. Thus, the label "Cruise Other Utilit." indicates the average amount participants budgeted for the other essential items in the round where they budgeted for the cruise, etc.

Figure 6

Economically Equivalent *ROTH LOW* and *DEFERRED HIGH* Participants' *WealthConsumed* by Category
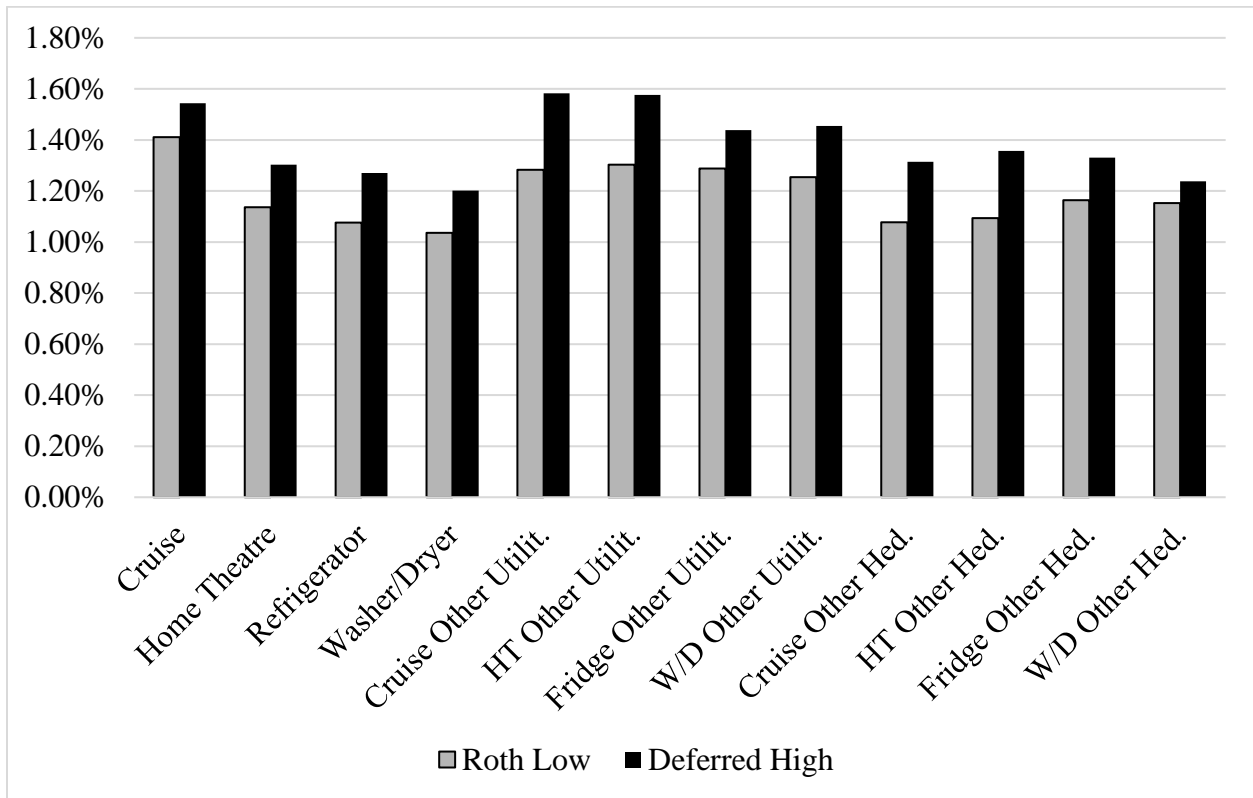
Note: See Figure 4 notes for explanation of spending categories and Figure 2 for experimental conditions.

Table 1
Participant Demographics

	Mean or Proportion (s.d. if applicable)				
	Total Sample **N = 350**	*ROTH LOW* **N = 91**	*ROTH HIGH* **N = 84**	*DEFERRED LOW* **N = 88**	*DEFERRED HIGH* **N = 87**
% Female	52%	53%	52%	57%	44%
Age (in years)	48.76	49.22	48.86	49.49	47.45
	(7.91)	(7.54)	(8.22)	(8.33)	(7.52)
Work Experience (in years)	26.76	27.25	26.12	26.84	26.78
	(8.75)	(8.47)	(9.15)	(9.18)	(8.30)
Tax Returns Filed in Past 7 Years	6.95	6.92	6.95	6.94	6.97
	(0.29)	(0.34)	(0.31)	(0.32)	(0.18)
Median Household Income	$50k - $75k	$50k - $75k	$50k - $75k	$50k - $75k	$50k - $75k
Retirement Savings Rate	12.02%	11.69%	12.35%	12.61%	11.44%
	(8.66%)	(10.48%)	(7.89%)	(8.73%)	(7.15%)
Roth/Deferred Exp.					
Roth	40%	34%	40%	41%	45%
Deferred	65%	66%	60%	64%	69%
Roth & Deferred	28%	22%	26%	30%	33%
Roth or Deferred	77%	78%	74%	75%	80%
Currently Retired	8%	9%	6%	10%	7%
Financial Knowledge (1-7)	4.41	4.18	4.38	4.53	4.57
	(1.16)	(1.09)	(1.34)	(1.05)	(1.11)

Notes:
See Exhibit 2 for condition description and Appendix B for the items measuring Household Income, Retirement Savings Rate, Currently Retired, Financial Knowledge, and Roth/Deferred Experience. Note percentages for Roth/Deferred Experience indicate the percentage of participants who have money in each type of account.

Table 2
Dependent Variable Descriptive Statistics
Panel A: Total Sample Statistics (n=350)

	Min	Max	Mean	s.d.	Alpha	Min Factor Loading	Eigen Value	Variance Explained
WealthConsumed	5.64%	72.40%	22.55%	10.40%	NA	NA	NA	NA
TaxThoughts	−1.757	1.943	0.000	1.001	0.875	0.858	2.402	80.06%
NegTaxAffect	−1.673	2.415	0.002	1.000	0.932	0.850	3.325	83.13%
SpendAffect	1	7	4.734	1.156	0.904	NA	NA	NA

Panel B: Statistics by Cell

	ROTH LOW (N=91)		*ROTH HIGH (N=84)*		*DEFERRED LOW (N=88)*		*DEFERRED HIGH (N=87)*	
	Mean	s.d.	Mean	s.d.	Mean	s.d.	Mean	s.d.
WealthConsumed	21.32%	8.58%	18.72%	9.78%	26.38%	10.63%	23.67%	11.11%
TaxThoughts	−0.660	0.816	−0.595	0.931	0.667	0.667	0.589	0.688
Salient	2.802	1.558	2.940	1.806	5.239	1.330	5.207	1.268
Influential	2.703	1.441	2.845	1.780	4.932	1.285	4.839	1.275
Worrisome	2.835	1.544	2.869	1.670	4.636	1.416	4.379	1.519
NegTaxAffect	−0.591	0.684	−0.666	0.773	0.638	0.855	0.625	0.800
Angry	2.440	1.310	2.155	1.125	3.784	1.489	3.713	1.454
Disappointed	2.429	1.056	2.250	1.201	4.409	1.490	4.414	1.427
Pleased[a]	2.725	1.146	2.810	1.460	4.648	1.322	4.621	1.323
Happy[a]	2.747	1.141	2.679	1.319	4.705	1.332	4.724	1.378
SpendAffect	4.602	1.188	4.830	1.069	4.651	1.249	4.862	1.100

Notes:

WealthConsumed is the sum of the tax-adjusted spending (i.e., includes the gross up for taxes in the tax-deferred conditions) budgeted over the 4 experimental rounds, divided by round 1 starting nominal balances (i.e., $158,960 [$198,700] in the low [high] conditions).

See Appendix B for the items used to capture *TaxThoughts, NegTaxAffect,* and *SpendAffect.* Means and standard deviations for *TaxThoughts* and *NegTaxAffect* are for the factor scores; all other means and standard deviations for the other independent variable items are based on participants' responses on a 7-point likert scale.

[a] reverse coded

Table 3
Panel A: ANOVA Results for *TaxThoughts**

Source of Variance	Type 3 SS	df	MS	F	p
Model	138.715	3	46.238	75.722	< 0.001
DEFERRED	137.818	1	137.818	225.697	< 0.001
HIGH	0.004	1	0.004	0.007	0.934
DEFERRED × HIGH	0.447	1	0.447	0.733	0.393
Error	211.279	346	0.611		

Panel B: ANOVA Results for *NegTaxAffect**

Source of Variance	Type 3 SS	df	MS	F	p
Model	138.893	3	46.298	76.126	< 0.001
DEFERRED	138.851	1	138.851	228.308	< 0.001
HIGH	0.166	1	0.166	0.273	0.601
DEFERRED × HIGH	0.085	1	0.085	0.140	0.709
Error	210.428	346	0.608		

Where:

DEFERRED	=	Indicator equal to 1 (0) for tax-deferred (Roth) retirement plan condition.
HIGH	=	Indicator equal to 1 (0) for high (low) nominal balance condition.

*See Appendix B for the items used to measure *TaxThoughts* and *NegTaxAffect*. The dependent variables in these ANOVAs are the factor scores.

Table 4
Structural Equation Model Results for H1

Link			Std. Coeff.	Std. Error	Z	p	Prediction
DEFERRED	→	*TaxThoughts*	0.674	0.158	14.198	< 0.001	H1a +
DEFERRED	→	*NegTaxAffect*	0.490	0.145	7.719	< 0.001	H1b +
TaxThoughts	→	*NegTaxAffect*	0.235	0.044	3.706	< 0.001	+
NegTaxAffect	→	*WealthConsumed*	−0.241	0.006	−3.437	< 0.001	H1c −
DEFERRED	→	*WealthConsumed*	0.397	0.014	5.869	< 0.001	?
HIGH	→	*WealthConsumed*	−0.130	0.011	−2.567	0.010	H3?

$\chi^2 = 131.520$ df = 32   p < 0.001   CFI = 0.957   RMSEA = 0.094

Where:

WealthConsumed	=	Sum of tax-adjusted spending budgeted over 4 experimental rounds, divided by round 1 starting nominal balance.
TaxThoughts	=	Latent variable capturing the extent to which taxes were considered during budgeting decisions (see Appendix B for the items included).
NegTaxAffect	=	Latent variable capturing affect triggered by taxes during the experimental task (see Appendix B for the items included).
DEFERRED	=	Indicator equal to 1 (0) for tax-deferred (Roth) retirement plan condition.
HIGH	=	Indicator equal to 1 (0) for high (low) nominal balance condition.

Table 5
Structural Equation Model Results for H2

	Link		Std. Coeff.	Std. Error	Z	p	
DEFERRED	→	*TaxThoughts*	0.674	0.158	14.196	< 0.001	H1a +
DEFERRED	→	*NegTaxAffect*	0.490	0.145	7.720	< 0.001	H1b +
TaxThoughts	→	*NegTaxAffect*	0.235	0.044	3.702	< 0.001	+
NegTaxAffect	→	*WealthConsumed*	−0.178	0.007	−2.437	0.015	H1c −
DEFERRED	→	*WealthConsumed*	0.352	0.014	5.101	< 0.001	?
HIGH	→	*WealthConsumed*	−0.145	0.010	−2.891	0.004	H3?
DEFERRED	→	*SpendAffect*	0.288	0.162	3.969	< 0.001	H2a+
HIGH	→	*SpendAffect*	0.099	0.120	1.855	0.064	+
NegTaxAffect	→	*SpendAffect*	−0.404	0.076	−5.211	< 0.001	?
SpendAffect	→	*WealthConsumed*	0.156	0.005	2.779	0.005	H2b+

$\chi^2 = 174.358$ df = 70   p < 0.001   CFI = 0.968   RMSEA = 0.065

Where:

WealthConsumed	=	Sum of tax-adjusted spending budgeted over 4 experimental rounds, divided by round 1 starting nominal balance.
TaxThoughts	=	Latent variable capturing the extent to which taxes were considered during budgeting decisions (see Appendix B for the individual items).
NegTaxAffect	=	Latent variable capturing affect triggered by taxes during the experimental task (see Appendix B for the individual items).
SpendAffect	=	Latent variable capturing affect triggered by expected benefits of spending retirement funds.
DEFERRED	=	Indicator equal to 1 (0) for tax-deferred (Roth) retirement plan condition.
HIGH	=	Indicator equal to 1 (0) for high (low) nominal balance condition.

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Table 6
Structural Equation Model Results for H3

Link			Std. Coeff.	Std. Error	Z	p	Prediction
DEFERRED	→	*TaxThoughts*	0.674	0.158	14.196	< 0.001	H1a +
DEFERRED	→	*NegTaxAffect*	0.490	0.145	7.720	< 0.001	H1b +
TaxThoughts	→	*NegTaxAffect*	0.235	0.044	3.704	< 0.001	+
NegTaxAffect	→	*TotalSpending*	−0.197	1,072.770	−2.601	0.009	H1c −
DEFERRED	→	*TotalSpending*	0.125	2,314.428	1.748	0.080	?
HIGH	→	*TotalSpending*	0.097	1,686.803	1.856	0.063	H3+
DEFERRED	→	*SpendAffect*	0.288	0.162	3.969	< 0.001	H2a+
HIGH	→	*SpendAffect*	0.100	0.120	1.855	0.064	?
NegTaxAffect	→	*SpendAffect*	−0.404	0.076	−5.211	< 0.001	?
SpendAffect	→	*TotalSpending*	0.150	841.612	2.578	0.010	H2b+

$\chi^2 = 174.742$ df = 70 $p < 0.001$ CFI = 0.968   RMSEA = 0.065

Where:

TotalSpending	=	Sum of nominal spending budgeted over 4 experimental rounds.
TaxThoughts	=	Latent variable capturing the extent to which taxes were considered during budgeting decisions (see Appendix B for the individual items).
NegTaxAffect	=	Latent variable capturing affect triggered by taxes during the experimental task (see Appendix B for the individual items).
SpendAffect	=	Latent variable capturing affect triggered by expected benefits of spending retirement funds.
DEFERRED	=	Indicator equal to 1 (0) for tax-deferred (Roth) retirement plan condition.
HIGH	=	Indicator equal to 1 (0) for high (low) nominal balance condition.

Table 7
ANOVA Results for *WealthConsumed*

Source of Variance	Type 3 SS	df	MS	F	p
Model	0.277	3	0.092	9.130	< 0.001
DEFERRED	0.219	1	0.219	21.650	< 0.001
HIGH	0.062	1	0.062	6.101	0.014
DEFERRED × HIGH	0.000	1	0.000	0.003	0.959
Error	3.500	346	0.010		

Where:

WealthConsumed	=	Sum of tax-adjusted spending budgeted over 4 experimental rounds, divided by round 1 starting nominal balance.
DEFERRED	=	Indicator equal to 1 (0) for tax-deferred (Roth) retirement plan condition.
HIGH	=	Indicator equal to 1 (0) for high (low) nominal balance condition.

Table 8
Wealth Consumed from Economically Equivalent Account Balances

	DEFERRED HIGH (s.d.)	*ROTH LOW* (s.d.)	Diff.	t	df	p two-tailed
WealthConsumed	15.31% (9.06%)	13.03% (7.09%)	2.28%	1.817	166	0.071
Big-ticket	5.32% (2.19%)	4.66% (2.10%)	0.66%	2.050	176	0.042
Additional Spending	10.21% (7.81%)	8.45% (5.99%)	1.76%	1.641	166	0.103

Where:

WealthConsumed	=	Sum of tax-adjusted spending budgeted over 4 experimental rounds, divided by round 1 starting nominal balance.
DEFERRED	=	Indicator equal to 1 (0) for tax-deferred (Roth) retirement plan condition.
HIGH	=	Indicator equal to 1 (0) for high (low) nominal balance condition.
Big-ticket	=	Amount of *WealthConsumed* on featured items in each experimental round (i.e., refrigerator, washer and dryer set, cruise, home theater system).
Additional Spending	=	Amount of *WealthConsumed* on the annual shortfall, other essential spending (e.g., clothes, personal care, etc.), and other discretionary spending (e.g., gifts, entertainment, etc.) categories.